



Kingdom of the Netherlands



# **Review of Policies and Strategies Related to the Clean Cooking Sector in Ethiopia**

**Final Report**

**Strengthening the Enabling Environment for Clean  
Cooking Project**

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## Acronyms and Abbreviations

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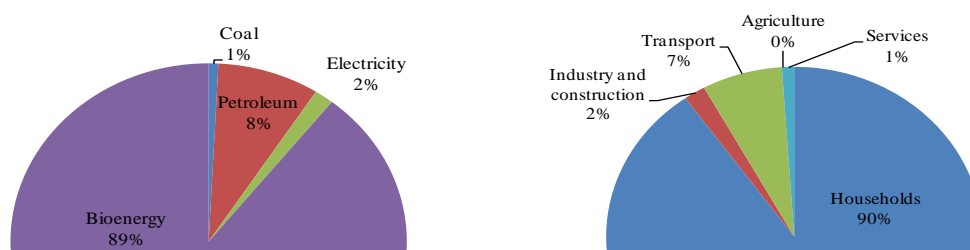
AETDPD	Alternative Energy Technology Development and Promotion Directorate, MOWIE
BEST	Biomass energy strategy
CO <sub>2</sub>	Carbon Dioxide
COM	Council of Ministers
CSA	Central Statistical Agency (of Ethiopia)
CRGE	Climate-Resilient Green Economy Strategy
ECAE	Ethiopian Conformity Assessment Enterprise
ECRC	Environment and Climate Research Center (of the EDRI)
EEA	Ethiopian Energy Authority
EnDev	Energising development
ESA	Ethiopian Standards Agency
EU	European Union
EUEI-PDF	EU Energy Initiative Partnership Dialogue Facility
EUR	Euro
FDRE	Federal Democratic Republic Ethiopia
GIZ	German Agency for Technical Cooperation
GoE	Government of Ethiopia
GHG	Greenhouse gases
GTP	Growth and Transformation Plan
HOPR	House of Peoples Representatives
ICS	Improved Cook Stoves
M	Million
MEFCC	Ministry of Environment, Forest and Climate Change
MoFEC	Ministry of Finance and Economic Cooperation
MOANR	Ministry of Agriculture and Natural Resources
MOH	Ministry of Health
MoMPNG	Ministry of Mines, Petroleum and Natural Gas
MOWIE	Ministry of Water, Irrigation, and Electricity
M&E	Monitoring and Evaluation
MRV	Monitoring, Reporting and Verification
Mtoe	Million ton of oil equivalent
NBE	National Bank of Ethiopia
NBPE+	National Biogas Program of Ethiopia (Scale-Up Programme)
NDC	Nationally determined contribution
NES	National Electrification Strategy
NEP	National Electrification Program
NICP	National Improved Cookstove Program
R&D	Research and Development
RE	Renewableenergy
SE	SustainableEnergy
SE4ALL	Sustainable Energy for All
SDG	Sustainable development goal
SME	Small and Medium Enterprise
SNV	Netherlands Development Organisation
toe	ton oil equivalent
TOR	Terms of Reference
USD	US Dollar
WASH	Water, Sanitation and Health
WB	World Bank

# 1. Introduction

## 1.1 Energy Sector Context

Biomass is still the main source of energy and cooking the largest consumer of energy in Ethiopia. According to the most recent national energy balance from MOWIE, 89% of all final energy supply was from biomass sources and the household sector consumed 90% of all energy consumed in 2014. The share of biomass energy from total energy supply has gradually decline over the past two decades (94% to 89%). This is the result of higher rate of demand growth for fossil fuels and electricity compared to biomass fuels.

Figure 1.1 Ethiopia National Energy Balance, 2014 (total energy consumed=36.4 Mtoe)



MOWIE (2016) National Energy Balance

Households account for nearly all the biomass energy consumed; fossil fuels are used mainly by the transport sector; and electricity use is about equally distributed across households, industries and the commercial sector.

- Biomass: 99% residential, 1% commercial, 0.01% transport (ethanol)
- Fossil fuels: 10% residential, 16% industrial, 74% transport
- Electricity: 39% residential, 34% industrial, 27% commercial

## 1.2 Clean Cooking Context<sup>1</sup>

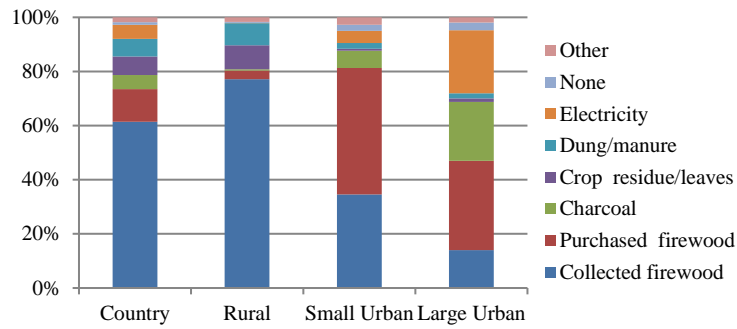
Solid biomass fuels (fuelwood, charcoal, animal dung, and crop residues) are the main sources of cooking for more than 90% households in Ethiopia (Figure 1.2). Modern bioenergy in the form of biogas and ethanol are used only by fewer than 20,000 households throughout Ethiopia. Rural households are nearly totally dependent on biomass fuels (less than 3% use fuels other than biomass); urban households use a more diverse range of fuels – however, even in urban areas more than 80% depend on biomass fuels.

<sup>1</sup>According to the Global Alliance for Clean Cookstoves, cookstoves are classified as “clean” or “efficient” if they meet the following conditions (<http://cleancookstoves.org/technology-and-fuels/standards/defining-clean-and-efficient.html>):

- Stoves/Fuels that meet Tier 2 for efficiency or higher will be counted as efficient;
- Stoves/Fuels that meet Tier 3 for indoor emissions or higher will be counted as clean, as it relates to potential health impacts; and
- Stoves/Fuels that meet Tier 3 for overall emissions or higher will be counted as clean, as it relates to potential for environmental impacts.
- Tier 4 stoves are the highest performing and most likely to achieve the greatest health or environment benefits

Based on this classification all cooking with solid biomass using traditional open fire cooking and even with the improved Injera baking stoves such as Mirt and Gunzie will be classified as not efficient and not clean (fall under Tier 0 for efficiency/fuel use and indoor air pollution); the Tikil stove will have Tier 2 rating for efficiency/fuel use. See Chapter on Technology and Innovation for more detailed discussion on this.

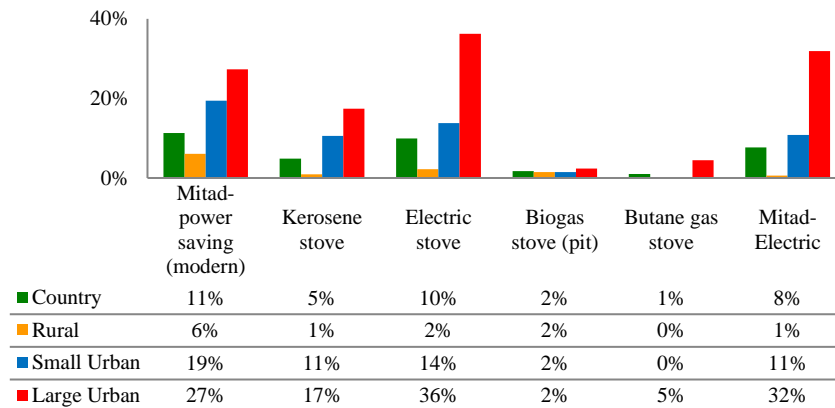
Figure 1.2 Source of fuel for cooking, 2016



CSA, NBE, World Bank (February 2017) Integrated surveys on agriculture, Ethiopia socioeconomic survey (ESS), 2015/2016

Ethiopian households predominantly use solid biomass for cooking and they cook using the open fire or inefficient and unclean traditional cook stoves. A recent CSA survey shows that only about 10% of households use energy saving stoves (for baking) and penetration of other modern and clean cook stoves is well below 10%. In rural areas fewer than 6% use improved and clean cook stoves

Figure 1.3 Stove ownership by households, 2016

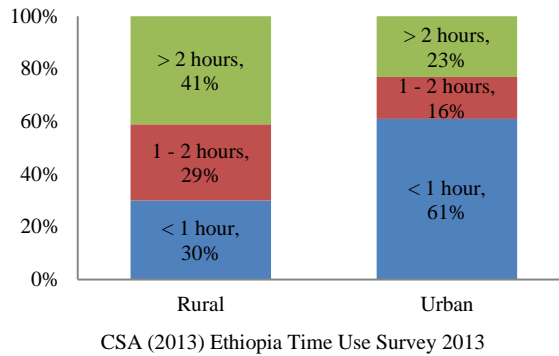


CSA, NBE, World Bank (February 2017) Integrated surveys on agriculture, Ethiopia socioeconomic survey (ESS), 2015/2016

Energy efficiency improvement for domestic cook stoves has been in the forefront of energy interventions in Ethiopia since the mid-1980s. Significant gains have been made, particularly in the past twenty years in disseminating energy efficient cook stoves in urban and rural areas. The clean cooking sector has attracted even higher interest in the past fifteen years due to its benefits in reducing exposure to air pollution and because of its potential to reduce greenhouse gas emission (or maintain CO<sub>2</sub> sequestration potential of forests). Four major impacts are associated with cooking with solid biomass fuels using unclean stoves:

- *The social and economic burden:* 80% of rural households collect fuelwood for cooking; 40% of those collecting fuel spend more than 2 hours per collection session, and 70% spend more than 1 hour for fuel collection. The fuel collection burden, borne by women, is significant with significant impact on loss of productive and home sustaining potential.

Figure 1.4 Collection times for households collecting fuelwood



- *The health burden:* women and girls allocate significant amount of time collecting and carrying heavy loads of fuelwood impacting their health. They also prepare meals using biomass fuels on traditional stoves exposing themselves and the small children they look after to smoke and respiratory diseases which are responsible for up to 5% of total deaths in Ethiopia. Smoke from cooking fires also causes them eye diseases.
- *The local environmental burden:* the total annual amount of fuelwood (and charcoal) consumed for cooking is 31Mtoe (or 86 million tons) about 10% of it in the form of agricultural residue. Fuelwood consumption levels exceed natural sustainable yields in most parts of Ethiopia therefore resulting in the degradation of forests; burning agri-residues as fuel diverts their use as animal feed and soil conditioners (resulting in economic losses as we as impact soil quality).
- *The greenhouse gas emission burden:* forests and woodlands are degraded where biomass is harvested in excess of natural yields. This degradation reduces the potential of forests to absorb carbon dioxide thus contributing to net emission of CO<sub>2</sub> to the atmosphere.

