

WOMEN'S EMPOWERMENT IN THE ENERGY SECTOR



Pictures: © WECF, © Caritas Luweero (top left)

MANUAL WITH CONCEPTS, IDEAS, PROJECTS AND
INITIATIVES FOR DECENTRALISED, RENEWABLE AND
GENDER-JUST SOLUTIONS

03/2022

This report is published by:



Date of publication: March 2022

Disclaimer: This manual seeks to contribute to the empowerment of women in the energy sector by providing concepts, ideas, projects and initiatives for decentralised, renewable and gender-just solutions. Not all of the authors and organisations that have contributed to this report work on all topics or areas covered. The different chapters reflect the opinions of the authors (and their organisations where they have contributed on their behalf) and do not necessarily reflect the positions of the publishing organisations or the other contributing organisations.

Concept and editorial team: Verena Demmelbauer (WECF), Katharina Habersbrunner (WECF), Anja Ireland (WECF), Agnes Mirembe (ARUWE), Marcela Noreña Ospina (WECF)

Acknowledgments: WECF wishes to thank the following colleagues for their feedbacks and support throughout the development of this report:

Betty Namagala (Caritas Kasanaensis, Luweero, Uganda)
Patience Affi (ARUWE, Uganda)
Anuma Getachew (OCFCU, Ethiopia)
Markus Brandhofer (Solarpartner Süd GmbH, Germany)

With support from:



WECF Deutschland
St.-Jakobs-Platz 10
80331 München
Germany
Tel: +49/89/23 23 938 0
wecf@wecf.org

WECF Niederlande
Korte Elisabethstraat 6
3511 JG Utrecht
Netherlands
Tel: +31/30/231 03 00

WECF Frankreich
Cité de la Solidarité
13 Avenue Émile Zola
France
Tel: +33/4/50 834 814

Bank Account WECF e. V.:
Stadtsparkasse München, IBAN: DE68 7015 0000 0013 1390 50, BIC: SSKMDEMM

Table of Contents

Introduction	5
1. Relevance of Gender and Energy	6
2. Gender Tools and Instruments in Energy Projects.....	9
2.1. Gender in the Project Design and Formulation	10
2.1.1. Gender Policy and Country Context Review	10
2.1.2. Stakeholder Mapping and Analysis	14
2.1.3. Gender Analysis.....	17
2.2. Gender in the Project Implementation	20
2.2.1. Gender-Sensitive Communication	20
2.2.2. Monitoring.....	22
3. Sustainable Energy Technologies	23
3.1. Solar Energy.....	23
3.2. Briquettes.....	25
3.3. Biogas	29
4. Energy Business.....	32
4.1. Business Models.....	32
4.1.1. Definition and Relevance	32
4.1.2. Instruments for Designing a Business Model	33
4.2. Business Plan	37
4.2.1. Elements of a Business Plan	37
4.3. From Energy to Business: Creating Business in the Energy Sector	39
4.3.1. Energy Cooperatives	39
4.3.2. Social Enterprises and Energy to Business Models	41
5. Gender Advocacy	43
5.1. Definition and Characteristics	43
5.2. The Policy Cycle	44
5.3. Women's Rights Advocacy	45
References.....	46

List of Figures

Figure 1: Global Energy Potential (Perez & Perez, 2009)	6
Figure 2: Influence of the Stakeholders (Authors)	16
Figure 3: Influence-Interest Matrix, adapted from (Mendelow, 1981)	17
Figure 4: Solar Latern (IndiaMART InterMESH Ltd., 2022)	23
Figure 5: Stand-Alone PV System with DC Load, adapted from (Mertens, 2015)	24
Figure 6: Schematic of Stand-Alone PV System with AC and DC Load, adapted from (Mertens, 2015)	24
Figure 7: Steps in the Briquetting Process (© Creation Energy)	26
Figure 8: Obama Stove for Briquette Usage (Clean Cooking Alliance, 2022)	29
Figure 9: Biogas Plant (Pandey et al., 2021)	31
Figure 10: The Magic Triangle (Gassman, et al., 2014)	33
Figure 11: Building Blocks of the Business Model Canvas (Osterwalder & Pigneur, 2010)	34
Figure 12: Business Model Canvas for Social Enterprises (Vial, 2016)	36
Figure 13: Social Business Model Canvas (Social Innovation Lab, 2020)	37
Figure 14: Energy to Business with Gender Just Energy Communities (Authors)	42

List of Tables

Table 1: Value of the Stakeholders (Authors)	16
Table 2: Strategies for Managing Stakeholders (Brugha & Varvasovszky, 2000, p. 344)	17
Table 3: Gender Analysis Frameworks, authors based on (March, et al., 1999)	18
Table 4: Information Needs of the Stakeholders (Cecelki & Dutta, 2011, p. 88)	20

Introduction

Renewable and decentralized energy solutions hold multiple opportunities and enormous potential for climate protection and social justice. Renewables go hand in hand with all 17 Sustainable Development Goals (SDGs) and can have a massive impact on sustainable development if used in a socially just way. Globally, gender inequality is one of the key issues to combat in the 21st century. The fifth global goal of the SDGs states that gender inequality is not only a human rights issue but a waste of the world's human potential. In this regard, there is growing recognition of the importance of renewable energy as a catalyst for gender equality and women's empowerment. Renewable energies can empower women by enhancing substantive and procedural rights. In gender-just energy projects and programs, women are not merely seen as rights holders but also as critical partners, development actors, experts, investors, and producers and consumers of energy. This allows them to use their variety of skills benefitting their families, communities, and countries socially, ecologically as well as economically.

Decentralized renewable energies can play a significant role in this struggle and strengthen women's self-esteem by enabling them to become active agents and decision-makers in the energy sector. This can be achieved, for example, through energy communities since they are able to promote women's empowerment and gender equality on the community level using their network to raise awareness. Energy communities also use their democratic structures and procedures to involve all members of society, which in turn can be expanded to the national level.

This manual provides information, concepts, and examples of women's empowerment and can act as a guide for local partners, rural women's organisations, NGOs, authorities, decision makers and beyond. It focuses on informing and empowering women about the use of renewable energy technologies decentralized renewable energy approaches, their advantages and potential. Moreover, it provides tools for women to become more familiar in dealing with renewable energy as consumers, producers, traders, or household members.

This manual is divided into five sections addressing gender, energy technologies, energy business, and advocacy. Chapter 1 deals with the nexus between energy and gender. Chapter 2 provides practical guidance on how to use gender instruments and tools in the planning and implementation of energy projects. Chapter 3 provides an overview of the main renewable energy technologies and their potential for the implementation of bottom-up projects. Chapter 4 explains important tools for business planning. Lastly, Chapter 5 gives an insight into the topic of advocacy for gender and energy.

1. Relevance of Gender and Energy

Energy is an essential component of our everyday life and is the engine for social and economic development in the past, present, and future. Energy can take different forms, such as heat (thermal), light (radiant), and electric power. Energy provision is crucial to improve the living standards and to meet the technological needs of the modern world. However, a high dependence of the energy provision on the use of fossil fuels has led to tremendous environmental damage. Meanwhile the share of renewable energy sources is increasing rapidly and providing solutions for underserved communities. However, the development of renewable energy needs pilot projects, markets, business models, awareness, and political frameworks.

Renewable energy uses sources that are continually replenished by natural processes - the sun, wind, water, earth's heat, and plants. They turn these sources into usable forms of energy, most often electricity, but also heat, chemicals, or mechanical power. They depend on energy flows through the earth's ecosystem from the insolation of the sun, as well as the geothermal energy of the earth. Renewable energy sources have been important for humans since the beginning of civilization. For centuries and in many ways, biomass has been used for heating, cooking, steam raising, and power generation, and hydropower as well as wind energy, for movement and later for electricity production. Figure 1 shows the annual global energy potential compared to the total reserve of fossil fuels and uranium.

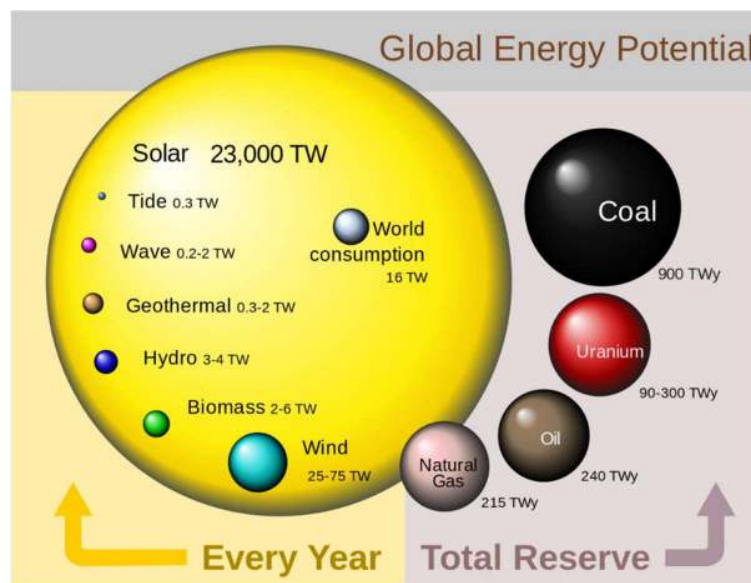


Figure 1: Global Energy Potential (Perez & Perez, 2009)

Access to reliable, affordable, efficient and sustainable energy sources lies at the core of modern energy-related projects due to its close links with socio-economic development, employment creation, and entrepreneurship as well as with improvements in human health, environmental sustainability and gender equality.

Gender is a multidimensional and dynamic concept that refers to the social constructed differences among individuals regarding their attitudes, behaviours, and identities. Those social differences are learnt in different circumstances and conditions and are influenced by historical, religious, economic, and cultural realities. In general terms, gender encompasses the set of norms and relations that determine how individuals are expected to behave and what they can and cannot do. This manual will focus on the differences between men and women as they have traditionally shaped tasks, rights and responsibilities, access to education, health, and finances.

Regarding energy, men and women have distinct roles, access to and control over resources in their households, communities, and society in general; and therefore, have different energy needs, interests, and responsibilities. This implies that the distribution of and the control over energy differs between men and women. Consequently, gender equality has been increasingly recognized as a fundamental element in energy projects as evidence shows that women and girls have been disproportionately affected by the energy deficit due to traditional gender roles and division of labour within the household and the community. Traditionally, women have been the principal users and providers of household energy. In Eastern Africa, women play a vital role as energy producers and managers of energy security for the household and community level as they are responsible for the hardship of collecting and using traditional biomass fuels for cooking and are thereby exposed to dangerous smokes with negative impacts on their health. Furthermore, the collection and transport of fuel represents a labour intensive and time-consuming task.

Increasing access to renewable energy services can make a significant difference in women's lives in terms of their health, workload and time-use, enabling other endeavours such as education and income generation. Provision of lighting, for example, provides the option of extended or flexible working hours, and thereby increases the time available for engaging in income generating activities for women, who often face substantial time constraints due to domestic work obligations. Given an opportunity, women have demonstrated their roles as producers and suppliers of energy products and as service providers. At the same time, access to energy-based technologies such as low-cost domestic appliances, power water wells, drip irrigation systems and labour-saving technologies for agricultural production and post-production, such as grinding and milling, enhances labour productivity and increases the time available for engaging in productive activities outside the household. With access to such technologies, women can increase their incomes and young girls can attend school. (UNIDO, 2014)

Unfortunately, such experiences are still at pilot-level and lack upscaling. Women continue to be an unrealized potential asset for the development of the energy sector. In most settings, women face a variety of constraints to participate in energy markets as producers and operators, as well as in collective action as members of energy producer cooperatives or user associations.

Energy projects that support the use of locally available renewable energy sources for productive uses can provide opportunities for women's entrepreneurship in local enterprises that can deliver reliable energy services based on renewable technologies. Due to their critical role in energy provision and consumption within households, women possess valuable knowledge relevant to sustainable energy solutions. Thus, renewable energy projects can enhance women's economic autonomy and social status, allowing them to earn an income and giving them the opportunity to take part in and drive sustainable development of their local communities. (UNIDO; UN Women, 2013)

The SDG 7 “Affordable and clean energy for all” of the 2030 agenda has established four target areas, namely access to electricity, access to clean fuels for cooking, renewable energy sources, and energy efficiency. A zooming-in of those targets reveals that women and men have different needs and interests and, consequently, different potential impacts in each of those areas.

- Regarding **energy access**, gender disaggregated data shows persistent gaps in household access rates, which is related to structural differences in income levels, access to finance, and location of female households (IEA; IRENA; UNSD; WB; WHO, 2019).
- Currently, around 2.8 billion people depend on firewood, charcoal and plant residuals for cooking and heating. Traditionally, women and girls bear the brunt of hardship as they are responsible for both supplying fuel for cooking and cooking itself. **Affordable access to clean fuels** for cooking and heating would not only reduce women’s arduous physical and time-consuming labour but also limit the exposure to harmful fumes, that affect their health. Moreover, it would represent an opportunity for girls and women to spend more time in education, income-generating work, and social and community activities.
- Affordability and social acceptability of **renewable energy sources** also vary between women and men. In general, women are more likely to accept renewable energy, but prevailing income-gaps make them less able to afford such technologies. Similarly, **energy efficiency** is closely related to affordability and economic factors that widely differ among genders, households, regions and countries. Further gender-related issues have been observed in the structure of the renewable energy sector. A study by IRENA indicates that the share of women in the renewable energy sector is higher than in the traditional one (IRENA, 2019).