In realization of all the factors outlined above the GOE has put clean cooking as a key intervention in its development agenda. The CRGE strategy put clean and efficient cooking interventions as one of the few fast-track interventions for GHG mitigation. A very ambitious National Investment Plan has been prepared for cook stoves and following this plan two five-year plans have been issued within the GTP framework. The GTP 2 plan envisages distribution of 11.5 million stoves during 2016- 2020.

### 1.3 Approach and Methodology

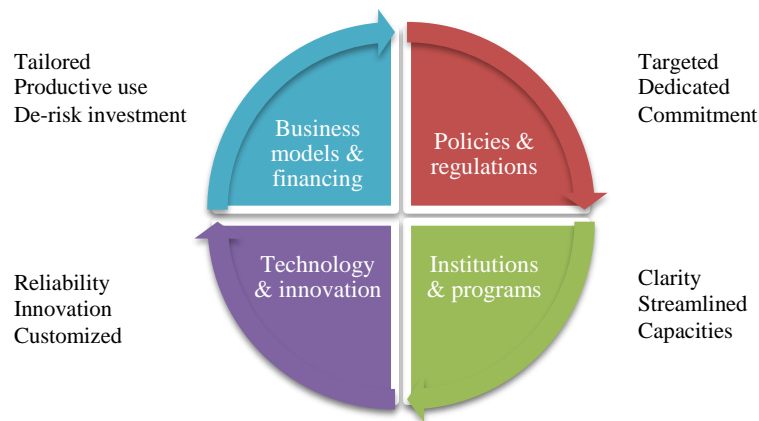
The SNV clean cooking project seeks to strengthen the enabling environment for clean cooking in Ethiopia through institutional capacity development and sector facilitation. The project will address four key objectives: (a) establish and operationalize a national clean cooking forum, (b) finalize and operationalize relevant policies and strategies, (c) support national clean cook stove standards, and (d) strengthen technical capacity for testing of clean cook stoves.

This study addresses the second objective – finalizing and operationalizing relevant national policies and strategies for clean cooking in Ethiopia. First, the relevant policies and strategies contained under the energy, health, environment, climate change, forestry, and gender sectors were reviewed for gaps, effectiveness, and efficiency. Second, study reviewed whether the institutional framework for promoting clean cooking is effective. Thirdly, the study reviewed the status of technology development and innovation for clean cooking. Finally, the study reviewed the distribution and financing models used in the clean cooking sector. The review will be approached in the context the analytical framework adopted by UNIDO for off-grid RE in 2012 shown in Figure 1.5.

- *Policies and regulations:* are they well targeted and have commitments (in institutional and other resources), are there clean cooking specific (dedicated) policies, have they been effective, efficient, equitable, and institutionally credible?
- *Institutions and programs:* is the institutional framework clearly articulated and implemented, are activities streamlined within and across key institutions, and is there adequate capacity in the key institutions?

- *Technology and innovation*: are the clean cooking technologies in the market fit consumer requirements, are innovations being promoted, have there been any new product innovations recently?
- *Business models and financing*: are the business/promotion strategies and models sustainable and replicable, is there sufficient financing of consumers and producers of clean *cooking* stoves?

Figure 1.5 Building blocks of an enabling environment for off-grid RE deployment



Adopted from IRENA, 2013. International Off-Grid Renewable Energy Conference 2012: Key Findings and Recommendations (as adopted from UNIDO, 2012)

This assignment will be carried out mainly through review of published and un-published documents and consultation with main stakeholders.

### 1.3.1 Policies and Strategies

The study reviewed clean cooking relevant policies and strategies including those in the energy, environment and climate change, forestry, health, and agriculture and natural resources sectors. The study team consulted the main stakeholders to get further insight into policies and strategies (energy sector government and non-government institutions).

<p><u>Energy</u></p> <ul style="list-style-type: none"> <li>- Energy policy (1994)</li> <li>- Biofuel Strategy (2009)</li> <li>- Draft new energy policy (2013)</li> <li>- National Improved Cook Stoves Investment Plan (2013)</li> <li>- Biomass energy strategy (BEST) (2014)</li> <li>- GTP II plan for alternative energy (2015-2020)</li> <li>- Intended nationally determined contribution (INDC) (2015)</li> <li>- National electrification strategy (2016)</li> <li>- National Electrification Program (2017)</li> <li>- Global Strategy for Safe Access to Fuel and Energy (SAFE), (UNHCR, 2014)</li> </ul> <p><u>Health and gender</u></p> <ul style="list-style-type: none"> <li>- Health Policy (1993)</li> <li>- National Policy on Women (1993)</li> <li>- GTP II plans for the sectors (2015-2020)</li> </ul>	<p><u>Environment, forestry and climate change</u></p> <ul style="list-style-type: none"> <li>- Environmental policy (1997)</li> <li>- Ethiopia's Programme of Adaptation on Climate Change (EPACC)</li> <li>- National REDD+ strategy (final draft, 2016)</li> <li>- Climate Resilient Green Economy (CRGE) strategy (2010)</li> <li>- Climate Resilience Strategy for Water and Energy</li> <li>- Forest Development, Conservation and Utilisation Proclamation (No. 542/2007)</li> <li>- GTP II plan for the sectors (2015-2020)</li> </ul> <p><u>Agriculture, livestock and natural resources</u></p> <ul style="list-style-type: none"> <li>- Sustainable Land Management Project II (SLMP-2)</li> <li>- GTP II plan for the sector (2015-2020)</li> </ul>
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### 1.3.2 Institutions and Programs

The mandates, responsibilities, activities of main stakeholders in relation to clean cooking will be reviewed under this section. The main stakeholders are listed below. Institutional capacity will be reviewed through



(a) assessment of their organizational capacity (resources, human, and material), (b) stakeholders' own self-assessment of their capacities through interviews, and (c) assessment of programs and projects they execute.

- MOWIE (AETDPD)
- MEFCC (NICSPP)
- MOMPNG (Biofuels)
- Ethiopian Sugar Corporation (Ethanol)
- Regional Energy Agencies
- 
- NICSPP (MEFCC, MOWIE, regional energy bureaus, GIZ, Wold Vision, other
- NBPE (MOWIE, regional energy bureaus, SNV, other partners)
- Other alternative fuels and stoves (MEFCC, MOWIE, regional energy bureaus, other partners)

- a. *Organizational capacity*: mandates, resource requirements including staffing, existing or committed resources
- b. *Capacity for program management and implementation*: capacity will be assessed across the functional areas with a focus on capacity to implement programs
- c. *Programs or projects undertaken*: review of program and project evaluation reports

The institutional assessment matrix is attached in Annex 5.

### **1.3.3 Technologies and Innovation**

Continuous technical innovation is required to meet growing and changing customer requirements (for energy efficiency, cost, reliability, elimination of emissions) and wider community or country goals and commitments (forest and other natural resource degradation, GHG emission reduction). However, in Ethiopia innovation in the clean cooking area appears to have stalled over the past decade: the last ICS innovation is 15 years old (the Gunzie stove).

Technology and innovation is an important segment of policy and implementation. This study will therefore evaluate issues and opportunities for technical innovation in the clean cooking area. The study will provide a matrix of clean cook stove types by tier, classify locally available stoves within this matrix, summarize their characteristics, and evaluate the technical innovation capacity and activities in government agencies, R&D institutions and private manufacturers.

### **1.3.4 Distribution Models and Financing**

The study will review the business and distribution models used for clean cook stoves in Ethiopia through: (a) review of program/project evaluations, (b) consultations with key promoters of clean cook stoves (MEFCC/NICS, MOWIE/AETDPD, MOMPNG, GIZ, SNV, Energy Bureaus of regional states), and (c) interview with selected improved and clean stove manufacturers and distributors.

## 2. Policies and Strategies

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The chapter outlines the policies and strategies related to improved and clean cooking in Ethiopia. Relevant policies include those that are directly related to the energy sector and policies and strategies in related sectors such as forest, environment and climate change, and health. This section also presents key international strategies and initiatives that have significant bearing on the improved and clean cooking sector.

### 2.1 Policies and Strategies in the Energy Sector

#### 2.1.1 Constitution of the FDRE (Proclamation No. 1/1995)

The constitution of the FDRE which guides all laws, practices and decisions of organs of state came into effect on 21 August 1995. Areas of particular interest in the Constitution include provisions for rights to development, rights of women, and rights to a clean and healthy environment.

- *Right to development:* Nationals have the right to participate and to be consulted with respect to policies and projects affecting their community.
- *Rights of Women:* (a) women shall enjoy the rights and protections provided for by the Constitution and have equal right with men; (b) women are entitled to affirmative action and special attention is to be given to women to enable their equal participation with men in political, social and economic life, (c) they have the right to full consultation in the formulation of national development policies, the design and execution of projects, and particularly in the case of projects affecting the interests of women; and (d) the State has the obligation to allocate ever increasing resources to provide to the public health, education and other social services
- *Environmental rights and objectives:* All persons have the right to a clean and healthy environment. The state's environmental objectives are to ensuring (a) clean and health environment for citizens, (b) engagement of citizens in planning and implementation of policies and projects, (c) program and project design and implementation does not damage the environment, (d) protection for the environment by citizens and the government.

National laws, which are issued as “Proclamations” in Ethiopia, are enacted by the House of Peoples’ Representatives (HOPR). Laws and decisions adopted by the HOPR are executed by the Council of Ministers (COM). The COM enacts regulations (derived from relevant proclamations issued by the HOPR), decides on the organizational structure of ministries and other government agencies and coordinates their activities, develops policies and strategies, drafts the federal budget, and protects patents and copyrights.

The constitution provides the framework and guidance for national policies and strategies. Policies in the energy and related sectors are all guided by principles enshrined in the Constitution. What are particularly relevant for the clean cooking area are the constitutional guarantees on the rights of women (the principal stakeholders in clean cooking programs) including their right for engagement in policy making, program planning and implementation. Another relevant area relates to citizens’ rights to clean and healthy environment (which includes the environment within the home) and responsibilities of citizens and government to protect the environment

#### 2.1.2 Energy policy (1994)

The national energy policy was issued by the transitional government of Ethiopia in 1994. This policy is still in place as the new energy policy drafted in 2013 is yet to be approved by the Council of Ministers. The rationale for the policy was recognition of the key role energy plays in the economy and social development, as well as to guide the sector along a least-cost and domestic resource compatible development path.

The objective of the energy policy is to ensure reliable energy supply and to promote shift from traditional to modern energy forms. The policy gave priority to (a) development of renewable resource of the country, particularly hydropower, (b) shift from traditional to modern energy uses (mainly from biomass fuels used

in households for cooking to modern fuels), (c) energy efficiency, (d) environmental sustainability, (e) private sector participation, and (f) institutional development.

In the area of domestic resource development the policy focused on hydropower as source of modern energy and afforestation to increase fuelwood supply. Geothermal, coal and natural gas were identified as supplementary to hydropower for modern energy supply; solar and wind energy resources are given limited role, mainly for thermal power (solar), and water pumping (wind).

Household energy is addressed under supply side policies with focus on increasing supply of alternative fuels to the household sector with the aim of creating sustainable balance between demand and supply for biomass fuels. The energy conservation and efficiency component of the policy stated the need for energy saving measures including increasing efficiency. Cross-cutting policies covered environmentally sustainable sector development, development of energy science and technology to build national capabilities, and public awareness and education.

Some of the limitations in the policy include:

- *Analysis of the country and sector context was very basic.* The sector context was only briefly introduced with share of biomass energy from total supply and domestic energy resources. Key issues including the socio-economic context, energy sector issues including institutional issues were not discussed.
- The policy sketched some inter-sectoral and cross-sectoral links related to cooking (deforestation, land degradation) but *failed to identify other key links including health, climate, gender* which would have had impact in the way the sector develops (e.g. stove development for IAP reduction). This limited the relevance of the policy (in the current context). Climate change links were particularly missing although the link between biomass energy use and climate change is clearly stated in the Environment Policy of 1997.
- *Policy implementation was not addressed within the policy or other strategy documents* emanating from the policy thus limiting its effectiveness. As an example, increasing supply of alternatives to biomass was recommended but what alternative fuels, to whom, where is not indicated. Similarly, energy efficiency measures were recommended but specific energy saving options are not identified and recommended.
- *The policy did not differentiate consumers* or target groups by geography, income or gender limiting policy relevance and failing to address equity issues. Policies are not specifically targeted (but this could have been addressed under strategy).
- *Sector governance issues including regulatory and institutional reforms were not given adequate attention.* The policy raised the need for a strong institution for policy making and sector coordination, better planning, human resource development, and self-reliance in technology.
- *Monitoring, evaluation and review of policy was not addressed.* Responsibility for M&E and review of policy was not given to a specific government agency, the roles of different actors in process were not considered.

### **2.1.3 Biofuel Development Strategy (2007)**

The biofuel strategy was developed during a period of high international interest in biofuels due to record high petroleum prices. Ethiopia, as a land locked country which imports all its petroleum requirements and which allocates the largest share of its export income on petroleum imports saw this as an opportunity for reducing its dependence on imports, improving energy security, attracting investment and creating jobs. Very high hopes were placed on biofuels where the policy indicated potential to produce 1 billion litres of ethanol annually (7 times petroleum consumption levels at that time) and similar levels of biodiesel production.

The goal of the biofuel strategy is to produce biofuels for the domestic market and for export. Specific objectives include substituting petroleum fuels with biofuels; creating jobs and raising incomes through biofuel feedstock production, processing, and distribution; and greenhouse gas emission reduction from replacement of petroleum by biofuels.

Key strategies for meeting objectives include technology transfer and R&D, promoting production of ethanol from sugarcane molasses and biodiesel from *Jatropha*, castor oil and palm oil; increasing biofuels use for

transport and for cooking; regulations in support of transition to biofuels including standards and blending mandates for transport. Cross-sectoral issues addressed include strong stakeholder engagement, international cooperation, efficient coordination and leadership (including a biofuel forum), and increasing finance for biofuel development.

- Following the approval of the strategy, the government created a biofuel unit within the Ministry of Water and Energy to coordinate biofuel development activities. This unit is now housed under the Ministry of Mines, Petroleum and Natural Gas. A national biofuel forum was also set up to coordinate activities across government ministries and among government and other stakeholders.
- Biofuels appeared relevant for Ethiopia at the time when there was great international interest for biofuels due to high prices and supply uncertainties for petroleum. Investors and the government showed great interest to develop biofuels in Ethiopia for both the domestic and export markets – more than fifty international investors were registered to develop biofuel feedstock in Ethiopia at the height of the biofuel boom around 2007.
- Very little of what was envisaged in the strategy has been realized – including investment from the government. Although production targets stated in strategic plans (e.g. GTP 2) continue to be very ambitious production and use have not risen as expected – ethanol production is still limited to 2 state owned sugar estates and there is no production of biodiesel.
- Key measures that were put forward in the strategy have not been implemented – e.g. increasing ethanol production from state sugar factories. As a result strategies for utilization (e.g. increasing ethanol blending levels for transport, expanding use in cooking) have not happened. Also some of the measures proposed, such as use of bio or vegetable oils for cooking could not be realized due to availability of the fuel as well as availability of appropriate cook stoves for the fuel.

#### **2.1.4 Draft new energy policy (2013)**

The National Energy Policy (draft) was issued in 2013 by the Ministry of Water and Energy. This new policy is not in force because it is yet to be approved by the Council of Ministers. The rationale for the new policy is based on new socio-economic context and rapidly evolving energy sector transformation (e.g. new energy forms such as wind and solar on the grid, off-grid electricity, electric rail, biofuels). The new policy was also necessary to address issues that had not been addressed in the energy policy of 1994 including climate change and health. The new energy policy aligns the sector policy with broader national strategies such as the CRGE and frames the policy in the current regional and international context.

The vision of the new energy policy is to make Ethiopia the renewable energy hub of East Africa. The mission is to ensure sustainable, reliable and affordable energy for socio-economic development of the country. Policy objectives include improving security and reliability of supply, increasing access, promoting efficiency, conservation and cleanness, strengthening sector governance, environmental and social safety and sustainability, and sector financing.

Cooking and bioenergy related policies are stated in four main areas: (a) promoting efficient and clean technologies with specific policies to improve household and service sector bioenergy efficiencies including with improved appliances, (b) supply side policies in the areas of sustainable forest management and supply, efficient bioenergy production, ensuring energy supply security (integrating energy into rural development packages), (c) demand side policies to accelerate distribution of efficient end use devices and introduction of alternative household fuels and technologies, (d) improving the governance and institutional frame for the above in technical standards and enforcement, appropriate regulations for bioenergy supply, enhancing domestic technical capacity, increasing the role of the private sector, and raising public awareness.

- The cooking context is more broadly understood with its inter-sector and cross-cutting links including climate change, environment and natural resources, gender, health. However, the rationale for the policies in the biomass and clean cooking sub-sector are not as strongly stated as in the national environment policy of 1997 where negative impacts were quantified (in lost agricultural and livestock production).
- The policy is aligned with current country socio-economic context, national strategies, specifically the climate resilient green economy strategy and sector development strategies and programs.

- The policy indicates areas for improved governance including decentralized decision making, stronger institutions with the requisite authority and resources, and better coordination (through energy forums, for example); it also points to the need for standards for efficient appliances.
- The policy does not address directly minority and vulnerable groups and their special circumstances – these include vulnerable households living in degraded areas (e.g. households living in areas identified for the sustainable land management or SLM program) and special groups such as refugees/Internally Displaced People (IDP) and host communities.
- The new policy shows the government’s continued commitment to the improved and clean cooking sector. The policy gives high priority to efficiency improvement which is usually the least cost option for consumers as well as the country level.
- The biomass and household cooking sector suffer from inadequate sector data (particularly verified data) in types and volumes of traditional energy consumed, stoves types used, distribution of improved and clean cook stoves, and consumer behavioural patterns (determinants of stove technology adoption by target groups).
- The clean cooking sub-sector has been split into two recently and the national improved cook stoves program (NICS) is housed under the MEFCC while some technical capability is left at the AETDPD under the MOWIE. Capacity to manage the clean cooking program is not adequate (in either ministry or even combined). There is need for better institutional set up and coordination.

### **2.1.5 Biomass energy strategy of Ethiopia, BEST (2013)**

The Biomass Energy Strategy of Ethiopia (BEST) was an initiative of the GIZ and MOWIE and it was developed with support from the EU Energy Initiative Partnership Dialogue Facility (EUEI PDF). A biomass energy strategy was deemed important in the case of Ethiopia because of its continued and growing dependence on biomass and the need to use the resource more sustainably.

The strategic vision of the strategy was sustainable use of biomass energy for socio-economic and environment benefit of citizens. The goal (mission) of the strategy was stated as improving access to sustainable and affordable biomass energy for all by 2030. Strategies were formulated in three areas:

- a) *Biomass energy supply*: expand and improve production of fast growing trees in existing and new plantations, sustainable management and harvesting of from forests and woodlands, increase charcoal production efficiency, process agricultural and process waste into charcoal.
  - b) *Biomass energy use efficiency improvement*: fuel efficient stoves and mitads development, revolving credit for stove producers and users, replacement of agri-residue used for cooking with electricity and other renewables.
  - c) *Institutional strategies*: assessment of capacity gaps in government, national charcoal policy for transparent and legal charcoal production and use, full integration of the BEST into national energy policy and the CRGE.
- This strategy estimated 122 million tons of biomass was consumed as fuel in 2013, significantly higher than the 79 million tons estimated by MOWIE for the same year (Energy Balance, 2012/2013). The study also estimated very high rates of charcoal consumption – more than 4 million tons of charcoal consumed in 2013 compared to just 48,000 in 2000. The strategy states that prior to 2000 charcoal use was significant only in Tigray and Somali regional states while by 2013 charcoal use was significant in all regional states. Reasons for the shift to charcoal in rural areas is explained as rising rural incomes, increasing access to fuel markets in rural areas, reduction of transport costs due to access by road, and declining access to wood in immediate vicinity of demand.
  - The massive move to charcoal use in both urban and rural areas (if indeed true) is an important consideration for new policies and strategies for several reasons: (a) charcoal production has much more damaging to forests than use of fuelwood, charcoal production technologies are very inefficient in Ethiopia, technology development and promotion for charcoal is not given adequate consideration in national programs.
  - The huge differences in estimates of energy used for cooking (fuelwood, charcoal) point to the need for reliable sector database. Policy making and implementation will be misguided without such data.

The BEST has a narrow perspective and deals exclusively with woody biomass resources and their use for cooking. The strategy has not provided data and insight into the availability and access to other biomass resources (agro-industrial waste, urban solid and liquid waste; it failed to specifically state the role of the biogas technology). The BEST also disregarded the potential role of biomass in non-cooking applications including power generation, agro-industrial thermal use (e.g. woody biomass and biomass waste use in cement kilns), and others. Because of the interaction of biomass resources to climate, environment, and natural resources, the strategy would have benefited if it was viewed from a broad context comprising climate and environment, natural resource management and livelihoods.