A cross-cutting issue to all those targets is the empowerment and participation of women in the energy sector, particularly in decision-making processes across different levels. Women continue to face barriers in energy research, policymaking, business, and consumption. The recognition of women as critical actors in the planning and implementation of projects, programs and policies as well as the adoption of participatory processes are, therefore, essential to tackling major challenges and inequalities in the energy field. Considering differential gender needs, risks and benefits during the project planning and implementation will positively impact many women’s lives in terms of health, time use, education and income generation (Cecelki & Dutta, 2011).

2. Gender Tools and Instruments in Energy Projects

The strategic and comprehensive integration of a gender perspective throughout the operational cycle of a project is known as **gender mainstreaming**. It encompasses the use of diverse tools and instruments to ensure gender equality. The term was introduced into international policy through the Beijing Platform for action in 1995 and it implies taking into account women's and men's different needs, priorities and experiences in the design, implementation and evaluation of policies, projects and programs. The strategy considers not only differences resulting from the historical unequal access to and control over resources and power, but also the national and local context and the intersectionality with factors such as age, ethnicity, class, and sexual orientation.

Gender Mainstreaming encompasses a range of steps along the policy or project cycle:

- Collection of gender disaggregated data and gender analytical information, which provides information about gender differences and inequalities and facilitates the monitoring of differential impact of a policy.
- Promotion of the involvement of women and men in decision-making at all levels to ensure that women's views are heard and considered.
- Context-specific action to promote gender equality.
- Enhancement of organizational capacity building and change, which involves the skills, knowledge and commitment of the people participating in management and implementation.

In the context of energy policy and projects, the incorporation of the gender mainstreaming strategy is relatively new. Even though sound knowledge about the interlinkages between energy and gender exists, the energy planning approach has traditionally been gender blind (Cecelki & Dutta, 2011). Energy access and electricity supply have improved significantly in recent decades. However, a focus on increasing productivity of the industry and commerce – sectors in which men have a higher participation – have led to greater benefits to men than to women. Women particular needs have not been prioritized. Especially women in rural areas bear the burden of undersupply because they are responsible for nearly every aspect of the domestic energy system and their livelihood is likely to depend on activities such as subsistence agriculture and small-scale informal sector that have been neglected by centralized on-grid systems (Escobar, et al., 2017). Therefore, gender mainstreaming in energy projects requires the analysis of those differential roles and needs within the context of community in order to provide solutions with a demand-side approach (UNDP, 2004).

The following sections of this manual will describe some instruments for gender mainstreaming in energy projects, including gender analysis, stakeholder analysis, and gender indicators.

2.1. Gender in the Project Design and Formulation

2.1.1. Gender Policy and Country Context Review

Gender mainstreaming is a long-term strategy that interacts with specific national and sectoral policies. Yet, policies are not static. They are embedded in social, economic and cultural context that determine their effectiveness and capacity to generate changes. Even though supranational and multilateral organizations have strived for the incorporation of gender equality policies at the national level and have established comprehensive guidelines for their planning and implementation, legal frameworks and gender issues widely vary across countries. Thus, an overview of the key gender issues in a country as well as the gender equality and sector-specific policies provide an outline for the subsequent planning stages.

A country context analysis contributes to design and implement gender-sensitive sustainable development projects by identifying how and why an environmental, economic, social, or political issue has differentiated effects on women and men. Furthermore, it shows the potential impacts of the intervention and how it could redress inequalities among groups of people (Cecelki & Dutta, 2011).

The methodological approach for conducting the analysis might vary depending on the availability of information. In some cases, the most relevant issues have already been addressed and the context analysis can be carried out through a desk review using household surveys and technical reports. By contrast, other projects involve interviews with stakeholders with a deep understanding of the local context or technical issues at stake.

Regardless of the method, the following topics should be described in the context analysis:

- Legal system
- Social structure
- Policy and institutional framework
- Economic situation
- Environment and natural resource management

Every aspect should additionally inform about the situation of women and men, focusing on differential access to resources, institutional systems and services and on possible imbalances in the roles of men and women in households, agriculture and the informal sector (Cecelki & Dutta, 2011). Specific and sectoral policies, such as energy and climate policies, should be also examined. Gender issues specific to the subsector where the project is working might shed light on the goals and scope of the project.

If the country context review reveals a disadvantageous situation for women or men, the project should aim to correct this imbalance. Yet, some goals might not be corrective but transformative. Transformative policies do not seek to meet the practical needs of women or men, but to change social, economic, political, or cultural institutions and structures that hamper the achievement of gender equality.

Lastly, the country context review should identify current and potential partner organizations and stakeholders.

Case Study: Overview of the Country Context Review - Uganda

Population: 42.7 million

Capital: Kampala

Languages: Swahili, English, Luganda, and other regional languages

Income: GDP per capita \$2,574 (PPP in 2020) (IMF, 2021)

Economic inequality: Gini coefficient 42.8 (medium) (World Bank, 2020)

Government: democracy

Civil society space: suppressed (Civicus, 2021)

Social Situation: Patriarchal structures and traditional gender norms continue to represent one of the major obstacles to equal rights for women in Uganda. Uganda has ratified the UN Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW) and gender equality programmes, including quotas for parliamentary elections (26.5% of seats in parliament area reserved for women), are in place. The actual number of women in parliament is 157 out of 452 (34.7%). Uganda performs fairly well in terms of political participation, occupying the 35th position worldwide. However, this indicator does not take into account the low level of women's participation in local and regional decision-making bodies.

Uganda has a relatively good economic participation rate by international standards, though the poverty rate is very high. The average gross national income is USD 684 per person per annum. The economic situation of women in Uganda is on the whole poor. Unemployment is very high, amongst young women and men. 70% of the population rely on subsistence farming for their livelihoods. Poor access to reliable and clean sources of energy is a major economic obstacle for women in Uganda.

Young people make up 75–77% of the total population of Uganda. The country performs particularly badly in terms of gender equality in education, in 129th place, with girls representing just 22% of the secondary school population. Youth unemployment sits at 13%, which is high but corresponds to the global average (14% in the EU). The difference lies in the fact that most young people are underemployed with insecure employment conditions: 83% work in the informal economy, the majority in subsistence farming.

National Climate Change Situation: Uganda signed and ratified both the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol (KP) as well as signed and ratified the Paris Agreement. Thus, committing itself to the adoption and implementation of policies and measures designed to mitigate climate change and adapt to its impacts. Uganda's Second National Communication was submitted to the UNFCCC in December 2015. Moreover, Uganda is a party to the implementation of the East African Community (EAC) Climate Change Policy, which requires member states to initiate and develop consistent and harmonized policies and plans to address climate change. Uganda also intends to implement strategies, plans and actions for low greenhouse gas emission development in the context of its development goals. These mitigation and adaptation intentions are based on the country's National Climate Change Policy (NCCP) 2015. Specific activities have been developed on the ground to increase resilience, regarding agriculture, water and urban planning among others.

Furthermore, the Ministry of Agriculture has developed a 10-year Climate Smart Agriculture Program (2015-2025).

National Energy Situation: Only 4% of the rural population has access to the (often unstable) public electricity network. This lack of access to electricity affects not only private households but also (agricultural) businesses and public institutions (e.g. schools and hospitals). There is heavy use of paraffin for lighting and diesel generators for electricity generation, even though both paraffin and diesel are expensive. Energy consumption for cooking is still predominantly dependent on biomass (wood: 78.6%, charcoal: 5.6%, crop residues: 4.7%). One side effect of firewood use is deforestation with irrevocable environmental consequences (forest coverage has dropped from 24% in the 1990s to 7% today). It is primarily men who are active in the formal energy sector, predominantly in large hydropower projects.

National Gender Policy: The policy establishes a clear framework for identification, implementation and coordination of interventions designed to achieve gender equality and women's empowerment in Uganda. The policy is a guide to all stakeholders in planning, resource allocation, implementation, and monitoring and evaluation of programs with a gender perspective. The main goal of the policy is to achieve gender equality and women's empowerment as an integral part of Uganda's socio-economic development

The implementation of this policy is guided by the following principles:

- Gender equality, through the empowerment of women in the development process
- Gender cuts across all sectors and levels, engaging women and men as providers and/or producers or beneficiaries of services
- Affirmative action, redressing the historical and present forms of discrimination against women and girls in the political, economic and social spheres
- Household and family relations, which influences individual participation in and benefits from development processes at all levels.
- Promotion of Gender and Development (GAD) and Women in Development (WID) approaches. The first one is based on the understanding of gender roles and social relations of women and men, with emphasis on the disadvantaged. The WID approach focuses specifically on improving the conditions of women.

Case Study: Overview of the Country Context Review - Ethiopia

Population: 117.8 million

Capital: Addis Ababa

Languages: Afar, Amharic, Oromo, Somali, Tigrinya, and other regional languages

Income: \$264.051.501, 94 (2020) (World Bank, 2020)

Economic inequality: Gini coefficient 35 in 2015 (World Bank , 2020)

Government: democracy

Social Situation: With more than 117 million people, Ethiopia is the second most populous nation in Africa after Nigeria, and the fastest growing economy in the region. However, it is also one of the poorest, with a per capita income of \$850. Ethiopia aims to reach lower-middle-income status by 2025.

In most households, especially in rural areas, roles and responsibilities follow gendered patterns. Men are traditionally seen as the breadwinner and decision-maker in the family. Girls help women with household chores and time-consuming activities such as collecting firewood and fetching water. These tasks are allocated to women on top of being engaged in productive work such as agriculture and livestock rearing, resulting in an unequal work burden. According to the European Commission, harmful practices and stereotypes against women and girls are still common in the country. A girl's primary role is to become a wife and mother, which comes with strict controlling of female sexuality. Girls' abstinence from sex is closely linked to family honour, which affects age of marriage as some families choose to marry their daughters early to reduce the risk of pre-marital sex. Some girls are forced to undergo "virginity testing" before marriage. Wife beating is widely accepted, although there is a trend that it is becoming less accepted, especially among men. According to the Demographic and Health Survey (DHS) by USAID, 63% of Ethiopian women aged 15-49 believe that wife beating can be justified under some circumstances compared with 28% of men.

Economic Situation: Ethiopia's economy experienced strong, broad-based growth averaging 9.8% a year from 2008/09 to 2018/19; Ethiopia's real gross domestic product (GDP) growth rebounded to 9% in 2018/19. Industry, mainly construction, and services accounted for most of the growth. Agriculture and manufacturing made lower contribution to growth in 2018/19 compared to the previous year. Private consumption and public investment explain demand-side growth, the latter assuming an increasingly important role.

Higher economic growth brought with it positive trends in poverty reduction in both urban and rural areas. The share of the population living below the national poverty line decreased from 30% in 2011 to 24% in 2016. Between 2016 and 2020, the government implemented its Growth and Transformation Plan (GTP II). The GTP II aimed to continue expanding physical infrastructure, including energy and renewable energy targets, through public investments and to transform the country into a manufacturing hub.

National Climate Change Situation: In the Paris Agreement, Ethiopia ratified to reduce its greenhouse gases by 64% by 2030. Agriculture is a major source of emissions in the country. Since the 1990s, the resulting emissions have doubled. This is mainly due to the growth of livestock, as they generate a high proportion of emissions through their digestive processes. However, arable farming and intensive grazing also have a large share. Since the upper, humus-rich layer of soil is usually removed, the agricultural suitability of the land is reduced, and a large proportion of the CO₂ is emitted into the atmosphere. To reduce the high emissions, experts see potential in combating soil degradation in the country by rebuilding soil organic carbon. However, livestock farming, and cattle feed cultivation are also levers for reducing greenhouse gases. Nevertheless, at the moment, there are hardly any studies and research in the country that offer solutions (Schierhorn & Müller, 2020).

National Energy Situation: The three main energy carriers in Ethiopia are refined oil products (diesel, gasoline, and kerosene), electricity (from solar radiation, water, wind, heat) and bioethanol (from sugarcane). Bioethanol was not produced in substantial quantities until very recently; it makes up 0.4 TWh annually (2017). Electricity is about to replace diesel as the main energy carrier in Ethiopia – but taken all refined oil products altogether (38.5 TWh in 2014), electricity (22.5 TWh in 2016) will still take a few years before it will surpass oil products as main energy carrier. Both the amount of imported refined oil products and the produced electricity are

increasing—but the growth rate for electricity is much higher than that for refined oil products. Ethiopia has a final energy consumption of around 40,000 GWh, whereof 92 % are consumed by domestic appliances, 4 % by transport sector and 3 % by industry. Most of the energy supply thereby is covered by bioenergy, which in case of domestic use is usually stemming from unsustainable sources. The produced electricity of ~ 9000 GWh/a is mainly generated by hydro energy (96 %) followed by wind energy (4 %), whereof in total 11 % are exported. In contrast the major share of energy supply for transport is imported in forms of petroleum. Ethiopia is endowed with renewable energy sources. These include, first of all, hydro, but also wind, geothermal, solar as well as biomass. Only a small portion of the potential is harnessed as of today. Due to its fast economic growth the energy demand is increasing enormous. Therefore, it is expected to rise by a rate of 10 -14 % per year till 2037. Today only 27 % of the population has access to an electricity grid. This share is increasing due to an extension of the national grid on the one hand and an increasing number of stand-alone-systems and mini-grids on the other hand.

For many rural communities there is no immediate prospect of being connected to the central electricity grid, and other commercial energy sources are often too expensive for low-income households. However, many rural areas do have local access to other sources of energy, such as solar energy, water streams, wind, and biomass. In 2016, the per-capita consumption of electricity in Ethiopia remains relatively low at about 770 kWh per year (Our World in Data, 2020). The national energy balance is dominated by a heavy reliance on traditional biomass energy sources such as wood fuels, crop residues, and animal dung.

The energy consumption in urban Ethiopia is hydroelectric and thermal plants which will be used for industrial development and productive and efficient centres.

National Gender Policy: Ethiopia has made progress towards gender equality such as reducing the education gap between boys and girls and increasing the representation of women in politics. Moreover, the legal framework of the country is consistent with international legal instruments on gender equality, such as the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Beijing Platform of Action. The Ethiopian constitution states that women have equal rights with men. However, Ethiopia remains a highly patriarchal society where women are disadvantaged to men. Ethiopia's rank as 117th country out of 149 on the Global Gender Gap Index, which indicates that gender inequality is pervasive. Women's experiences vary between different ethnic groups and are influenced by socioeconomic positions, where women affected by poverty often face multiple disadvantages. Ethiopia has in recent years experienced both climatic challenges (droughts) and civil conflicts, which have worsened pre-existing inequalities such as increasing women's unpaid labour, as well as created challenges such as gender-based violence (GBV) in temporary settlements and conflict-related sexual violence.

2.1.2. Stakeholder Mapping and Analysis

The European Institute for Gender Equality (EIGE) defines stakeholders as those actors who “deliver, influence, are impacted by and benefit from a policy and/or project” (EIGE, 2020). They are also defined as “parties with an interest” and can include individual, organizations, networks, public authorities, and individuals within organizations. The stakeholder analysis is a process that aims to identify the characteristics (behaviour, intentions, interrelations, and interests) of stakeholders

regarding a project or policy to determine their potential influence on decision-making and implementation (Brugha & Varvasovszky, 2000).

Part of this process can be the stakeholder mapping. This is a method, which often relies on visual tools, to clarify and categorize the various stakeholders by drawing pictures of who the stakeholder groups are, which interests they represent, the amount of power and influence they possess and whether they represent inhibiting or supporting factors for the project's/policy's objectives.

The project team (or team of policy developers) is responsible for the analysis, but it is a joint and collaborative process requiring gender and diversity expertise within the team and cooperation with relevant experts.

The analysis is commonly conducted following a four-steps process:

1. Identifying and Collecting Data about Stakeholders: Looking for potential actors with an interest in the policy or project because they either are affected by the issue or can bring their influence to bear on the implementation. Based on preliminary information from the country context review, an initial list of stakeholders can include:

- Government agencies (national to local if relevant),
- Bilateral and multilateral development partners,
- National and local NGOs and initiative groups (special attention needs to be paid to those representing poor and/or marginalised groups), but also others interested and involved,
- Business and private service providers,
- Universities/research institutes,
- Religious leaders,
- Stakeholders who are working on men's and women's issues related to the specific area of the planned programme/activity, e.g. vulnerability, adaptation, mitigation and emissions reduction,
- Women and men representing specific sector interests, e.g. agriculture, fisheries, forestry, manufacturing, service, economic development, and business.

A typical visual exercise in order to identify stakeholders and how they relate to each other is the "circle of influence". This tool is helpful, for instance, to identify stakeholders through participatory approaches and can be developed during a community meeting. The aim is to find who actively takes part in community life and decision-making in terms of gender and social status. It includes institutions within the community but also external actors and groups. By jointly drawing circles depicting individual stakeholders or groups of stakeholders is also possible to determine how the different stakeholders relate to each other in terms of contact (frequency and intensity), cooperation, information flow and provision of services.

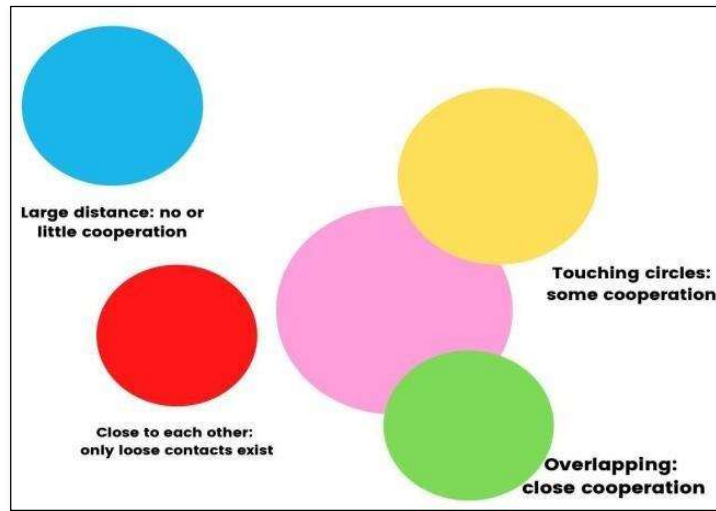


Figure 2: Influence of the Stakeholders (Authors)

2. Analysing: It consists of constructing tables, matrices, maps or other tools to determine stakeholders' relevance, experiences and perspectives as well as their relation to each other. The following criteria can provide guidance in the process:

- Contribution to the subject issue/expertise (value)
- Willingness to engage
- Influence (in which direction) (value)
- Necessity of involve (value)

The value of the stakeholder can be presented in a table, as following:

Table 1: Value of the Stakeholders (Authors)

SH	Contribution	Willingness	Influence	Necessity to involve
SH1	High (knowledge in energy efficiency)	Low (not affected by EE project in this specific region)	High	High

3. Prioritizing: It implies categorizing the stakeholders according to their interest and influence on the policy/project. The influence-interest matrix can help to develop an understanding for the engagement level.

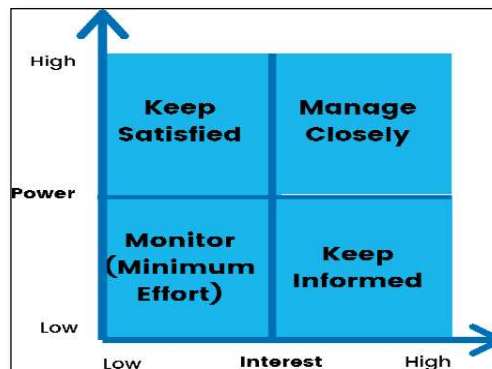


Figure 3: Influence-Interest Matrix, adapted from (Mendelow, 1981)

4. **Engaging with Stakeholders:** Once the stakeholders have been prioritized, the project team needs to establish contact with the stakeholders and to develop a strategy for managing their needs and interests, that is, how much and what kind of attention to give to them. Brugha & Varvasovszky (2000) argue that the engagement step involves establishing an optimal 'fit' for every stakeholder depending on their position in the project (supportive, mixed, non-supportive, and marginal). Using a different strategy might lead to missed opportunities for gaining support or even pose the project at risk.

Table 2: Strategies for Managing Stakeholders (Brugha & Varvasovszky, 2000, p. 344)

Strategies Positions	Involve	Collaborate	Defend	Monitor
Supportive	Optimal fit	Missed opportunities	Missed opportunities	Missed opportunities
Mixed	Risk	Optimal fit	Missed opportunities	Missed opportunities and risk
Non-supportive	Risk	Risk	Optimal fit	Risk
Marginal	Resource waste	Resource waste	Resource waste	Optimal fit

2.1.3. Gender Analysis

The integration of a gender perspective into policies, programmes and projects requires an analysis of the specific gender issues in a particular context. The gender analysis is a practical and systematic tool that identifies, examines and assesses the differences between women and men (and boys and girls) in a wide range of aspects, including roles, rights, needs, opportunities, constraints and power (UNIDO, 2014; EIGE, 2018; Hunt, 2004). In this sense, a gender analysis makes it possible to pinpoint the potential impacts of an intervention on men and women and on gender relations and, therefore, contributes to gender responsiveness of policies and projects (EIGE, 2018).

There exist different frameworks for carrying out the analysis. The frameworks differ in their scope and emphasis. Thus, the choice of the most suitable one depends on the priorities, tasks, contexts, and resources of the project. Table 3 summarizes some well-known frameworks.

Table 3: Gender Analysis Frameworks, authors based on (March, et al., 1999)

Framework	Main Features	Components
Harvard Analytical Framework	<ul style="list-style-type: none"> - Focus on data at the micro-level (community and households). - It describes who does which activity, who has access to and control of resources and the influence on gender roles 	<ol style="list-style-type: none"> 1) Activity profile (who does what) 2) Access and control profile (who has access to and control over resources) 3) Influencing factors (what factors shape and determine the differences) 4) Checklist for project cycle analysis
Moser Conceptual Framework	<ul style="list-style-type: none"> - Distinction between two types of gender needs: practical and strategic gender needs - Emphasis on women's triple role (reproductive, productive and community work). 	<ol style="list-style-type: none"> 1) Gender role identification 2) Gender needs assessment 3) Control of resources and decision-making within the household 4) Planning for balancing the triple role 5) Distinguishing between different aims in policy interventions 6) Involving women and gender-aware organisations in planning
Gender Analysis Matrix Framework	<ul style="list-style-type: none"> - Community-based technique for identifying and analysing gender differences. 	<ol style="list-style-type: none"> 1) Analysis at four levels of society (women, men, household, community) 2) Analysis of four kinds of impacts (labour, time, resources, socio-cultural factors)
Capacities and Vulnerabilities Approach (CVA)	<ul style="list-style-type: none"> - Focus on how capabilities and vulnerabilities determine the effect that a humanitarian crisis will have on people and how they will respond to it. 	<ol style="list-style-type: none"> 1) Categories of capacities and vulnerabilities (physical, social or organizational, motivational and attitudinal, 2) Additional dimensions of "complex reality" (disaggregation of data by gender and social relations, change over time, interactions between categories of analysis and

		analysis at different scales and levels of society)
Women's Empowerment (Longwe) Framework	- Based on the notion of five different 'levels of equality'	<ol style="list-style-type: none"> 1) Levels of equality (control, participation, conscientisation, access, welfare) 2) Level of recognition of women's issues (neutral, positive, negative)
Social Relations Approach	<p>- It uses concepts rather than tools to concentrate on the relationships between people and their relationship to resources and activities</p> <p>- Focus on the role of institutions such as the state, market, community, and family</p>	<ol style="list-style-type: none"> 1) Development as increasing human well-being 2) Social relations 3) Institutional analysis (analysis of rules, activities, resources, people and power at the state, market, community, and family levels) 4) Institutional gender policies 5) Immediate underlying and structural causes

Regardless of the selected framework, a gender analysis entails at least three stages: data collection, analysis of information, and integration of the findings into policies, programs and projects.

- **Data Collection:** using existing qualitative and quantitative gender-disaggregated data and identifying further needed information.
- **Analysis of the Information:** identifying gender differences and the underlying causes of inequalities. In this stage, it is key to identify and assess the decision-making power, access to resources and control over resources, barriers and constraints on participation and risk and consequences of gender mainstreaming (EIGE, 2018; UNIDO, 2014).
- **Integration of the Findings into the Project:** developing strategies to promote gender equality throughout the project cycle. It includes assessing partner capacity for gender sensitive planning; assessing the potential of the project to empower women, address strategic gender interest and transform gender relations; and developing gender-sensitive indicators (Hunt, 2004).

Some key issues to consider when conducting a gender analysis are:

- Direct and indirect target of the proposed policy, program or project
- Groups that might benefit from the project
- Consultation with women and men regarding the solution of challenging issues and involvement in the development of the solution
- Specific mechanisms to encourage and enable women to participate in the policy initiative or programme
- Roles and activities of men and women

- Access to and control of resources, services, and decision-making
- The extent to which the policy, programme or project potentially challenge the existing division of tasks, responsibilities and resources among men and women
- Socioeconomic context, structural factors (demographic, legal and institutional) and by cultural and religious aspects that shape activities, access, and control
- Opportunities or entry points for change

2.2. Gender in the Project Implementation

Gender-sensitive projects and policies focus on increasing the participation of women in the implementation phase. To achieve this goal, it is crucial to institutionalize the process, i.e., to develop an enabling framework within the project or organization to act on the recommendations arising from the design phase (Cecelki & Dutta, 2011). In this context, gender-sensitive implementation starts with the selection and training of the implementation team: it is important to ensure a gender balance in the project staff, to offer training on specific gender issues and, if possible, to ensure the participation of a gender expert (UNIDO, 2014).