A review or update of the BEST with a broader and current perspective would make it a more impactful.

*a) Broad analytical perspective*

- The BEST update will benefit from a broader assessment of interaction of biomass resource and their use with climate change, local environment and natural resources and rural livelihoods. Such perspective will show conflicts and complementarities of biomass resource availability, access, applications. For instance, the forest sector is expected to be the largest means of reducing GHG emissions from Ethiopia in its Nationally Determined Contributions or NDC (responsible for 130MtCO<sub>2</sub>e from the total of 255MtCO<sub>2</sub>e) and Ethiopia has committed itself to reduce deforestation and forest degradation as well as create new forests. The CRGE and NDC put forest actions as one four pillars:

*“Protecting and re-establishing forests for their economic and ecosystem services, while sequestering significant amounts of carbon dioxide and increasing the carbon stocks in landscapes”*

- Similarly, an in-depth analysis of the interaction of biomass resources and natural resources and the local environment (soil and water quality, reduced agricultural productivity) will show potential synergies of biomass energy development with natural resource and environmental actions.

*b) Biomass energy supply (Objective 1):*

- The BEST will benefit from a wider vision of biomass energy supply issues – not only woody biomass for cooking, but all biomass resources including agro-industrial wastes, urban solid and liquid wastes. Higher productivity of agriculture and expansion of agro-industries will increase supply of agro-industrial waste and their potential uses in agro-industries, households and commercial applications.

*c) Biomass energy use efficiency improvement (Objectives 2 and 3):*

- The updated BEST will need to consider biomass energy use in a wider perspective than just cooking in the household sector including biomass energy utilization for centralized and decentralized power generation, thermal energy applications in agro-industries and other sectors
- The strategy appears to have not fully taken into account (or may have underestimated) the scale at which electricity has penetrated the residential and commercial cooking market. Considering the goal for universal electrification by the GOE a more detailed evaluation of the potential of electricity to replace biomass in cooking and other applications should be considered. Electricity is believed to have displaced significant amounts of biomass energy used for cooking and baking in urban areas.
- The BEST also needs to consider the possible large scale penetration of petroleum and liquid biofuels for cooking and other uses in both rural and urban areas.

*d) Institutional strategies (Objectives 4 and 5):*

- Findings from the BEST regarding biomass resources are significantly different from previous estimates (e.g. the Woody Biomass Inventory in 2000). Nationwide evaluation of biomass resources need to be undertaken regularly at much shorter intervals for better strategy formulation. Today this is possible because of the high profile forestry has been given in Ethiopia’s CRGE and NDC. Institutions working on biomass energy should have strong links with forest sector institutions (e.g. forest departments under MEFCC, the REDD+ Secretariat) to utilize what is available.
- Biomass energy promotion institutions need to develop close link with the forest development programs under MEFCC including the forest inventory work being undertaken by the MEFCC for

regular and high quality woody biomass resource data at the national level. Because of the requirement for regular reporting to the UN Framework Convention on Climate Change (UNFCCC) Ethiopia will from now on conduct national GHG inventories including forest inventories regularly.

- Institutions working on biomass energy should also review biomass energy consumption data available from national sources such as the Central Statistical Agency (CSA) of Ethiopia. The CSA publishes two surveys that have Welfare Monitoring Survey (WMS) and the Income and Expenditure Survey that provide data on amounts and values of cooking energy used as well as types of cooking devices used.
- Review/revise the updated BEST and seek endorsement by the Council of Ministers (COM)

### 2.1.6 National Improved Cook Stoves Investment Plan (2013, Version 8)

The NICS investment plan recognizes the multi-dimensional impacts and therefore the cross-sectoral linkages of clean cooking in the Ethiopian context and the need for coherent and coordinated action. The plan promotes a coherent and programmatic approach instead of ad hoc and piecemeal actions by numerous projects and project actors. It also recommended results-based management built on solid MRV and M&E systems.

The plan identified the following barriers for the clean cooking sub-sector:

- a) **Institutions:** limited coordination of stakeholders resulting in promotion of different priorities (not necessarily conflicting priorities) such as the interest of the health sector for clean stoves with chimneys while the energy sector priority may be in fuel saving. The IP suggested that government engagement is extensive but capacity is not adequate.
- b) **Markets:** some of the major barriers identified include access to production inputs (such as raw material for stove manufacture); stove producers are generally very small workshops using basic production methods and facilities thus low production volumes and productivity; limitation in transport and distribution infrastructure results in limited availability and access of ICS and adds to costs; existing distribution models have not managed to use existing distribution channels; distribution and marketing support has been limited to building production capacity (setting up stove producers) and **not the developing the supply chain** (therefore key distribution actors have not received incentives to reach customers); marketing messages have not been effective because the messages may not be effective or communication may be ineffective; market monitoring and reporting is weak to provide valuable information for market development.
- c) **Products:** some ICS may not meet customer requirements, pointing out meeting customer needs better requires monitoring and feedback to product development which is generally lacking; product development capabilities (including testing and evaluation of stoves) is not adequate to meet the requirements of the NICS program (although the IP recognizes some existing technical capacity at MOWIE, capacity will not be adequate for such a large scale program as the NICS).
- d) **Financing:** budget allocated by the government is limited (at the federal, regional and Wereda levels), the case is dire at the Wereda level where most of the program activities fall; resources available from development partners have been limited with external funding available through only a few bilateral organizations; customer financing options have been slow to develop; existing distribution models rely on subsidies (sometimes direct and substantial [e.g. domestic biogas], or indirect and limited [e.g. improved wood stoves]) which challenge the market based model that programs seek to promote.

The following issues and shortcomings are identified in the investment plan:

- The investment plan focuses on promoting improved household stoves for biomass fuels (not clean cooking); therefore the role of other clean fuels and stoves were not sufficiently explored. In addition the clean cooking in the service sector was not addressed (these include commercial services such as restaurants and social institutions such as schools, universities, detention centers);
- need to consider other elements of the cooking environment including kitchens, cooking practices (collecting fuel, preparing fuel, feeding fuel, tending to stoves), fuel access issues;

- need for more detailed data on cooking fuel uses and practices in both rural and urban areas; whether and how consumers are using improved stoves, what drives their decision to obtain and use the stoves; and
- market segmentation for clean cooking has not been addressed in sufficient detail (e.g. estimate of the potential market for electric Injera baking or cooking).

### **2.1.7 The Second Growth and Transformation Plan for the energy sector (2015-2020)**

The second Growth and Transformation Plan sets out baselines and targets for the energy sector during 2008 to 2012 EFY. The target for the improved and clean cooking sub-sector for 2012 EFY is shown below. The budget requested for the biomass component of the GTP 2 energy sector plan was ETB 443 million over five years, 90% of sought as grant from external sources (ETB 429 million excluding biogas systems).

- Improved cook stoves (solid biomass stoves): 11.45 million
- Domestic biogas: 31,400
- Household biofuel stoves: 20,000
- Solar cookers: 5,000
- Institutional gasifier stoves: 60
- Institutional briquette stoves: 60
- Improved charcoal production kilns: 250
- Biomass briquetting systems: 250
- Production of ethanol fuel: 1,375 million liters (using 412 million liters for cooking, lighting, agro processing); distribution of 4.1 million ethanol stoves
- Production of biodiesel: 450 million liters (using 270 million liters for cooking, agricultural processing); distribution of 1.8 million biodiesel stoves
- Connection of 6.9 million new customers to the national grid

The rationale for the biomass component of the plan is stated as reducing demand for fuelwood to reduce pressure on forests, reduce indoor air pollution in homes thus reducing health problems for women and children, and reducing the time and effort spent by women and girls for fuel collection.

Strategies for achieving targets include (a) capacity building of the lead ministry, regional state Bureaus of Energy, and stove producing micro and small enterprises (MSEs), (b) development of new alternative energy technologies including clean cook stoves, (c) improved monitoring of the alternative energy program, (d) market development through public awareness of the benefits of technologies promoted, and (e) enhanced engagement of stakeholders and partners to increase resource flow to the alternative energy program (through forums).

- Baseline was 8 to 9 million ICS distributed at beginning of GTP period and the GTP 2 proposed additional 11.4 million ICS. The GTP 2 plan states that there would be a total of 16 million ICS by the end of the GTP 2 period (appears to have disregarded the need for replacements);
- The plan for distribution of household stoves is very ambitious; on the other hand, the plan for distribution of improved technologies and systems on the supply side is too small (or pilot level) with for example plan to distribute 250 improved charcoal kilns;
- Targets for biofuels are unrealistic including the budget as illustrated by targets for biofuel production and biofuel stove distribution targets (6 million biofuel stoves). Budget request for the biomass component of the program (excluding biofuels) was ETB 429 million over five years;
- Inconsistent plans within the same sector, for example, fuel and stove distribution for biomass, biofuels, electricity, and LPG;
- Need for integrated sector planning frame - inconsistent plans made for the same sector in different strategies and programs: consider plans for electric, LPG, other stoves in the CRGE for the energy sector;
- Questions about current and future relevance for some actions – this is the case, for example, for biodiesel production. The GTP 2 plan for biofuels points to the “absence of incentives for deteriorating engagement of private companies in biofuel feedstock production, biofuel production and processing”;



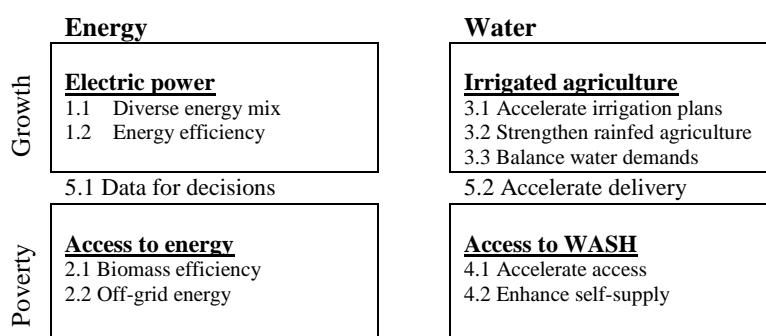
- Resources available, particularly financial resources, to implement the ICS component of the GTP2 plan fall far short of the budget estimate. In the GTP2 plan the budget requested for distribution of 11.5 million improved cook stoves was ETB 429 million (USD 20 million). Similarly in the NICSP Investment Plan for 2013-2018 the budget request was for USD 33.5 million. However, only about 10% of the total budget required could be mobilized.<sup>2</sup> and
- The plan ignored electric stoves from the list of clean cooking stoves for promotion. This is despite the fact that the electricity component of the GTP 2 plan has ambitious targets to connect 6.9 million new customers on the grid by 2012EFY (2020). Electricity is already having a transforming effect in the household cooking market and its potential in the short and long term should have been considered in more detail. Also note that although electric stoves do not make the list in the GTP 2 plan, they are part of the CRGE plan for the sector with estimated penetration of 5% in rural and 61% in urban areas by 2030 (p. 108, FDRE, CRGE, 2011)

### 2.1.8 Ethiopia CRGE, Climate Resilience Strategy: Water and Energy (?)

The climate resilience (CR) strategy for water and energy puts biomass energy efficiency as one of four key strategies for resilience for the energy sector (along with energy efficiency and diversifying energy mix, and off-grid electrification for electricity). The strategy estimated the funding required for the biomass efficiency improvement component to 2031 at USD 245 million.