The gender perspective is also to be considered in the continuous processes of communication and monitoring.

2.2.1. Gender-Sensitive Communication

In the planning period and during the implementation, communication is key to effectively engage all stakeholders. Communication, understood as the “practice of producing and negotiating meanings” (Schirato & Yell, 1997, p. 21), is a dynamic process that shapes attitudes and behaviours of the involved participants. During a project, the implementation team communicates with different target groups and their communication needs widely vary. Therefore, strategies, tools and channels need to be adapted to the particularities of each group. ENERGIA summarizes the different information needs regarding gender as follows:

Table 4: Information Needs of the Stakeholders (Cecelki & Dutta, 2011, p. 88)

Target Group	Information Needs
Project Management	<ul style="list-style-type: none"> • Need to know about the overall approach for identifying and addressing gender issues • Need updating on results and impacts on project efficiency and outcomes (information in a form that can be shared with outsiders including donors) • Need to track and monitor
Project Staff	<ul style="list-style-type: none"> • Need to understand how to apply mainstreaming strategies, what specific activities are planned, what are individual roles and responsibilities • Need to understand what gender mainstreaming is, its benefits and what are the roles and responsibilities of each stakeholder/partner

Project Beneficiaries	<ul style="list-style-type: none"> • Need to be clear on what they can expect from the project (how would women and men benefit), what their roles and responsibilities are, how they would participate
Policy Makers and/or Donors	<ul style="list-style-type: none"> • Need to see visible and measurable impacts using gender-aware strategies and approaches in projects they support, how this can contribute towards improving the overall project performance, and how to adapt the generic gender mainstreaming strategy and encourage future projects to adopt it
Development Community (other Project Practitioners/ Project Designers/ Academics/ Research Institutions)	<ul style="list-style-type: none"> • Good practices and lessons in mainstreaming gender for application in energy projects, as well as relevance for other sectors • Concrete tools and approaches for integration into project processes

Gender-sensitive language is also of paramount importance within the communication strategy. It implies addressing “women and men – and those who do not conform to the binary gender system – as persons of equal value, dignity, integrity and respect” (EIGE, 2019, p. 9). Channels, words and images need to be carefully reviewed, so that they do not reproduce and perpetuate gender stereotypes and prejudices.

Some aspects to consider in order to communicate in a gender-sensitive way:

- The chosen words might foster (unconscious) stereotypes against one gender, demean, ignore or subordinate women or men. Examples are the use of masculine pronouns, nouns and adjectives as generic and universal, or the association of women with discriminatory words such as hysterical, hormonal, or bossy. To avoid them, it is key to be aware of the existing stereotypes and consider strategies according to the type of language – natural gender, grammatical gender or genderless.
- Beyond the words, the circumstances in which communication takes place shape power and social relations. Evidence shows that in many contexts women’s opinion are less heard than men’s and, as a result, women often feel less able to express themselves in public. In general, the content (what is message), the sender (who speaks), the place (where the communication takes place) should ensure that women and men are represented, and their voices can be heard.
- Images serve as a vehicle for stereotypes and might reinforce traditional gendered division of labour, roles and responsibilities. Depicting women and men in traditionally assigned roles and profession contributes to the reinforcement of gender inequalities.
- Access to and control over communication channels might vary among men and women. For example, women are less likely to have access to information and communication technologies (ICTs) due to economic constraints. Thus, it is important to identify which channels are socially inclusive in a particular context.

Overall, a gender-sensitive communication strategy should be guided by the following principles:

- Ensure that women and men are equally and actively represented in images, messages and advertisement pieces.
- Challenge gender stereotypes and inaccurate assumptions about women and men.
- Avoid exclusionary forms such the use of he/his when referring to both men and women
- Identify socially inclusive channels
- Tailor messages and channels to the local needs

2.2.2. Monitoring

Monitoring is an integral part of the project implementation. It is a continuous process that helps to determine to what extent the targets have been met and to identify and tackle emerging problems during implementation. Regarding gender, monitoring aims to measure whether the project is reaching women and men, addressing their differential needs and removing existing participation barriers. Gender disaggregated data and gender-responsive indicators are key during this phase.

The issues covered by the monitoring processes are manifold and include:

- Women's and men's participation in the project activities (share)
- Activities impact on women's empowerment
- Activities that target women
- Identified gender gaps -and gender-related project successes
- Mitigation measures for negative impacts (for example increased workload)
- Enhancement measures of positive impacts
- Perceptions about the impact of the activity (UNDP, 2004)

An indicator is defined as “a fact, figure or a perception that enables measurement of a change in a situation or condition and which confirms progress towards achievement of a specific result” (Cecelki & Dutta, 2011, p. 79; BMI Lab, 2020). Gender-responsive indicators are those that present gender disaggregated data in order to track progress and changes in the relations between men and women and differing impacts in an established period. The use of both quantitative (changes over time presented in terms of numbers, percentages or ratios) and qualitative (changes in opinions, perceptions and attitudes over time) indicators is recommended.

The SMART framework has become the most used tool for developing indicators. According to this framework, indicators should be

- Specific – it narrowly and accurately describes what will be achieved
- Measurable – changes should be countable or at least observable
- Achievable – it is realistic to expect the targets to be attained
- Relevant – the indicator is closely linked to the relevant outcome
- Time-bound – it clearly specifies by when the indicator will be achieved

In energy projects some relevant indicators are related to the access to energy, participation in decision-making bodies, changes in domestic workloads, productive use of the energy source, benefits of the energy service.

3. Sustainable Energy Technologies

3.1. Solar Energy

Photovoltaic (PV) technology converts sunlight into electricity. Photo means “light” and voltaic means “electric”. The amount of energy that can be produced is directly dependent on the sunshine intensity. Thus, for example, PV devices can produce electricity even in winter and even during cloudy weather although at a reduced rate. Some applications for PV systems are lighting for commercial buildings, outdoor (street) lighting, rural and village lighting etc. Solar electric power systems can offer independence from the utility grid and offer protection during extended power failures. Solar PV systems are found to be economical especially in the hilly and far-flung areas where conventional grid power supply is expensive to reach. Solar PV includes the following devices and technologies:

Solar Lantern

Solar photovoltaic powered lights called solar lanterns are an alternative solution to village lighting needs. A typical solar lantern consists of a small photovoltaic module, a lighting device, a high frequency inverter, battery charge controller and appropriate housing. During daytime, the module is placed at a sunny place and is connected to a lantern through a cable for charging. The expected life of the lamp is 3 to 5 years.



Figure 4: Solar Lantern (IndiaMART InterMESH Ltd., 2022)

Solar Home Systems

Solar Home Systems (SHS) can either be independent of the utility grid (stand-alone) or connected to the utility grid (grid connected). This manual only considers the stand-alone systems.

Stand-alone PV systems are usually composed of 1-2 PV panels and are meant to operate independent of the electric utility grid. They are generally designed and sized to supply certain direct current (DC) loads. The amount of energy available to the user from the PV panels can be calculated. The simplest type of stand-alone PV system is a direct-coupled system, where the DC output of a PV module or array is directly connected to a DC load (as illustrated below). If there is no electrical energy storage (batteries) in the direct-coupled system, the load only operates during sunlight hours, making these designs suitable for common applications such as mobile charging, ventilation fans, water pumps, and small circulation pumps for solar thermal water heating systems.

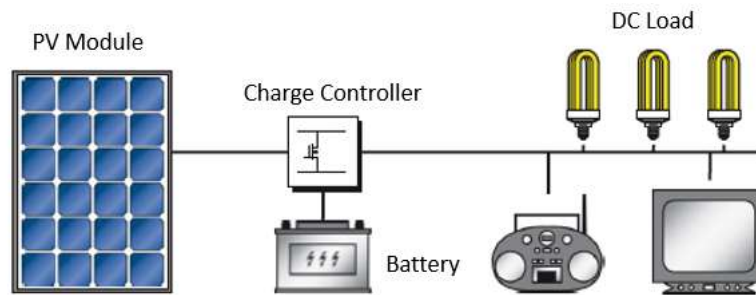


Figure 5: Stand-Alone PV System with DC Load, adapted from (Mertens, 2015)

In many stand-alone PV systems, batteries are used for energy storage. The figure below shows a schematic of a typical stand-alone PV system powering direct current (DC) and alternating current (AC) loads. A charge controller manages the energy flows and prevents overcharging of the battery, which can reduce battery performance or lifespan. The inverter is needed to transform DC from the battery to AC for the monitor.

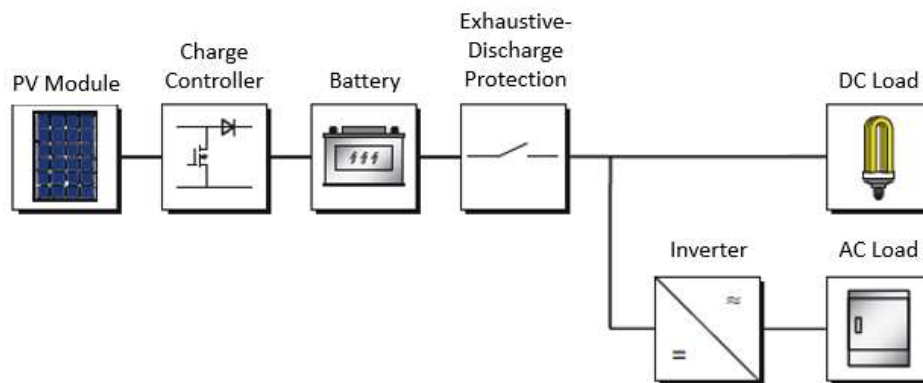


Figure 6: Schematic of Stand-Alone PV System with AC and DC Load, adapted from (Mertens, 2015)

Solar Home System Sizing

In this unit, system sizing includes

- Introduction to System Sizing
- A Sample Design Situation
- Steps in System Sizing Process

The concept considers precisely the needs of the users and plans the dimension and installation accordingly. A household with 6 members and devices like a water pump and refrigerator has different electricity needs than a household with 3 members and devices like TV and mobile phones. After system sizing is conducted and construction is planned, in a first step the installation can be accomplished, which comprises the following steps:

- Site Assessment (where to install, roof inspection, weight)
- Preparation for Installation
- PV Array Installation
- Connection of the Charge Controller
- Battery Installation
- Installation Assessment and Final Checklist and Start-Up of the PV-System

During the use of solar home systems following maintenance tasks are necessary to ensure an efficient, sustainable and safe operation:

- It should be guaranteed that there is no shadow on the solar panel.
- Depending on the air quality, the solar panel must be cleaned regularly with a wet cloth. In case of dust, a clean (dry) cloth can be used to wipe it.
- During cyclone/heavy storm, the solar panel must be taken off from the roof and kept inside the house safely.
- The charge controller needs to be checked and cleaned regularly.
- The level of electrolyte of the battery should be checked every 30 days.
- The battery must be kept on a wooden plate.
- No flammable item is allowed close to battery.
- Security regulation must be considered and trained, e.g. not touching both poles of the battery at the same time.
- Regular check by experienced solar companies will guarantee long standing electricity production.

3.2. Briquettes

Briquettes can be described as a fuel derived from compacting biomass into a dense block. It is cheaper, requires no other raw material and produces heat equivalent compared to other fuels like firewood or charcoal. Nowadays, biomass briquetting is applied in the same industries where low-density biomass is produced. The briquettes are produced using biowaste (e.g. agricultural waste), which is available in abundance and at low or no cost and therefore offer great potential to replace or supplement traditional energy sources. This results in a variety of economic, environmental and social benefits, such as job creation, economic empowerment, money saving through lower prices of briquettes compared to firewood or charcoal, the use of local agricultural residues, efficient burning rates, reductions of deforestation and environmental pollution through reduced use of firewood, time savings through elimination of wood collection, reduced health risks due to less indoor pollution and emissions.

Raw Material for Briquetting

Almost all agro-residues can be briquetted. Agro-residues such as saw dust, rice husk, tapioca waste, groundnut shell, cotton stalks, soybean stalks, mustard stalks, sugar cane bagasse, wood chips, castor husk, coffee husk, dried tapioca sticks and coconut shell powder can be briquetted individually and in combination with or without using binders.

Factors Influencing the Selection of Raw Materials

The factors that mainly influence the selection of raw materials are their moisture and ash content, flow characteristics as well as particle size and availability in the locality. Moisture content in the range of 10-15% is preferred because high moisture content will pose problems in grinding and more energy is required for drying. Biomass feedstock having up to 4% of ash content is preferred for briquetting.

Briquetting Process

The series of steps involved in the briquetting process are described below and in Figure 7.

The collection and preparation of raw materials includes drying, size reduction, mixing of raw materials in correct proportion, and mixing of raw materials with binder. The raw materials are available in higher moisture contents than required for briquetting. Drying can be done in open air (sun), in solar driers, with a heater or with hot air. It is desirable to make briquettes of more than one raw material. Mixing will be done in proper proportion in such a way that the product should have good compaction and high calorific value. The process of carbonizing, crushing and adding binders (starch, molasses) depends on the briquetting technology adopted. The compressing process takes place inside the briquetting machine. Slicing into pieces and drying the briquettes are final steps before they are packed for distributing and selling.

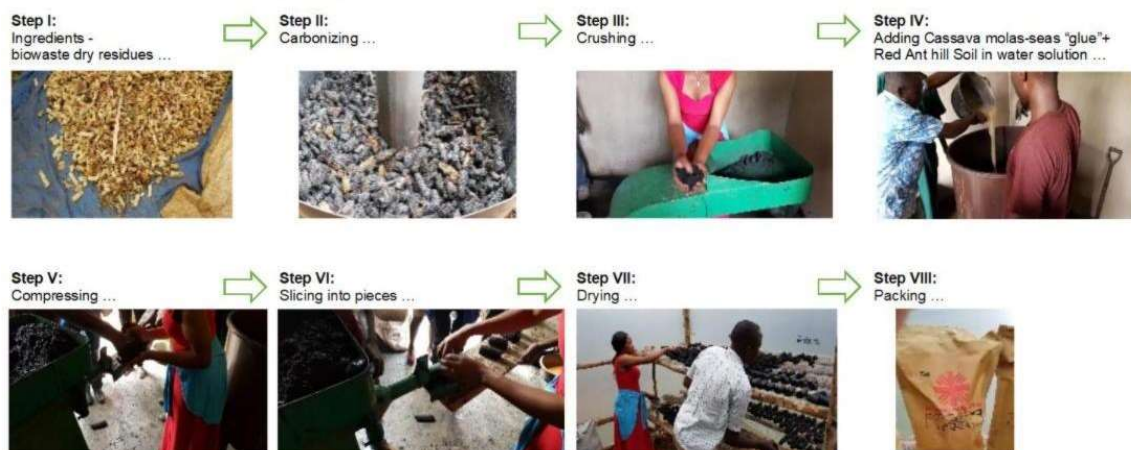


Figure 7: Steps in the Briquetting Process (© Creation Energy)

Advantages of Agro-Residual Briquettes

- The process of briquetting increases the net calorific value of material per unit volume (high energy density of briquettes)
- Easy to transport and store
- Uniform in size and quality
- Helps solve the problem of residue disposal
- Helps to reduce deforestation by providing a substitute for fuel wood
- Cheap and easy to produce, different technologies and machines are applied
- Generates income and employment opportunities

- More efficient burning rate than firewood
- Mitigates climate change through lower emissions
- Contributes to managing solid waste
- Reduced health risks and safe to use indoors
- Increased safety of women and children

Necessary Requirements to Start a Briquette Production Unit

- Space requirement: Sufficient space is required for starting a briquette production unit to store the raw materials for briquetting and produced briquettes.
- Raw materials: Continuous availability of raw materials is a major factor for profitable briquette production.
- Drying facility to dry raw materials: The moisture content of the commonly available raw materials is usually too high. Therefore, any of the drying technologies such as solar driers/ heaters/ hot air generator systems are required to bring down the moisture content to a desirable level for briquetting.
- Shredding machine: A shredding machine with a minimum of a 5 horsepower motor is required to powder the agro-residues for briquetting.
- Briquetting machine: A high pressure hydraulic piston press type briquetting machine is required to produce briquettes from agro residues.

Good Practice: Gender Justice and Renewable Energy - Briquette Production

In the current set-up, ARUWE and Caritas with technical and financial assistance from WECF are facilitating cooperatives to increase the local value chain by producing briquettes and empowering women cooperatives. This process was designed after a needs assessment of the prevailing energy demand of the communities. The assessment pointed out a high demand for practical trainings and diversification of alternative renewable energy (RE) technologies. A key focus area of trainings has been 'development of business activities and productive use of RE' at both cooperative and household levels. In particular, the commercial production of briquettes is considered a viable business. The briquettes are produced using biowaste which is available in abundance and at low cost and therefore offers great potential to replace or supplement indigenous energy sources. This results in multiple economic, environmental and social benefits and allows women to develop business models on local level. In particular, the interest among female cooperative members to produce, consume and sell briquettes is very high. Many members have started to produce briquettes manually. Building on these rudimentary efforts, ARUWE intervened and introduced a professional briquette machine to improve production. As a result, many female cooperative members adopted the technology and market-oriented production and share the technology. Caritas facilitates continuous trainings, product improvements and market linkages. The project involves 4 cooperatives serving approximately 5,000 members. ARUWE and Caritas are approaching women in particular to become energy entrepreneurs.

Examples from Ethiopia

In Ethiopia most households use firewood as a source of energy for food preparation. A study by Afribiomass shows that briquettes, compared to firewood, can have almost double the fire power measured in watts. Several studies by GIZ have assessed and confirmed the functionality of briquettes, such as sesame straw briquetting in Tigray as well as sawmill dust briquetting in Oromia region.

Technical Equipment for Briquette Production

- **Single Drum Carbonizer**

These are optimum sized circular metal kilns with conical tops made of for instance 2 mm thick sheet metal. The tops have air inlets that can be closed or opened at will to control air flow. A total one-day production consists of one full cycle and could produce up to 1000 kg char.

- **Double Drum Carbonizer**

A double drum carbonizer is for instance made from 2 mm thick sheet metal with a 4 cm gutter. Inside the drum a perforated cone with a chimney and external inverted cone is placed. The covering lid provides a water seal. A total one-day production consists of one full cycle and could produce up to 1000 kg char.

- **Hammer Mill Crushing Machines**

Hammer mill is used for grinding the raw material. The hammer mill must ensure the flow of air to evacuate the shredded material by itself (no additional fan is required).

Depending on the machine, the char should be crushed to small pieces to about 1-2 mm size with 10-20% fines in order to enhance their workability and compactness. Hammer mill is employed to reduce the particle size of the feed material with a production capacity of for instance 100 kg/per hour.

- **Extruder Pressing Machine**

The charcoal extruder is designed and manufactured to produce small sized briquettes of for instance 20 mm diameter, producing several charcoal briquettes at a time. The case and parts of the extruder are made from sheet metals, square pipe and angle iron. The extruder is a screw type press, made of a sheet metal which is welded on a solid steel shaft, designed to produce high density briquettes. Depending on the machine, the raw material is mixed thoroughly and transported to the end of the extruder. Since the end of the extruder is a type of circular die with holes, the materials can be pressed against those holes to produce a compact and uniform size briquettes.

- **Hand Press Machines**

Hand moulding requires a 5 kg weight to tap the mixture into the mould. This, however, does not produce a high briquette density. Estimated moulding pressure may vary between 2-3 kg/cm². One person can make about 30 briquettes per hour with hand moulding, provided that the charcoal-clay mix or paste is ready.

Example of Stoves for Briquette Usage

Mirchaye/ Obama (beehive briquette stove) is an improved cooking stove as shown in Figure 8. The combustion chamber of the stove is made of ceramic and cladded with sheet metal. The efficiency of the stove in terms of fuel saving is about 30% in comparison to a traditional charcoal stove.



Figure 8: Obama Stove for Briquette Usage (Clean Cooking Alliance, 2022)

3.3. Biogas

Biogas is a combustible gas produced by anaerobic digestion of organic materials. Raw material required includes organic plant and animal matter, such as animal dung, poultry waste, plant waste (husk, grass, weeds etc.), human excreta, industrial wastes (saw dust, waste from food processing industries) and domestic waste (vegetable peels, waste food materials). The material is required to have a certain water content, which needs to be added to dry matter. During the anaerobic digestion process, 65% methane (CH₄), 35% carbon dioxide (CO₂), and traces of hydrogen sulphide (H₂S) are produced as by-products.

The gas is only combustible if the quantity of methane in the mixture is above 50%. After these organic materials have been digested, they go out as slurry, which is a rich fertilizer for agricultural production.

Ideal Conditions for Biogas Production

- Temperature: 20-35° C
- pH level (neutral)
- Retention time 40-60 days
- Dilution 1:1 (dung:water) (depending on which organic matter is used)

Selection of Site for Installation of a Biogas Plant

- The distance between the plant and site of gas consumption or kitchen should be small to minimize cost on gas pipeline and gas leakage.
- It should be near the cattle-shed to minimize the distance of carrying cattle dung and transportation cost.
- There should be enough space for storage of digested slurry or construction of compost pit.
- It should be at least 10 to 15 meters away from any drinking water well to prevent contamination of water.
- The area should be free from roots of trees which are likely to creep into the digester and cause damage.
- It should be open to receive the sun's rays for most part of the day to keep the plant warm. The sunlight should fall on the plant as temperatures between 15°C to 30°C are essential for gas generation at good rate.
- It should be on an elevated area so that the plant does not get submerged during normal rains.
- Sufficient space must be available for day-to-day operation and maintenance. As a guideline 10 to 12 m² area is needed per m³ of gas.
- Plenty of water must be available as the cow dung slurry with a solid concentration of 7% to 9% is used.

Uses of Biogas

- Domestic fuel
- For street lighting (gas lamp)
- Generation of electricity (with biogas generator)
- If compressed, it can replace compressed natural gas for use in vehicles

Advantages of Biogas

- Calorific value high enough to be used for cooking and lights
- Clean fuel
- No residue produced
- No smoke produced
- Non polluting
- Economical
- Can be supplied through pipelines or backpacks
- Burns readily - has a convenient ignition temperature
- The bio-manure in the form of digested slurry is reusable

Construction Material for Biogas Plant

For the construction of biogas plants bricks, cement, sand, concrete, and pipes are needed. There are several types of biodigesters. However, this manual only considers the fixed dome digester (see Figure 9).

The various forms of biomass are mixed with a defined quantity of water in the mixing tank. This forms the slurry. The slurry is fed into the digester through the inlet chamber. When the digester is partially filled with slurry, the introduction of slurry is stopped, and the plant is left unused for about two months. During these two months, anaerobic bacteria present in the slurry decompose or ferment the biomass in the presence of water. As a result of anaerobic fermentation, biogas is formed, which starts accumulating in the dome of the digester. As more and more biogas forms, the pressure exerted by the biogas forces the spent slurry into the outlet chamber. From the outlet chamber, the spent slurry overflows into the overflow tank. The spent slurry is manually removed from the overflow tank and used as manure for plants. The gas valve connected to a system of pipelines is opened when a supply of biogas is required. To obtain a continuous supply of biogas, a functioning plant can be fed continuously with the prepared slurry. Figure 9 shows the basic mechanism for a biogas power plant. The partners in Uganda, ARUWE, have developed a biogas digester built with weaved bamboo. This is an example of a sustainable way of construction using local material and additionally applying traditional techniques of weaving bamboo to achieve a stable tank.

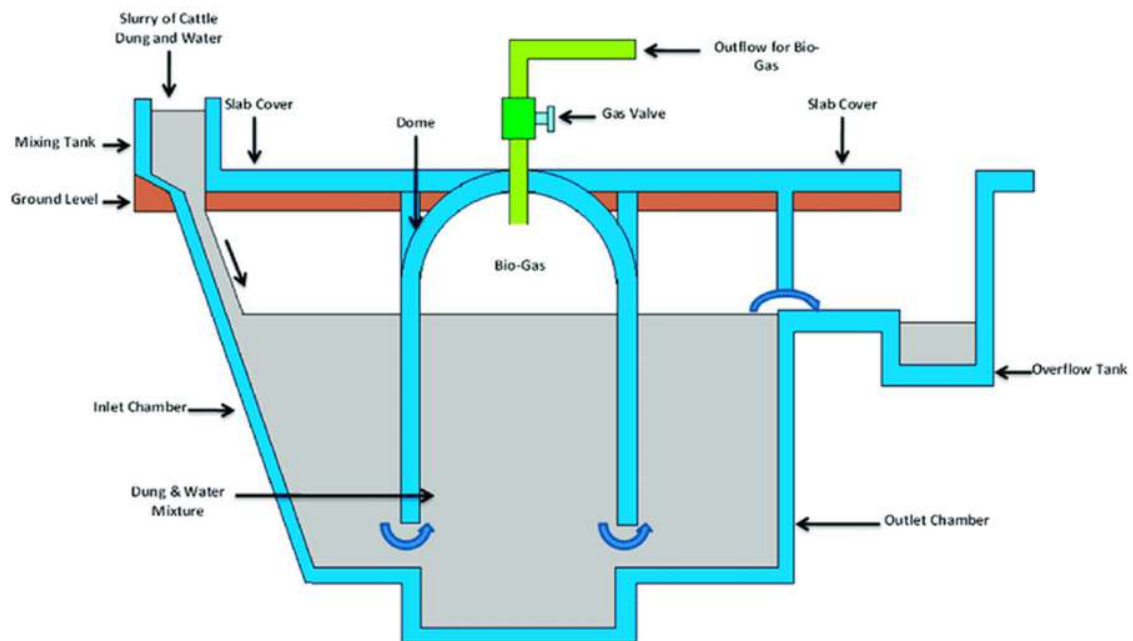


Figure 9: Biogas Plant (Pandey et al., 2021)

4. Energy Business

Renewable energy sources can create great opportunities for entrepreneurship in production, installation, distribution, and supply. However, market opportunities and a business idea are not sufficient if they are not accompanied by a sound business strategy. To ensure the economic sustainability as well as a social and environmental positive impact, entrepreneurs need to understand and deal with a wide range of issues and challenges that go beyond the technical particularities of each technology and include legal frameworks, financing, social contexts, and marketing strategies. For this reason, this section provides resources for the planning of sustainable energy business and explains the most important steps from the conception of a business idea to company building.