The CR strategy reinforces the role of biomass energy use efficiency measures proposed under the green economy (GE) strategy as described in the CRGE document (and later GOE made commitments in the (I)NDC.

**Figure 2.1 Climate resilience strategy for water and energy**



- The strategy appears to have overlooked potential for energy efficiency for electricity use including efficiency improvement for cooking with electricity. The strategy proposed very high level of funding for the clean cooking sector (USD 245 million to 2031 or USD 8/stove), several times higher than the proposed in other documents including the GTP 2 and NICS investment plans.<sup>3</sup>

### 2.1.9 Intended nationally determined contribution (INDC) of the FDRE (2015)

Ethiopia submitted its intended nationally determined contribution in 2015, committing to cut GHG emissions to 145MtCO<sub>2</sub>e in 2030 (reduction of 255MtCO<sub>2</sub>e from the business as usual scenario). The NDC has four pillars: (a) crop and livestock productivity, (b) protect, re-establish forests for economic, eco-system services, CO<sub>2</sub> sequestration, (c) electricity supply from renewable energy, and (d) leapfrogging to modern energy efficient technologies.

<sup>2</sup>The NICSP investment plan sought USD 33.5 million for implementation during 2013-2018 (National Programme for Improved Household Cook Stoves Development and Promotion in Ethiopia, Version 8, 2013). According to NICS implementation plans only USD 3.69 million or 11% was available by 2015 (committed by donors: 73% from Norway, 9% from UNDP, and 17% from the Barr Foundation).

<sup>3</sup> For example, the GTP plan for improved biomass cookstoves is dissemination of 11.45 million stoves with budget of ETB 429 million (USD 20 million) or under USD 2/stove.

The forest sector is the biggest contributor to the NDC, responsible to 50% of the total emission reduction (130MtCO<sub>2</sub>e) by 2030; clean cooking stove distribution contributes 30% of the ER from the forest sector (21% from bioenergy, 9% from electricity). The efficient stove promotion program has short and long term targets: the short term target in the GTP2 plan is to disseminate 11 million improved cookstoves by 2020. According to recent progress reports from MEFCC and MOWIE achievement is about 80% of annual targets. This raises another key issue, which is the existence and quality of the monitoring, reporting and verification (MRV) system for the improved cookstoves program, and in general energy sector programs.

#### **2.1.10 National electrification strategy, NES (2016), National electrification program, NEP (2017)**

The NES provides strategies to scale up electrification in a more effective and sustainable manner. The objectives to create a more responsive institutional framework to accelerate electrification; enhance program coordination for better performance; better planning, design, construction and management; and increased connection rates both on and off-grid.

The national electrification program (NEP) was issued in November 2017 following the NES. The NEP foresees universal electrification (connection of all households) by 2025 – 65% of connections through the national grid, 35% of households through off-grid technologies. It further envisions connecting nearly all households (97%) to the national grid by 2030.

- The NEP foresees universal electrification in 2025 (65% on grid, 35% off-grid). The program envisions connection of 97% of households to the national grid by 2030 (7 years earlier than forecasted by the power system expansion master plan in 2014).
- Increased urbanization, rising incomes in both urban and rural areas, and universal electrification through the grid will result in significant shift from biomass to electricity (this is already the case in urban areas where electricity has become an important, in most cases the cheapest source of cooking).

#### **2.1.11 Ethiopian power system expansion master plan study, Draft Final Report, Volume 2: Load forecast report & distributed load forecast report (Feb 2014)**

The master plan foresaw electrification of 95% of households through the grid by 2037. The plan assumes that a large segment of households will use electricity for cooking in the long run (the following is for newly connected households):

*“As time passes the newly connected households would purchase more electrical equipment, and it is assumed that an average household would have 8 x 10 W lights operating for 3 hours per day, a 50 W radio operating for 6 hours (less usage due to TV set), a 200 W TV operating for 3 hours per day and a 1000 W electrical cooker operating for 1.2 hours per day for 365 days which gives 854 kWh.”*

- This plan assumes high rate of electric stove penetration for both newly connected and existing electricity consumers. This is different from estimates of other policies, strategies and studies that foresee limited role for electricity for cooking in the future.

#### **2.1.12-SE4All Global Action Agenda (April 2012)**

The UN initiated the Sustainable Energy for All (SE4ALL) agenda in 2012. The SE4ALL has three objectives for 2030: (1) ensuring universal access to modern energy services; (2) doubling the global rate of improvement in energy efficiency; and (3) doubling the share of renewable energy in the global energy mix. Actions are divided into seven “sectoral” areas: **(1) modern cooking appliances and fuels**; (2) distributed electricity solutions; (3) grid infrastructure and supply efficiency; (4) large-scale renewable power; (5) industrial and agricultural processes; (6) transportation; and (7) buildings and appliances. There are also four “enabling” Action Areas: (1) energy planning and policies; (2) business model and technology innovation; (3) finance and risk management; and (4) capacity building and knowledge sharing. The SE4ALL identified the following “high-impact” opportunities for modern cooking appliances and fuels:

- **building sustainable local value chains for clean and efficient cooking solutions;**

- building market demand by raising awareness of their health, economic, environmental, and gender benefits;
- investing in the infrastructure and local distribution supply chains required for cleaner fuels (e.g., ethanol and LPG); and
- developing tiered standards for efficiency, emissions and safety; and designing cooking appliances that meet consumer needs and price points.

Potentially useful inputs for future clean cooking policies and strategies:

- Introducing the value chain development approach for clean cooking (SNV is well placed to engage in this area because of its rich experience in the agriculture and other sectors);
- Building infrastructure and supply chains for advanced biofuels such as ethanol; increasing production of ethanol from state sugar factories, support for distribution including in developing appropriate technical regulations for supply (storage, transport, distribution), pricing incentives; and
- Understanding consumer requirements better through social research and using this as feedback for technical development of clean cook stoves.

### **2.1.13 The Nexus between Sustainable Development Goals and Clean Cooking**

The Sustainable Development Goals (SDGs) which are adopted by 193 nations in 2015, marked a major step towards addressing poverty, inequality, and climate change by 2030. Clean cooking is a key driver for the success of SDGs. Developing a thriving market for clean and efficient cookstoves and fuels will transform lives. The Global Alliance for Clean Cookstoves shows how clean cooking relates and directly deliver gains across 10 of the 17 SDGs.

- Goal 1- Clean cooking is part of basic services necessary to lead a healthy and productive life and saves households time and money*
- Goal 2- Efficient cookstoves reduce the amount of fuel needed to cook, thus reducing the burden on families who would otherwise have to collect it, buy it, or trade their food for it*
- Goal 3- Reducing smoke emissions from cooking decreases the burden of disease associated with household air pollution and improves well-being, especially for women and children.*
- Goal 4- Children, particularly girls, are often kept out of school so that they can contribute to household tasks, like cooking and collecting fuel.*
- Goal 5 – Unpaid work, including collecting fuel and cooking, remain a major cause of gender inequality*
- Goal 7 – Clean cooking is essential to addressing energy poverty and ensuring sustainable energy security for billions of people.*
- Goal 8 – Energy access enables enhanced productivity and inclusive economic growth. The clean cooking sector offers many job opportunities*
- Goal 11 – Clean cooking addresses household and ambient air pollution, resource efficiency, and climate vulnerability.*
- Goal 13 – Up to 25% of black carbon emissions come from burning solid fuels for household energy needs. Clean cooking solutions address the most basic needs of the poor, while also delivering climate benefits.*
- Goal 15 – Up to 34% of woodfuel harvested is unsustainable, contributing to forest degradation, deforestation, and climate change.*

## 2.2 Policies and Strategies in Related Sectors

### 2.2.1 Environment Policy (1997)

The goal of the Environment Policy is to improve and enhance health and quality of life of all Ethiopians and to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources and the environment as a whole. Guiding principles for policy include rights of citizens to live in a healthy environment, engagement of communities in decision making, and consideration of sustainability in development, use and management of renewable resources.

The impact of non-sustainable exploitation of forests and agricultural residue for fuel is understood as contributing to deforestation and forest degradation, loss of production from crop and livestock production. According to the policy burning of dung as fuel instead of as soil conditioner causes reduction in grain production by 0.55 million tons annually and degradation results in loss of livestock production equivalent to 1.1 million tropical livestock units.

The policy promotes the use of appropriate and affordable technologies which use renewable and non-renewable resources efficiently. For the energy sector the policy recommends:

- Improved sector planning (recommended inter-sectoral planning, meaning integrated planning)
- Sustainability considerations in sector development
- Recommended that large industries and enterprises consuming large volumes of wood to grow their own wood
- Farm and homestead planting of trees to meet wood fuel requirements of households

The Environment Policy recommended Ethiopia's strong engagement in climate change action with firm and visible commitment for GHG reduction. It recognized Ethiopia's environmental and long term economic interest and its energy prospects coincide with need to minimize GHGs.

The Environment Policy is comprehensive and forward looking and for this reason it is still relevant today. It has valuable lessons for policy and strategy development in the energy sector:(a) considered sectoral links more broadly than in the energy policy, (b) highlighted the impact of wood and agricultural residue use for fuel, detailing its impact on soil quality degradation, reduction in crop production and livestock production, (c) considered GHG in the policy – very early in the GHG debate; it also pointed the role of biomass energy in GHG emission, (e) monitoring, evaluation and policy review is part of the policy document (this is not so for the energy policy of 1994 or the draft energy policy of 2013).

### 2.2.2 National REDD+ strategy (final draft, 2016)

Forests are important sources of economic and ecological service in the context of Ethiopia meeting critical development needs of the country and livelihoods of millions of citizens, particularly in rural areas. The strategy points out that Ethiopia's forest resources are threatened by agricultural expansion and non-sustainable harvesting of trees for fuel.<sup>4</sup>Adequate legal and institutional frameworks are not in place or have not been implemented effectively to arrest or reverse this threat.