4.1. Business Models

4.1.1. Definition and Relevance

A business model is an analysis tool that precedes the business plan and helps entrepreneurs to define their value proposition. It represents core aspects of a business, such as its purpose, values, target customers, distribution channels, partnerships and revenues. It describes how an organisation creates and delivers value in the frame of economic, social, cultural or other contexts and can be seen as a blueprint for strategy to be implemented through organisational structures, processes and systems (Osterwalder & Pigneur, 2010).

Business models are particularly relevant for new businesses since they present a business idea in a simple and structured way and are usually the basis of a good business plan (Osterwalder & Pigneur, 2010). They aim to attract potential investors and co-workers. Yet, they are also essential for analysing existing businesses in order to explore new possibilities and create alternative strategies. Business models therefore need to be seen as dynamic systems – a constantly improving model in which the adjustment of one component will have an impact on other areas and elements of the business model. Essentially, a business model encompasses three key elements. These are: the value proposition, the value creation and delivery, and the value capture (Bocken, et al., 2014).

The decision about the business model adopted is strategic and depends on a variety of factors, such as economic values (e.g. profit or non-profit business), social values (e.g. social entrepreneurship), ecological values (e.g. environmental entrepreneurship), or legal status (e.g. limited liability company or cooperative) or geographical focus (e.g. local or multinational company), use of the brand (e.g. own brand or franchise). Recently, digitization has created a new kind of business model based on digital assets such as information and business intelligence and platforms, in which companies no longer rely on physical assets and structures.

Additionally, the increasing relevance of sustainability is gradually leading to the development of new business models that aim to combine economic-oriented goals with environmental or social-oriented value propositions (Bocken, et al., 2014). Those models are known as sustainable business models (SBMs) and entail a wide array of innovations such as the maximization of material and

energy efficiency, the substitution with renewables and natural processes, and the development of scale-up solutions (Bocken, et al., 2014).

4.1.2. Instruments for Designing a Business Model

There are two main concepts for designing business models that have their origins at the University of St. Gallen - the magic triangle and the Business Model Canvas (BMC). While the magic triangle is compact and simple, the BMC looks at a business model in a much more differentiated and precise manner. Due to its arrangement and preparation, the BMC is particularly suitable for workshops. You can use the magic triangle spontaneously in any discussion. The main distinguishing feature of the two meta-models is the level of detail and the resulting number of business model elements.

Magic Triangle

The magic triangle is a practical tool that focuses on four central questions for any business:

- **Who** are the clients?
- **What** does the company deliver?
- **How** is the offering created?
- **Why** is it financially viable?

Those questions are displayed in a triangle and intend to stimulate the discussion about the core elements of the business; namely the value proposition, the value chain, and the revenue model. As shown in Figure 10, the central dimension of the triangle is the target customer because their needs define how and why a company works (Gassman, et al., 2014). The second dimension focuses on the products and/or services that the company offers to the customer. The third dimension describes the processes, activities, and resources that the company needs to operate and, lastly, the fourth dimension explains the mechanisms for financial sustainability such as the cost structure and the revenue stream (Gassman, et al., 2014).

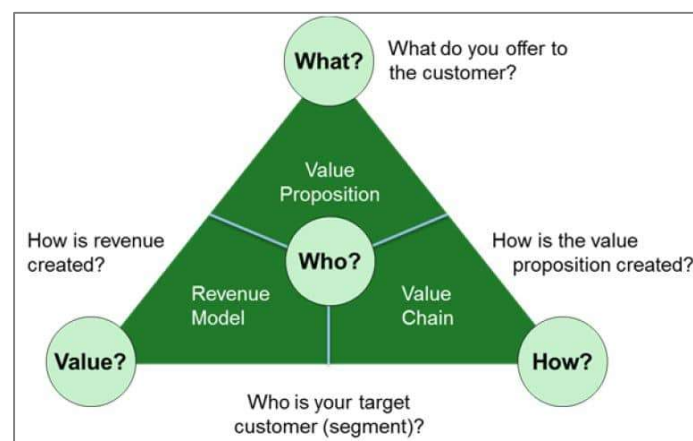


Figure 10: The Magic Triangle (Gassman, et al., 2014)

Business Model Canvas

While there are several frameworks to design and reconfigure business models, most widely applied is the Business Model Canvas (BMC). It is a tool that helps to focus on what is really driving the business and to identify customer requirements. Additionally, it is feasible for brainstorming and easy to understand for outsiders. The BMC was originally introduced by Alexander Osterwalder and is conceived as a one-page design tool with nine building blocks focusing in the main areas of a business. Given its structured but simple approach, it allows teams to focus and gain a common understanding of the individual component of the business.

The offer or value proposition is at the core of the Canvas. The additional building blocks focus on customers (right side of the canvas), infrastructure (left side of the canvas), and financial viability (bottom of the canvas) (Osterwalder & Pigneur, 2010). Figure 11 presents the distribution of the building blocks according to Osterwalder and Pigneur.

Key partners	Key activities	Value propositions	Customer relationships	Customer segments
	Key resources		Channels	
Cost structure			Revenue streams	

Figure 11: Building Blocks of the Business Model Canvas (Osterwalder & Pigneur, 2010)

A set of guiding questions for every component has also been developed:

- **Value Proposition**
 - What is the value you deliver to your customer?
 - Which of your customer's problems are you helping to solve?
 - What is the customer need that your value proposition addresses?
 - What is your promise to your customers?
 - What are the products and services you create for your customers?

- **Customer Segments**
 - For whom are you creating value?
 - What are the customer segments that either pay, receive or decide on your value proposition?
- **Channels**
 - How does your value proposition reach your customer?
 - Where can your customer buy or use your products or services?
- **Customer Relationships**
 - What relationship does each customer segment expect you to establish and maintain?
- **Revenue Streams**
 - How do customers reward you for the value you provide to them?
 - What are the different revenue models?
- **Key Partners**
 - Who are your most important partners?
 - Which key resources do you acquire from partners?
 - Which key activities do your partners perform?
- **Key Resources**
 - What are the resources you need to create and deliver your value proposition?
- **Key Activities**
 - What are the activities you perform every day to create and deliver your value proposition?
- **Cost Structure**
 - What are the important costs you have to create and deliver your value proposition?

Once the questions have been answered, it is time to look for possible links among the building blocks. For instance, one should consider that every value proposition needs a specific customer segment and is linked to a particular revenue stream.

Social Business Model Canvas / Gender-just

Social entrepreneurship is becoming a catalyst for social justice, economic development, and environmental protection. Given the focus on sustainable outcomes, business models for social entrepreneurship might differ from those of traditional businesses. Even though value creation remains a key element of the business model, social enterprises are primarily mission-driven (Vial, 2016). That is, their primary purpose is to contribute to human development by engaging in the solution of social and environmental challenges (Vial, 2016).

Aiming to deal with the specificities of social businesses, Vial (2016) proposed an adaptation of the business model canvas that focuses on the mission of the business, as shown in Figure 12.

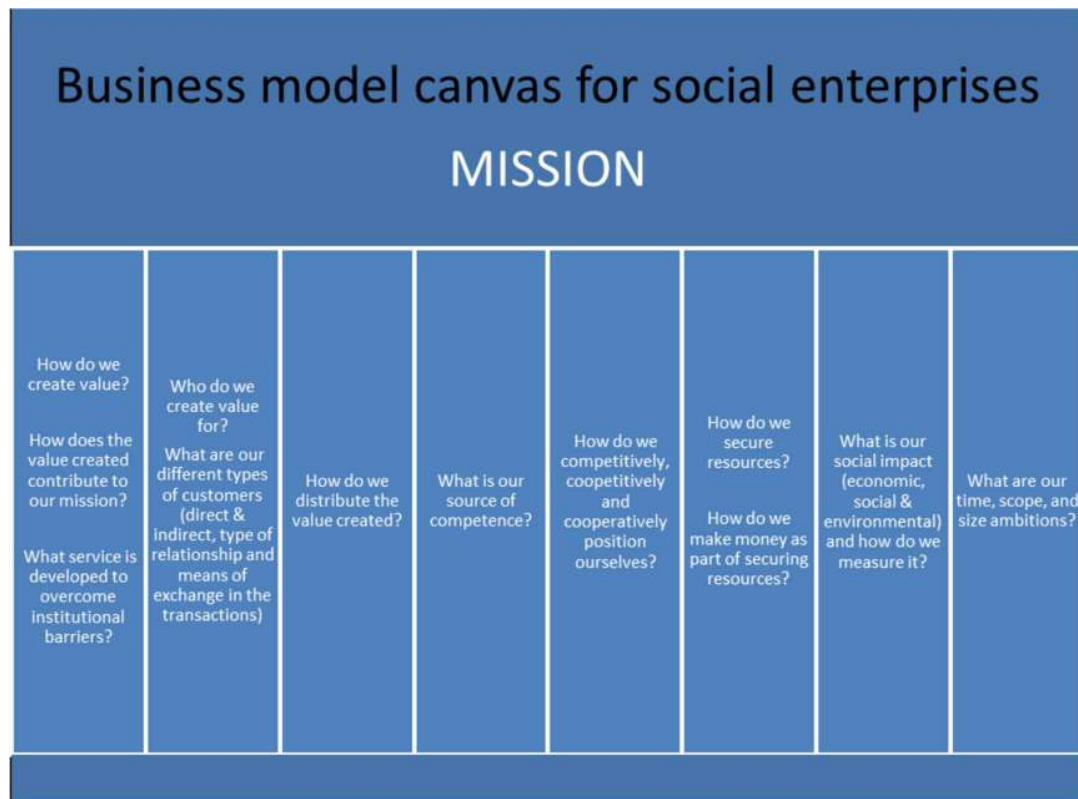


Figure 12: Business Model Canvas for Social Enterprises (Vial, 2016)

A second adaptation of the traditional business model canvas was developed by the Social Innovation Lab in 2013. The focal point of the canvas is the created impact and because of that includes new aspects that are divided into 13 building blocks.

The social business canvas considers two different segments: beneficiaries and customers. Consequently, each segment has a corresponding value proposition (social value proposition and customer value proposition). Additionally, the value proposition includes the planned impact measures. Key stakeholders and surplus (investment of the profits) are additional elements.

Key Resources	Key Activities	Type of Intervention	Segments	Value Proposition
<i>What resources will you need to run your activities? People, finance, access?</i>	<i>What programme and non-programme activities will your organisation be carrying out?</i>	<i>What is the format of your intervention? Is it a workshop? A service? A product?</i>	<i>Beneficiary</i>	<i>Social Value Proposition</i>
Partners + Key Stakeholders		Channels	<i>Customer</i>	<i>Impact Measures</i>
<i>Who are the essential groups you will need to involve to deliver your programme? Do you need special access or permissions?</i>		<i>How are you reaching your beneficiaries and customers?</i>	<i>Who are the people or organisations who will pay to address this issue?</i>	<i>How will you show that you are creating social impact?</i>
Cost Structure		Surplus	Revenue	<i>Customer Value Proposition</i>
<i>What are your biggest expenditure areas? How do they change as you scale up?</i>		<i>Where do you plan to invest your profits?</i>	<i>Break down your revenue sources by %</i>	<i>What do your customers want to get out of this initiative?</i>

Figure 13: Social Business Model Canvas (Social Innovation Lab, 2020)

4.2. Business Plan

After defining the most appropriate business for the business idea, the next stage of the entrepreneurial process is to develop a comprehensive business plan, including objectives, strategies, and budgets. The business plan is a fundamental tool for the entrepreneur to attract investors, as it provides information about the operational, social, and environmental viability as well as the financial profitability of the project. In order to do so, it is necessary to conduct research to get an idea of the resources needed, the procedure to be followed, the obstacles to be overcome, the goals to be achieved, and the strategies and tactics to reach the objectives.

The business plan is a written communication tool in which the entrepreneur systematically details the key information about the core activities and objectives and how she/he plans to arrange marketing, financial and operational aspects to achieve the goals. In this sense, the business plan has an internal function (it is a guide for the company's operations and management) and an external function (it is a tool for the search for financing).

4.2.1. Elements of a Business Plan

The complexity, content, and length of the plan vary depending on the business (Friend & Zehle, 2004). However, a good business plan includes some interrelated core elements:

- **Executive Summary:** It is a brief presentation with an overview of the most relevant aspects of the business plan. It should be clear, concise, and attractive as it is the mean to attract the attention of the potential investors. It should provide information about the profile of

the business (key information), the team, the product or service, the target market, the strategies and necessary resources, the expected economic results and financial indicators of the plan.

- **Description of the Business Idea:** It presents the business model based on the identified opportunities or needs. It clearly defines the concept and essence of the business and presents information about the core competencies and differentials that the business offers.
- **Strategic Analysis:** It is the analysis of the external environment, the industry and its structure, and the market. It considers the prevailing political, economic, social, and technological situation and their trends. Moreover, it brings together the internal analysis, the product/service analysis, and the external analysis through a tool known as SWOT analysis (Strengths, Weaknesses, Opportunities, and Threats).
- **Strategic Planning:** It declares the vision (what the business intends to do), mission (how the company turns the vision into reality), the objectives (specific targets for success), and the strategies of the business. Furthermore, it sets out the competitive advantage, the desired position in the market and how it will be achieved through its brand and product portfolio strategies.
- **Marketing Plan:** It determines the target market segment(s), their size and growth rates. It describes the customers and their needs as well as the value proposition to satisfy them. It details the marketing mix, also known as the four P's of marketing, which is a tool to determine how to position the business in the market. It encompasses detailed descriptions of the product (design, features, quality, quantity, brand, packaging), the price strategy (list price, discounts, payment method), the promotion (advertising, direct marketing, public relations), and place (geography, channels).
- **Operational/Production Plan:** It specifies the physical location of the company, its facilities, equipment and machineries, sources of supply of key materials, personnel requirements, and details the production process.
- **Management and Organisation:** It focusses on the human capital of the business. It presents the organisation chart and describes the team's capabilities, responsibilities, and relationships. It also outlines the training plans and the costs associated with the employees.
- **Financial Planning and Budget:** It represents the projections of the business and assesses the economic viability and profitability of the business. Moreover, financial planning helps the entrepreneur to determine the financial resources necessary for the realisation of the business plan, the total costs of the business, the financial needs, and the sources of financing for the business.

In conclusion, the business plan is a powerful tool for any business as it draws up a roadmap for the entrepreneur. However, its effectiveness depends also on the ability of the entrepreneur to communicate the idea to a specific audience and to gain approval.

4.3. From Energy to Business: Creating Business in the Energy Sector

Expanding access to affordable and reliable energy and clean cooking technologies is crucial to support economic growth in countries of the Global South as it enables the provision of a variety of services and creates business opportunities in different sectors (IEA, 2019). For instance, access to energy could positively impact the agricultural sector - on which the livelihood of many households in the Global South depends - due to increase in the productivity derived from improved irrigation, agro-processing and storage systems.

Despite a steady growth on electrification rates and access to clean cooking technologies, rural areas in most African countries continue to be underserved and face important economic and geographical constraints that limit the scalability of the on-grid electricity provision in the short-term. Thus, the implementation of decentralized and local solutions for sustainable energy is key to boost energy generation and distribution and to enable productive uses of energy. The active participation of citizens as initiators or partners in energy projects is fundamental to the transformation of the energy systems. This chapter describes business opportunities in the energy sector such as energy cooperatives and other bottom-up and demand-driven energy innovations.

4.3.1. Energy Cooperatives

Energy cooperatives have gained considerable attention in recent years due to their role in the energy transition towards renewable energy in global north countries. These bottom-up approaches have been crucial to the adoption of renewable energy technologies in countries such as Germany, Netherlands, and Denmark (Caramizaru & Uihlein, 2020) due to their democratic structures and contribution to the achievement of social and environmental goals. In the African continent, energy cooperatives are incipiently emerging as a pathway to solve energy access issues.

A cooperative is defined as “an autonomous association of persons united voluntarily to meet their common economic, social and cultural needs and aspirations through a jointly owned and democratically controlled enterprise” (ICA, 2020). That means that cooperatives are people-centred enterprises that bring members together in a democratic and equal way and whose main goal is not to gain financial revenues, but to create social benefits for their members and their communities. Moreover, cooperatives share a set of principles that guide their operations and internal governance:

- Voluntary and open membership
- Democratic member control (one person, one vote)
- Member economic participation
- Autonomy and independence
- Education, training, and information
- Cooperation among cooperatives
- Concern for community

When it comes to energy, cooperatives are considered a form of decentralised community-scale system for energy production and consumption, thereby offering new roles to citizens, and ensuring their participation in decision-making processes. Moreover, energy cooperatives have “a mission that goes beyond the sole production and distribution of energy to turn its focus to benefits to the community” (REScoop, 2020).

The activities of energy cooperatives vary depending on the community’s needs and possibilities (Friends of the Earth Europe; REScoop. eu; Energy Cities, 2020) and include:

- **Energy Generation:** It is a usual starting point and constitutes the most common activity among cooperatives. Generation is understood as the process of producing electric power by transforming an energy source such as solar energy, wind, or biofuel. It also includes the production of biomass briquettes for cooking. The decision for a cooperative to generate energy depends on the availability of energy sources in the area and the provision of required technologies for generation. Equally important are the regulatory frameworks and the local/national support to decentralized energy generation.
- **Energy Distribution:** The operation and maintenance of a mini grid for the distribution of electricity at the local level is a further field of activities for energy cooperatives. In this case, the generator system is not necessarily owned by the cooperative, but its operation is granted by local authorities through a concession or another third party. Particularly in rural contexts, where the centralized provision is scarce and its attractiveness for private actors is low, this form of operation has proven to be an efficient model as it reduces bureaucratic hurdles and empowers locals.
- **Energy Supply:** The cooperative produces and sells electricity to their member and beyond (clients that are not necessarily members). A cooperative energy supplier faces diverse challenges such as regulatory restrictions, the influence of established market actors, and financial limitations (Friends of the Earth Europe; REScoop. eu; Energy Cities, 2020).

Whether generating, distributing, or supplying energy, cooperatives play a crucial role in **fighting energy poverty** and in increasing access to clean energy, which has positive impacts on the health, and livelihoods of rural households.

Some aspects to consider when creating an energy cooperative are:

- Legal requirements for the establishment of an energy cooperative in the country
- Administrative burden (e.g., applying for operation permits)
- Technical and economic feasibility of the selected energy source
- Local acceptance of the cooperative model and decentralized energy
- Financial feasibility and resources needed during the planning, development, and operation phases. In this regard, it is important to consider financial option such as grants, loans from traditional or cooperative banks, third-party financing, and local authorities support (Friends of the Earth Europe; REScoop. eu; Energy Cities, 2020).

Case Study: Creating Energy Cooperatives to Serve the Agricultural Sector in Ethiopia

Cooperatives have traditionally played a fundamental role in the Ethiopian economy. In the agricultural sector, on which about 85% of the population depends, cooperatives have enabled small-scale farmers to acquire technologies, to access new markets, and to enhance their bargaining power in the market, thereby securing sustainable livelihoods. Moreover, their focus on education ensures the development of individual and social capacities.

In Ethiopia, agricultural cooperatives are facing challenges such as increasingly occurring droughts, low quality of harvest, low productivity and price volatility, and lack of access to investment capital. Furthermore, insufficient energy supply in rural areas has hampered the technification and productivity of the sector. In this sense, the use of renewable energies becomes a key factor for the sustainability of agriculture in the country. Energy cooperatives serving the agricultural sector can ensure the production and access to clean and affordable energy solutions and can be powerful tools to increase productivity and profitability.

Furthermore, as established structures within rural communities, agricultural cooperatives constitute suitable entry points and change agents for the promotion and adoption of renewable energies. For instance, they can contribute to the setting up of cooperatives for the production and distribution of biomass briquettes.

Gender Equality in Energy Cooperatives

Cooperatives are considered powerful agents for social inclusion and empowerment of their members. As bottom-up and democratic initiative, they further facilitate women's empowerment and gender justice. Women have traditionally been underrepresented in the energy field at the policymaking and implementation level as well as in the energy industry itself (IRENA, 2019). Nevertheless, because of their core principles, energy cooperatives could provide specific benefits for women such as equal access in the whole energy value chain (including jobs, funding, and profits), control over energy production and consumption, and opportunities to participate in local economies, thereby becoming economically empowered. Moreover, energy cooperatives increase the level of participatory democracy and female leadership (Fraune, 2015). In this regard, cooperatives can use instruments and tools to assure women's effective participation such as establishing a high female ratio and gender quotas in the management structures of the organization. Moreover, communication and training activities are important vehicles for women's participation at the cooperative level. In general, decentralized, democratic and pluralist energy strengthens agency and capabilities of women and men and promotes human well-being beyond access to energy solutions.

4.3.2. Social Enterprises and Energy to Business Models

Social entrepreneurship is growing rapidly and has a great potential to drive sustainable development. Social enterprises are defined as "organisations involved at least to some extent in the market, with a clear social, cultural and/or environmental purpose, rooted in and serving primarily the local community" (Becker, et al., 2017, p. 25). Given that both, the provision of environmentally sustainable products and the contribution to the tackling of social problems, are at the core of social entrepreneurship activities, renewable energies constitute a promising field in this

kind of business (Van der Horst, 2008). Social enterprises in the energy sector can bridge the gap between communities affected by energy poverty and the solutions available in the market as they use bottom-up approaches to understand community's needs, expectations, and constraints and use local resources for the development of new technologies or the adaptation of existing ones to the local conditions.

Either as replicators or starters of a business model, social entrepreneurs can bring innovation in the sustainable energy sector in areas such as the design, production, assembly, commercialization or maintenance of clean cookstoves (CCS), pico and micro solar solutions and cleaner fuels (biomass briquettes). The productive use of renewable energy can also bring added value in the health and mobility sector. For instance, Figure 14 shows the multiple sectors involved and interlinkages created with the production of renewable energy.

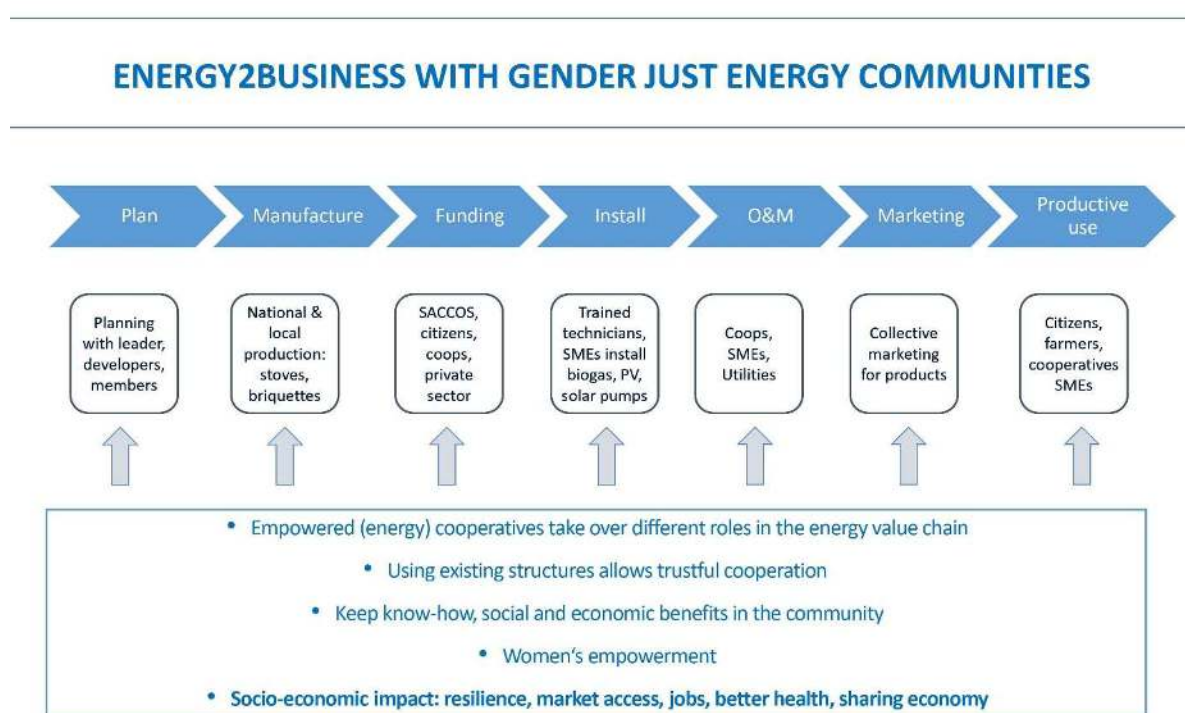


Figure 14: Energy to Business with Gender Just Energy Communities (Authors)

5. Gender Advocacy

5.1. Definition and Characteristics

Advocacy is recognized as being a vital factor in recent progress on issues of gender and human rights. The acknowledgment of gender as a cross-cutting aspect in global issues and its integration into the policy agenda at the global and to some extent to national and institutional levels has been the result of the work of women's rights activists. Despite this progress, many challenges remain and advocacy is, therefore, as relevant as ever.