The goal of the REDD+ strategy is to reduced deforestation and forest degradation, and at the same time improve sustainable management of forests to increase carbon stocks. It seeks to reduce GHG emissions from and increase CO<sub>2</sub> sequestration into forests. The strategy recommends a set of policies, laws and investments to conserve and restore forest resources. The strategy also recommends national and regional state level institutional reform to achieve the goal.

The REDD+ program seeks to reduce deforestation and forest degradation by addressing the drivers for this (e.g. reducing the demand for wood products) and restore degraded areas through afforestation, reforestation, and forest restoration. The program will also strengthen the institutional and governance issues in the sector for improved sector management and development.

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<sup>4</sup>The national REDD+ strategy points out that Ethiopia is losing 92,000 ha of forest annually and that current afforestation rates are only 19,000ha annually, i.e. less than a quarter of the loss

The strategy identifies extraction of wood for fuel (wood for charcoal making and wood consumed directly) as the main causes of forest degradation in Ethiopia. Charcoal production is deemed a particularly severe contributor to forest degradation. The strategy proposed dissemination of fuel efficient stoves and alternative fuels to reduce demand for wood fuels (alternative fuels proposed include electricity, solar, LPG, biogas). The strategy has not identified biofuels as alternatives despite biofuels and particularly ethanol being considered in the GTP 2 plan as such an alternative. Targets for 2030 include dissemination of fuel efficient stoves to 3 million households, promotion of biogas systems to 0.8 million households, and use of other alternative fuels (electricity, LPG, solar) by 1 million households.

### **2.2.3 Climate Resilient Green Economy (CRGE) strategy (2010)**

The vision of the CRGE is to achieve middle income status by 2025 in a climate-resilient and green economy. The CRGE has identified more than 60 initiatives to reduce greenhouse gas emissions by 250MtCO<sub>2</sub>e by 2030 (reducing business as usual emission of 400MtCO<sub>2</sub>e to 150MtCO<sub>2</sub>e).

The CRGE has four pillars: (a) improve crop and livestock practices, (b) protecting and re-establishing forests for economic, ecosystem services and carbon stocks, (c) electricity generation from renewable sources for domestic and regional markets, and (d) transition to modern and energy—efficient technologies in transport, industry, and buildings.

The strategy has prioritized four initiatives: development of hydropower capacity, large-scale dissemination of rural cook stoves, efficiency improvement in livestock production, and reducing emissions from deforestation and forest degradation. The forestry sector accounts for nearly a quarter of total emission from Ethiopia in 2030 – half of this due to deforestation from expansion of agriculture into forests, and the remaining half mainly forest degradation mainly due to wood fuel consumption.

### **2.2.4 Forest Development, Conservation and Utilization Proclamation (No. 542/2007)**

The forest proclamation is based on the rationale that development, conservation and sustainable use of forests plays a decisive role in satisfying the needs of society for forest products and contributes to economic enhancement. Development and conservation of forests contributes to preventing soil erosion, desertification, loss of biodiversity and reduction of agricultural production. The policy points out that sustainable use for forests is possible by enhancing engagement of concerned communities and by harmonizing forest policies and programs with those of other sectors. Strategies articulated for promotion of forest development and for production and movement of forest products are relevant for the clean cooking sector.

*Promotion of forest development:* the proclamation promotes forest development by private individuals or companies, associations, government, and non-government agencies by ensuring their right to obtain rural land for this purpose. The proclamation states that management plans for protected and state forests will be developed with participation of local communities. The proclamation promotes farm forestry by providing plant seeds to farmers, and by assuring rights for land holding, development and transfer. The government shall

- Promote forest technology
- Promote market for forest products
- Designate, demarcate and register state forests
- Conserve, develop and administer and utilize state forests
- Administer protected forests and prevent forest fire

*Production and movement of forest products:* state forests are protected by this proclamation from non-sustainable exploitation (harvesting, settlement in forests, grazing by cattle, hunting) by the requirement for permits.

### **2.2.5 Health policy (1993)**

The health policy is based on the principles of decentralized health service, prevention, equitable distribution of limited resources, development of domestic capacity, regional and international cooperation for control of health hazards, and increased participation of the non-government sector in health service delivery.

The policy puts high priority on health care (prevention) awareness, priority to prevention of epidemics, reducing health problems stemming from mal nutrition and poverty, occupational and environmental health. The policy gives special focus on health service to families and particularly to women and children, for the productive population, marginalized communities, and those afflicted by human and non-human induced disasters.

The policies and strategies that are relevant to the clean cooking sector include those that promote public education and awareness on healthy living, personal hygiene, and healthy environment (inside the house and the home).

### **2.2.6 National policy on women (1993)**

The National Policy for Women seeks to enhance the social and economic role of women in society. It provides a range of actions to improve the social and economic participation and benefits to women. The policy gives women equal rights to men in both the economic and social sphere. The policy recommends integrating gender aspects into sector development plans and increasing effective service delivery to women. The policy gives high priority for

- Increase women's access to health care, education and employment (ensure that economic, social and political policies and programs give women equal access to country's resources as men);
- Eliminating discrimination against women including in the labour market, customary practices (through public awareness, laws, policies, regulations); and
- Supporting women to receive financial assistance for the formation of women's associations and groups (the policy created the Women's Affairs Office within the Prime Minister's office to promote the interests of women).

### **2.2.7 National science, technology and innovation policy (2010)**

The national science, technology and innovation policy recognizes environmental issues, in particular desertification, deforestation and forest degradation as critical problems in the context of Ethiopia. The policy indicates that solutions to these environmental problems are possible through the adoption, adaptation and generation of green technologies in agriculture, energy and water resources. Proposed strategies include:

- Introduction of fast growing trees for afforestation/reforestation and as sources of wood products including biomass energy, soil conservation;
- Local production of wind and solar energy hardware to make them affordable;
- Adopt waste management technologies together with energy generation; and
- Build local technological capacity (including building a center for research on energy).

### **2.2.8 Global Strategy for Safe Access to Fuel and Energy (SAFE) (UNHCR, 2014)**

There are 22.5 million refugees worldwide and Ethiopia is the sixth largest destination country for refugees in the world hosting 0.9 million refugees in 2018. Main refugee sources to Ethiopia are South Sudan (48% of refugees), Somalia (28%), and Eritrea (18%). Nearly three-quarter of the refugees in Ethiopia are living in just two refugee camps (Gambella for South Sudan refugees, SOMEL refugee camps in Dollo Adofor refugees from Somalia).

Large refugee influxes exert social, economic and ecological pressure at country and more importantly at the local level. Generally these are adverse pressures (although they can also be positive in some cases) stretching the capacity of local communities and ecosystems to support new populations. Provision of energy to refugees is one of the most significant in terms of the scale of such impacts. In realization of this the UNHCR and its partners have developed an energy strategy called SAFE strategy in 2014. The vision of this

strategy is “to satisfy energy needs of refugees for cooking and lighting in a safe and sustainable manner.” The strategic objectives are to:

- Integrate energy into emergency preparedness and response
- Develop and implement country level energy strategies
- Improve access to household fuel and lighting using appropriate technologies and renewable energy
- Increase access to energy for schools, health centres and other institutions.
- Establish and manage woodlots for fuel provision and environmental protection

The strategy envisages six implementing approaches: partnerships and coordination, capacity building, communication and advocacy, integrated approaches, measurement, and innovation.

The SAFE is a global strategy that provides broad guidance that applies across countries. However, because country contexts diverge widely (climate, natural resources, human and institutional setup and capabilities) global strategies can only give broad guidance. For this reason the SAFE strategy recommends the development and implementation of country specific strategies.

### **2.2.9 Strategic Plan: Safe Access to Fuel and Energy – Ethiopia Country Strategy (2015-2018), UNHCR Ethiopia, 2015**

The SAFE strategy for Ethiopia provides the strategy direction for the years 2015-2018. The strategy sets the context of refugee camps in Ethiopia including distribution of refugees, their energy demands, availability of energy resources, and the cost of energy. The strategy then sets objectives and targets for in six areas: (a) scale-up energy access, (b) expand the use of renewable energy, (c) attain efficient use of energy, (d) achieve sustainable management of environmental and natural resources, (e) unlock the potential of the private sector in energy service delivery, and (f) strengthen the capacity of the UNHCR and partners to effectively manage energy and environment-related operations.

The strategy has the following limitations:

- Disregarded host communities
- Disregarded integration with national energy and other relevant sector policies and strategies (including key national strategies such as the CRGE)
- Overlooked the resilience context in the design of the strategy which is critical in Ethiopia (and particularly for refugee/host community areas in the geographic and economic periphery)
- Lessons from existing interventions have not been evaluated (many have failed)
- The strategy would have benefited from a more in depth analysis of problems/issues, then evaluating strategic alternatives before selecting strategies
- Strategy formulation appears purely technical – setting the context in terms of energy demand (types, quantities), resources (types, quantities), then costs. The institutional and socio-economic and cultural context have been overlooked
- Considering the scale of demand and impact on biomass resources a more studied and refugee/host community specific resource mapping would have been useful
- The issue of supply-chains (service delivery models) have not been addressed (but lessons from past interventions show this to be critical). For example, several approaches for service/product distribution have been attempted – import and free give away of ICS, central purchase and distribution of stoves and solar lanterns, local/host community assembly and distribution of stoves
- The strategy has also not given attention to the needs of disadvantaged groups (how it will address their special circumstances) including women and girls, persons with disability, and the elderly

The SAFE strategy for Ethiopia is for the 2015-2018 period, which means it will be reviewed for the next planning period of 2019-2022 (review may already be in progress). It is recommended that such a review of the strategy consider the following to make it more relevant and actionable:

- A broader assessment of the context including the institutional set up and distribution models for energy services
- Broader assessment of needs that include host communities and their institutions
- Consideration of policies and strategies at the national and regional state level (Somalie, Oromia, Tigray)

- Generation of strategy alternatives, then rating and selection of options (selection could be by strategy formulation team and/or key stakeholders)
- Consider climate change as key
- Consider specific needs and capabilities of disadvantaged groups (women, girls, persons with disabilities, elderly)
- Incorporate lessons from past energy service interventions in the refugee context in Ethiopia

## 2.3 Key Issues and Recommendations

National policies are generally supportive of natural resource protection and conservation, environmental sustainability and domestic technological development. Energy sector policies all give cooking high priority for policy and strategic action although the degree to which they understood the level of impacts and links across sectors varied significantly.