Advocacy – also known as campaigning or policy influencing – is an umbrella term defined as “the process of negotiating and mediating a dialogue through which influential networks, opinion leaders, and, ultimately, decision makers take ownership of your ideas, evidence, and proposals, and subsequently act upon them” (Young & Quinn, 2012). It is a deliberate process of influencing individuals, groups and institutions in power in order to create, implement, reform or enforce laws and policies for social change. Advocacy encompasses a wide range of activities from organizing lobbying meetings with key people to arranging workshops and activities for organizations, but it is important to consider that advocacy activities are by definition non-violent and legal.

There is a wide range of specific advocacy practices. However, some elements are common along an effective advocacy process:

- Defining advocacy objectives
- Researching on the specific topic
- Writing and publishing findings as a way to mobilize the public
- Identifying the audiences
- Delivering compelling messages
- Creating effective relationships and networks
- Fundraising
- Effective communication skills and the ability to put forward coherent arguments
- Evaluating advocacy efforts

The approach to advocacy varies among NGOs or civil society organizations. Depending on the type of relationship the organizations have with policymakers, approaches can be classified into 4 categories (Young & Quinn, 2012):

- **Advisory Activities**, which are based on empirical research aiming to assist decision-makers in the policy process.
- **Media Campaigning**, which aims to create public pressure on the decision-makers. It is the common approach of watchdog organizations.
- **Lobbying**, which mainly involves meetings with decision-makers and influential people. This approach usually aims to protect the interest of particular groups.
- **Activism**, which has two main goals: 1) to promote a certain value set (e.g. environmentalism) and 2) to represent people who are not included within government social service provision (e.g. victims of gender-based violence).

Even though it might be a predominant approach, organizations normally use a mix of practices, according to their capacities and influence power. Advocacy can take place at all levels: school, village, district, municipality, region, country or globally.

5.2. The Policy Cycle

The policy cycle is an approach to policy-making that describes the process as a logical sequence of phases, commonly presented in a circular form. There is room for advocacy in every stage of the cycle. Typically, the process starts with identification of an issue and its inclusion in the policy agenda (problem formulation). Several factors can act as stimulus to start the process, e.g., the election of a new government, crises and natural disasters, the emergence of new technologies and solutions, as well as policy research and evaluations. Subsequently, the discussion is focused on the identification and selection of a suitable and concrete measures to solve the problem. Once the policy has been formulated, public authorities implement, monitor and evaluate the targets to determine if the problem has been solved or it has to be redefined in order to start a new cycle. Figure 15 illustrates the cycle.

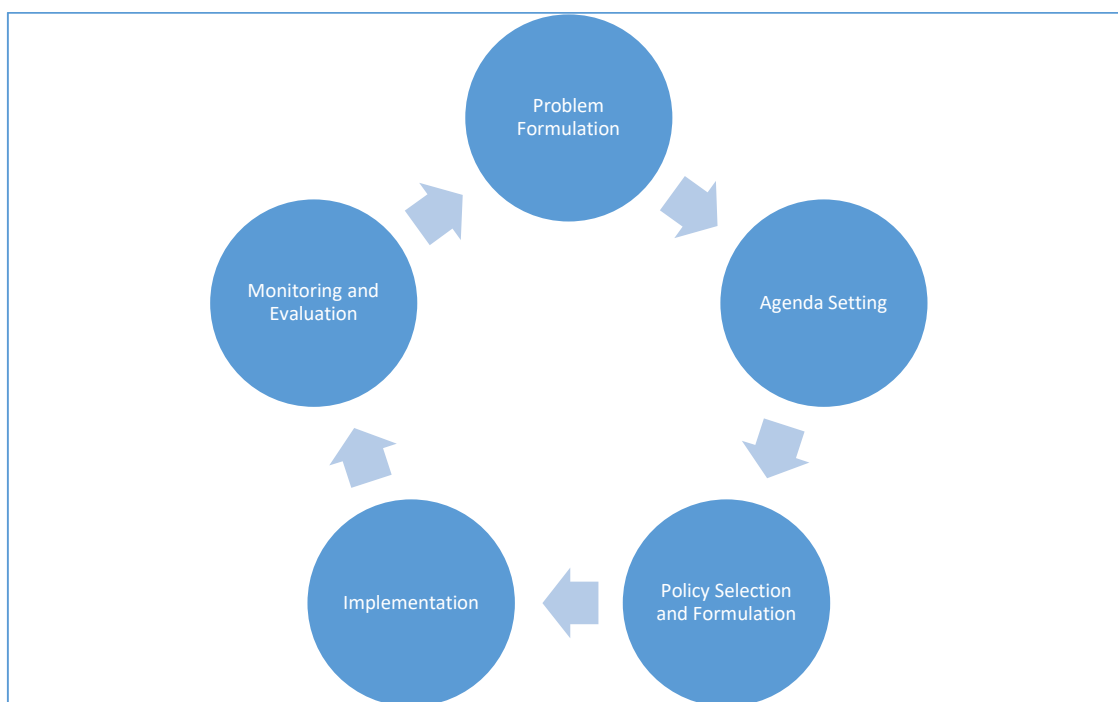


Figure 15: The Policy Cycle (Authors)

Advocacy might have a direct policy impact as to if and when the recommendations or demands are adopted and implemented for the government. However, direct change happens only in very few cases due to multiple sources of influence that converge in the process. Therefore, outcomes of advocacy activities can be very slow.

5.3. Women's Rights Advocacy

From grassroots organizations struggling at the local level to international networks with a voice in policy processes of the United Nations, women's advocates demand the full realization of human rights through reforms of legal frameworks and cultural practices in order to eliminate all forms of gender and intersecting inequalities. To do so, it is critical to ensure democratic participation of women and communities in the decision-making of policies and programmes at any level.

Some strategies that have proven to be effective are:

- Creating interlinkages and working across issues
- Promoting the participation of grassroots groups
- Finding allies and building relationships to develop unified positions
- Using innovative communication strategies
- Utilizing existing spaces for participation
- Identifying gaps in expertise and building capacity
- Strengthening the women's movement at any level

Case Study: Advocacy Needs in Uganda

Uganda accedes to several international standards and codes, though many of them have not been systematically recorded for dissemination to state and non-state stakeholders. Thus, some of the international established codes, which the Government of Uganda signed, have not been translated into policy, legislation and/or specific actions. The general lack of awareness regarding these conventions has implications for the ability of citizens to exercise their rights. For this reason, advocacy remains an important strategy to achieve social and political changes. Regarding women's rights, the following issues should be at the stake of advocacy:

- Women's political participation
- Access to finance
- Inheritance law
- Childcare and children's rights
- Gender pay gap/care gap/ pension gap
- Women's participation in decision-making
- Sexual and gender-based violence
- Women's economic empowerment and economic justice

References

- Becker, S., Kunze, C. & Vancea, M., 2017. Community energy and social entrepreneurship: addressing purpose, organisation and embeddedness of renewable energy projects. *Journal of Cleaner Production*, Volume 147, pp. 25-46.
- BMI Lab, 2020. *BMI Lab*. [Online]
Available at: <https://bmilab.com/blog/2020/01/23/business-models-definition-and-reason>
[Accessed 22 08 2021].
- Bocken, N. M., Short, S., Rana, P. & Evans, S., 2014. A literature and practice review to develop sustainable business model archetypes. *Journal of Cleaner Production*, Volume 65, pp. 42-56.
- Brugha, R. & Varvasovszky, Z., 2000. Stakeholder Analysis: a Review. *Health Policy and Planning*, 15(3), pp. 239-246.
- Caramizaru, A. & Uihlein, A., 2020. *Energy communities: an overview of energy and social innovation*, Luxembourg: Publications Office of the European Union .
- Cecelki, E. & Dutta, S., 2011. *Mainstreaming Gender in Energy Projects A Practical Handbook*, The Hague: Energia.
- Clean Cooking Alliance, 2022. *Clean Cooking Catalogue*. [Online]
Available at: <http://catalog.cleancookstoves.org/stoves/280>
[Accessed 15 03 2022].
- EIGE, 2018. *Gender Analysis*. [Online]
Available at: <https://eige.europa.eu/gender-mainstreaming/methods-tools/gender-analysis>
[Accessed 14 03 2021].
- EIGE, 2019. *Toolkit on Gender-sensitive Communication*, Luxembourg: Publications Office of the European Union.
- EIGE, 2020. *Gender Stakeholder Consultation*. [Online]
Available at: <https://eige.europa.eu/gender-mainstreaming/methods-tools/gender-stakeholder-consultation>
[Accessed 10 03 2021].
- Escobar, M., Forni, L., Ghosh, E. & Davis, M., 2017. *Guidance Materials for Mainstreaming Gender Perspectives into Model-based Policy Analysis*, Davis, California: SEI.
- Fraune, C., 2015. Gender matters: Women, renewable energy, and citizen participation in Germany. *Energy Research & Social Science*, Volume 7, pp. 55-65.
- Friend, G. & Zehle, S., 2004. *Guide to Business Planning*. London: The Economist.
- Friends of the Earth Europe; REScoop. eu; Energy Cities, 2020. *Community Energy: A practical guide to reclaim power*, s.l.: s.n.

Gassman, O., Frankenberger, K. & Csik, M., 2014. *The Business Model Navigator: 55 models that will revolutionise your business*. Upper Saddle River, NJ: FT Press.

Hunt, J., 2004. Introduction to gender analysis concepts and steps. Volume 64, pp. 100-106.

ICA, 2020. *What is a Cooperative*. [Online]
Available at: <https://www.ica.coop/en/cooperatives/what-is-a-cooperative>
[Accessed 10 09 2021].

IEA; IRENA; UNSD; WB; WHO, 2019. *Tracking SDG 7: The Energy Progress Report 2019*, Washington: The World Bank .

IEA, 2019. *Africa Energy Outlook 2019*, Paris: IEA Publications.

IMF, 2021. *World Economic Outlook*. [Online]
[Accessed 18 12 2021].

IndiaMART InterMESH Ltd., 2022. *IndiaMART*. [Online]
Available at: <https://www.indiamart.com/sunplugtechnologies/solar-lamps.html>
[Accessed 15 03 2022].

IRENA, 2019. *Renewable Energy: A Gender Perspective*, Abu Dhabi: IRENA.

March, C., Smyth, I. & Mukhopadhyay, M., 1999. *A guide to Gender-Analysis Frameworks*. Oxford: Oxfam GB.

Mendelow, A., 1981. Environmental Scanning--The Impact of the Stakeholder Concept. *ICIS 1981 Proceedings*, Volume 20, pp. 407-418.

Mertens, K., 2015. In: *Photovoltaik - Lehrbuch zu Grundlagen, Technologie und Praxis*. Munich: Carl Hanser Verlag, p. 255f.

Osterwalder, A. & Pigneur, Y., 2010. *Business Model Generation: : A Handbook for visionaries, gamechangers and challengers*. Hoboken, New Jersey: John Wiley and Sons.

Our World in Data, 2020. *Our World in Data*. [Online]
Available at: <https://ourworldindata.org/energy/country/ethiopia#per-capita-what-is-the-average-energy-consumption-per-person>
[Accessed 01 11 2021].

Perez, R. & Perez, M. J., 2009. A Fundamental Look at Energy Reserves for the Planet. *SHC Solar Update*, Volume 50, p. 2.

REScoop, 2020. *Report on REScoop Business Models*, s.l.: REScoop.

Schierhorn, F. & Müller , D., 2020. *Klimaschutz und Klimaanpassung in Äthiopien*, Berlin: GFA Consulting Group.

Schirato, T. & Yell, S., 1997. *Communication and Cultural Literacy: An Introduction*. Sydney: Allen & Unwin.

UNDP, 2004. *Gender & Energy for Sustainable Development: A Toolkit and Resource Guide*, New York: UNDP.

UNIDO; UN Women, 2013. *Sustainable Energy for all: The gender dimensions*, Vienna: UNIDO.

UNIDO, 2014. *Guide on Gender Mainstreaming Energy and Climate Projects*, Vienna: UNIDO.

Van der Horst, D., 2008. Social Enterprise and Renewable Energy: Emerging Initiatives and Communities of Practice. *Social Enterprise Journal*, 4(3), pp. 171-185.

Vial, V., 2016. A Business Model Canvas for Social Enterprises. *Sains Humanika*, 8(1-2), pp. 1-8.

World Bank , 2020. *Gini Index (World Bank Estimate)-Uganda*. [Online]
Available at: <https://data.worldbank.org/indicator/SI.POV.GINI?locations=UG>
[Accessed 18 12 2021].

World Bank, 2020. *Gross Domestic Product, PPP - Ethiopia*. [Online]
Available at: <https://data.worldbank.org/indicator/NY.GDP.MKTP.PP.KD?locations=ET>
[Accessed 18 12 2021].

Young, E. & Quinn, L., 2012. *Making Research Evidence Matter: A Guide to Policy Advocacy in Transition Countries*, Budapest: Open Society Foundations.