The energy policy of 1994 is still in place as the new energy policy of 2013 is still at draft stage not being approved by the Council of Ministers. The 1994 policy gave high priority for a shift from use of traditional energy sources (biomass fuels used in the household sector for cooking) to modern energy, energy efficiency and environment sustainability, all of which are directly relevant to clean cooking. The policy recommended two strategies for the household sector: supply of alternative fuels to biomass, and energy efficiency in cooking. The policy had the following shortcomings in the area of clean cooking:

- The inter-sectoral linkages of clean cooking were understood narrowly than today (e.g. links to health, gender and climate change)
- Policy implementation strategies were not addressed
- Sector governance issues were not given due attention
- Monitoring and evaluation framework for policy was not included in the policy

The draft national energy policy of 2013 is still yet to be endorsed by the Council of Ministers. It has now been five years since the last draft and it should get another revision before it gets approved. The draft policy puts sector in the contemporary context with linkages in the economic and social sectors as well as environment and climate more strongly. It envisions Ethiopia as the renewable energy hub for East Africa with potential for both energy export and imports. Clean cooking and bioenergy policies include promotion of clean and efficient technologies, particularly for the household sector; and sustainable bioenergy production. The new policy recommends stronger governance including stronger institutions and decentralized decision making (which can be an option for faster dissemination of clean cook stoves), standards and their enforcement for clean cook stoves.

### *Recommendations for energy policy*

- The Energy Policy (draft) was issued in 2013 but it is yet to be approved by the Council of Ministers (COM). It is recommended that this draft policy, which is already five years old, is reviewed one more time and submitted for approval to the COM. A substantial review is required; this revision is better carried out **by working groups for each area of policy one of which will be clean cooking**. The working groups should be composed of key stakeholders which would be led by a team composed of ME FCC, MOWIE, and MoMPNG as a coordinator.
- It is recommended that the new policy include an M&E framework in the policy so that lessons can be learnt, corrective actions can be taken during policy and strategy revisions.
- Policy making should be based on quantitative assessment of sector development paths or scenarios (e.g. using energy analysis models); policy should give high priority to sector data management and sector development scenario analysis including using energy models.

The biofuel development strategy was approved by the Council of Ministers in 2007 during a period of high interest in biofuels internationally. The government of Ethiopia considered biofuels due to their perceived potential to reduce dependence on imported petroleum fuels. There was high hope that ethanol and biodiesel can be produced competitively to replace up to 20% of domestic gasoline and diesel consumption and also exported. There was also hope that ethanol can contribute significantly to meeting household energy demand for cooking. The government initially has set up a unit for coordination of biofuel development within MOWIE and a national biofuel forum for coordination of stakeholders. This unit has moved to the MOMPNG since 2015. Today little of what was envisaged for biofuels ten years ago has come to be realized.



Only ethanol is produced, no biodiesel, and less than 3% of the plan to produce more than 1.3 billion liters during the GTP 2 period is produced and used.

The biomass energy strategy (BEST), issued in 2013, envisions sustainable biomass energy use in Ethiopia. The strategy proposed increasing the biomass energy supply base with promotion of fast growing trees, increasing biomass fuel use efficiencies, and integration of the BEST strategy into energy policy and a special policy on charcoal. The strategy conducted an energy consumption survey and reviewed biomass energy supply scenarios and estimated current levels of biomass energy consumption were much higher than previously thought (122 million tons vs. 79 million tons) and that consumption of charcoal has grown alarmingly between 2000 and 2013 in both rural and urban areas. Wood and charcoal consumption estimates from this strategy are much larger than those from recent national energy balances, raising the issues of data validity and the impact this has on policies and strategies. If indeed wood and charcoal consumption levels are as estimate in the strategy more focused attention should be given to improving the efficiency of charcoal stoves and accelerating their diffusion.

The national improved cook stoves investment plan (IP) was launched in 2013. The IP promotes a coherent, coordinated and programmatic approach to the ICS sector. It seeks to address market barriers by supporting development of the supply chain, ICS product development so that stoves meet consumer requirements better, and increase financing for ICS from domestic and external sources. A revision or update of the IP will benefit from a wider approach to ICS sector development including giving more emphasis on development and promotion of stoves for modern fuels, promotion of clean cooking in the social and commercial sectors, understanding the drivers for cook stove adoption by consumers.

The second Growth and Transformation Plan for the energy sector has put very ambitious plans for the clean cooking sector: 11.45 million ICS, 31,400 domestic biogas, 20,000 biofuel stoves, 412 million liters of ethanol for cooking (4.1 million ethanol stoves), 270 million liters of bio-oil derived fuel for cooking (1.8 million oil stoves), and 5,000 solar cookers. The budget requested for the biomass component of the plan was ETB443 million.

#### ***Recommendations for energy sector strategies***

- Strategies are essential for implementing policies providing more specific directions, actions and costs. The government's move to develop sector wide short term strategies (e.g. GTP), and sub-sector specific strategies (biomass, biofuels) provides a clearer guide for sector actors. However, strategies formulated in recent years suffer from consistency among them, credibility in their targets, and limitation in M&E.
- Consistency between strategies – although similar directions are charted in the various strategies the scale and emphasis among them differs (sometimes basing strategies on different data such as those from the biomass strategy which estimate much larger fuelwood and charcoal consumption). A more coherent approach for strategy making should be followed including using a single consistent sector database.
- The Biomass Energy Strategy (BEST) was developed in 2013. This strategy document has not been well communicated among the different stakeholders for implementation. However, similar to the revised draft Energy Policy, BEST also needs to be revised and updated in order to be inline with changes in technology, policy, and national development direction. Moreover, estimates of firewood and charcoal consumption as cooking energy in BEST hugely vary from other references. Verification of such information for reliability is crucially important not to misguide policy making and implementation.
- Global Strategy for Safe Access to Fuel and Energy (SAFE) was developed by UNHCR in 2014. Despite very useful information and strategic directions to address the energy and environmental issues of refugees in the country, it has not been well communicated by relevant government stakeholders nor integrated to the national sector strategies. SAFE strategy should also be updated in light of the current national and international integration policies for refugees, and also need to be adopted into national energy sector strategy after indorsed by mandated sector organizations.
- Some goals stated in strategies appear not to be credible (e.g. targets for biofuels). A more credible and measured approach to target setting which takes into account capacities (regulatory, financial, technical) should be followed in the future.

- Resource mobilization for implementing the National Improved Cookstoves Program (NICS) has fallen much short of expectations (only 10% or less than expected).<sup>5</sup> Further, what is available has also not been fully utilized. Reasons for such resource flow to the program include limited promotion of the program for potential development partners, internal capacity within the program and at ministry level to develop viable proposals to development partners, inadequate performance on existing commitments (for those already investing in the program to increase their commitments). The main recommendation is to increase capacity of the NICSP program unit and those at higher ministry level for resource mobilization and for more effective program management.
- Monitoring and evaluation of strategies – a strong M&E (MRV) system including a strong sector database of not only basic data but sector wide analysis using energy models should be available for strategy development.
- It is a good idea to think of a **clean cooking strategy**, much like the electrification strategy, to address clean cooking issues in an integrated framework. There is sufficient ground for this due to the scale and impact of cooking in the Ethiopian context.

The forest development, conservation and utilization proclamation promotes forest protection through better management including with engagement of local communities, forest development through promotion of forest technologies and markets for forest products. The proclamation states that movement of forest products (which would include fuelwood and charcoal) should be regulated with requirements for permits.

Environment and climate change policies relevant to the clean cooking sector are contained in the Environment Policy, the CRGE, the climate resilience CR strategy for the water and energy, and the CR strategy for agricultural and natural resources. The Environment Policy puts biomass energy in a broader context with linkages to the natural resource degradation, climate change and gender. The CRGE considers protecting and rehabilitation of forests, and transition to modern and energy-efficient technologies as two of the four pillars of the strategy. The CR strategy for water and energy puts biomass energy efficiency as one of the four key strategies for the sector. Clean cooking features highly in the INDC where the forest sector contributes 50% of the total emission reduction from Ethiopia and clean cooking 20% of the ER from the forestry sector.

The health policy puts priority on prevention of diseases, on occupational and environmental health, and providing health care to women and children. These are directly related to reducing or eliminating indoor air pollution from the home which affect mainly women and children. The national policy on women recommends integration of gender issues into sector development programs, and it ensures women's right for full participation in the economic and social programs that affect them

The science, technology and innovation policy promotes green technologies to address environmental problems associated with deforestation and forest degradation. The policy recommends afforestation and reforestation with fast growing trees to meet demand for wood products including energy, and to build local technological capacity including building a national center for energy research.

#### ***Recommendations for energy related policies and strategies***

- There is very close link among clean cooking, forest development, environment, climate change, health, gender, and technology and innovation. For this reason a framework, platform or **forum for cross-sectoral strategy development, monitoring and evaluation** should be in place. Strategy development and M&E for the clean cooking sub-sector should have these as key stakeholders.

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<sup>5</sup>Raising finance for the green economy (including the NICS) has proven much more difficult than initially thought. For instance, resources required to implement the green economy component of the CRGE was USD150 billion over 20 years but less than USD 100 million could be raised six years into the plan

## 3. Institutions and Programs

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### 3.1. Evolution and Developments in the Energy Sector Institutions: A Brief Background

#### 3.1.1. What are Institutions? Why are they Important?

The definition of institutions involves several complex social, legal and organizational concepts and, as such, there is no universal definition for the term. However, as broadly defined by the World Bank (2000)<sup>6</sup>, institutions are the “**rules of the game**” that emerge from formal laws, informal norms and practices, and organizational structures in a given setting. The incentives they create shape the actions of public officials. Institutions overlap with but are not synonymous with organizations; they are affected by policy design but are broader in scope and less subject to frequent change than most policy frameworks.

#### **Effective enforcement of the ‘rules of the game’ is important for government institutions to deliver:**

The concept of “rules of the game” is the key defining characteristics of institutions, because, by setting the ‘rules of the game’, government institutions play an important role in shaping and incentivizing the way society and organizations behave. These rules guide economic and political interactions, determine how goods and services are delivered, shape how budgets are spent, and regulate the justice system. But, by themselves, these rules are not always effective. When rules are not enacted and enforced by effective and trusted institutions, then resources are wasted, services aren’t delivered, and people (especially the poor) do not receive the required protection<sup>7</sup>. In fact, when institutions are unable or unwilling to enact and effectively enforce the rules, it is not only the public service delivery that suffers, but the institutions themselves become dysfunctional and predatory.

#### **Box 3.1: Building Capable Public Sector Institutions**

Building the institutions for a capable public sector is essential to enhancing state effectiveness, but also immensely difficult. Once poor systems are in place, they can be very difficult to dislodge. Strong interests develop in maintaining the status quo, however inefficient or unfair. And those who lose out from present arrangements may be unable to bring effective pressure to bear for change. Even when the incentives are there to improve public sector performance, formidable information and capacity constraints often thwart the attempt. .... How can governments with ineffective public institutions begin to put things right? The complex problems involved in building and managing a public bureaucracy do not lend themselves to clear, unambiguous solutions. .... The foundations of an effective public sector: (i) Strong central capacity for formulating and coordinating policy, (ii) Efficient and effective delivery system, and (iii) Motivated and capable staff.

**Weak Capacity and Fragmented Policymaking in Developing Countries:** In aid-dependent countries donors sometimes alleviate, but too often worsen, the problem of weak central capacity. To the extent that their policy advice supplements weak capacity at the center, they help solve the short-term problem at hand. But such advice does nothing to build long-term capacity if politicians fail to recognize the need ultimately to rely on local experts. Donors may also fragment central capacity for policy formulation, entering with ministries into bilateral deals on multiple projects without determining whether their cumulative effects are collectively sustainable or mutually consistent. In many countries public investment programs have become passive repositories of donor-driven projects, whose recurrent costs after completion continue to accumulate, contributing to an expansionary fiscal bias. Lack of coordination between the ministry of planning and the ministry of finance sometimes further impedes the integration of capital and current expenditures. (Source: **WB: BUILDING INSTITUTIONS FOR A CAPABLE PUBLIC SECTOR: World Development Report 1997**).

**Institutions are set up by bringing three key elements: (i) people, (ii) power or mandate, and (iii) resources** to effectively deliver public goods or services. In bringing these three components of institutions together, it is important to pay a special attention the human factor – the ‘people’ component. No matter how well designed and laid out the ‘rules of the game’ may be, effective implementation of the rules depends to a large extent on the behavioral context of the people who enforce the rules. In a simple, plain language, institutions are organized entities and organizations are a collection of people. When people are brought together human dynamic emerges. After all, people are human beings and they are not simple spectators or inanimate machines to be engineered by a rational set of blueprints; and people come with all sorts of ideas, interests, norms, beliefs and egos. Missing these human factors, therefore, overlooks important dimensions that shape institutional change.

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<sup>6</sup>World Bank (2000): Reforming Public Institutions and Strengthening Governance: A World Bank Strategy.

<sup>7</sup> Andrew Rathmell (2016): Building Effective Institutions.

### 3.1.2. Evolution of Energy Sector Institutions: Historical Trajectories

**Continuing engagement of the government and donors in the cookstoves sector is essential:** The role of the public sector in general and that of the government in addressing the rampant market failure in the Ethiopian clean cooking sector cannot be overemphasized. Having recognized their fair share of the burden (of addressing market failure in the cookstoves sector), the Government of Ethiopia (GoE) and several bilateral and multilateral development partners (DPs), have been actively supporting the sector for nearly four decades now. Previous efforts in the sector, which continued to this date, include establishing and developing cookstove sector institutions, institutional capacity building, design, development, deployment, promotion and commercialization of improved and clean cooking technologies, innovative financing schemes, TA and training for the private sector; and more recently, supporting establishment and enforcements quality standards.

Before moving on to discussion of key government institutions in the sector, we believe, it worth saying few words about cookstoves sector institutional development trajectory. This would serve as a backdrop to visualize the current state of institutions, institutional capacities and arrangements (coordination or lack of it) that will be discussed later in sections (3.2 and 3.3).

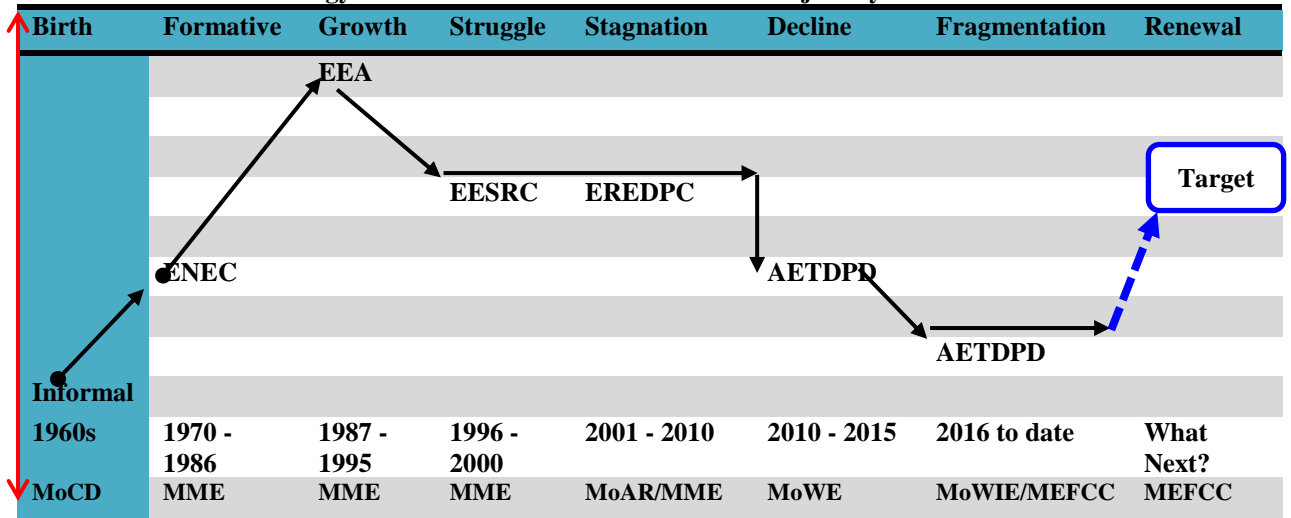
**Initial rapid institutional growth and development was followed by considerable institutional instability, stagnation and fragmentation of portfolio (mandate):** Before mid-1970s, there was no formally mandated institution in the cookstoves sector in Ethiopia. However, there some limited cookstove activities by some government institutions (e.g., the then Ministry of Community Development) promoting user-made mud-stoves as part of wider development goal. In response to the two global oil price shocks of the 1970s, however, formal energy sector institutions emerged, established and rapidly grew between 1980 and 1995. The following is a brief sequential account of development and trajectories of the energy sector institutional situation:

- **Ethiopian National Energy Committee (ENEC):** Following the two oil price shocks of the 1970s that hit Ethiopia badly and disproportionately, a high-level political decision was made to contain the impact of the oil crisis as well as pave the way for Ethiopia to shift to the development and use of its indigenous renewable energy resource in a more organized manner. In effect, the ENEC was established around 1978. The then Ministry of Mines, Energy and Water Resources (MoMEWR) served as a Secretariat of the Committee (ENEC) drawn from a number of line ministries (Ministries of Energy, Agriculture, Industry, State Farms, etc). As a special-purpose vehicle designed to give birth to a higher form of energy sector organization, ENEC served as a semi-formal coordination platform until it withered in late 1980s.
- **Ethiopian Energy Authority (EEA):** The EEA was established in the late 1980s with an all-inclusive mandate for renewable energy with the exception of large hydropower projects. Side by side with large scale recruitment, training and capacity building programmes to build a strong energy sector institution, the EEA conducted energy sector studies and implemented dozens of renewable energy development projects and programmes including cookstoves, PV-based rural electrification, biogas, woody-biomass inventory, new fuels (charcoal and briquettes) production and marketing. The EEA was split into two (EESRC and Energy Works Department, but within the MME – the latter after few years). The EEA’s organizational mandate was reduced to the level of a Center in mid 1990s.
- **Ethiopian Energy Studies and Research Center (EESRC):** Under its new organizational form and content as a Center, the mandate of the institution was not only reduced but it was also modified and made to focus on energy studies and research. In 2002, the energy sector institutions (this time includes the electric utility) were into two Super Ministries (the electricity sector moved to the then Ministry of Infrastructure and the EESRC to the Ministry of Agriculture and Rural Development). The EESRC continued until it was rebranded as EREDPC and re-joined the MoME around 2005.
- **Ethiopian Rural Energy Development and Promotion Center (EREDPC):** The EREDPC was established in the early 2000s under the MoWE with a clear mission and mandate to promote

efficient and environmentally sound energy technologies in a sustainable manner, and facilitation of energy development in rural areas through the provision of information, technical assistance and loan financing to the private sector, community organization, non-governmental and governmental organizations in order to contribute to accelerated economic and social development.

- **Alternative Energy Technology Development and Promotion Directorate (AETDPD):** In 2010, The EREDPC lost its institutional mandates and renamed as AETDPD under the newly rebranded MoWIE (former MoWE). Having lost large segments of its institutional mandates, the institution was weakened further and it is currently in downward spiral – the spiral needs to be stopped and reversed.
- **Fragmentation of mandates between various ministries and agencies:** In 2015, the MoWE was again restructured and renamed as Ministry of Water, Irrigation and Electricity (MoWIE). In effect, two new mandates – Irrigation and Electricity – were made the responsibility of the MoWIE, but one of its historical mandates – Renewable Energy (other than large hydropower) – was distributed over two other Ministries. The MoEFCC took over the National Improved Cookstoves Programme (NICSP) while the mandate for bio-ethanol development was transferred to the Ministry of Mines, Petroleum and Natural Gas. Despite the fragmentation of the Renewable Energy (RE) mandates, the AETDPD including its Workshop, Laboratory and above all a highly skilled and experienced staff of over 40 staff remained under the MoWIE. Obviously, the intention of the decision to restructure the MoWIE can only be good, but the consequences of fragmentation of RE mandates are not only causing a coordination nightmare among stakeholders, but they are also damaging to the entire RE sector development. Such fragmentation of RE mandates begs for high-level decision makers’ attention to reverse the downward spiral and put the RE sector back on a center stage. Historical trajectories of the RE sector institutional developments are schematically represented in Table 3.1 below.

**Table 3.1: Renewable Energy and Cookstoves Sector Institutions Trajectory:**



Note: Years are only indicative, not exact

### 3.2. Key Institutions and Clean Cooking Activities: Programs and Projects

Energy is a service to be provided to consumers; and its consumers are both diverse and their category too many ranging from residential through commercial and transport to agricultural and industrial sectors. So are energy carriers (biofuels, electricity, fossil fuels, etc) and service providers (parastatal, utilities, fuelwood suppliers, stove producers and retailers). The cookstoves sub sector is no exception. In fact, navigating through the cookstoves sector is much more diverse and complex than the overall energy sector, because it involves too many interest groups and actors (governments, donors, activists, private businesses) and cross-

sectoral and cross-cutting issues (Forestry, climate change, agriculture, health, gender, employment creation, etc). Simply put, actors and stakeholders in the energy sector are too many and too diverse to easily navigate. Such diversity and multiplicity of actors in the cookstoves sector is what makes all the more important task of sector coordination extremely difficult and often less effective, if not ineffective altogether.

This section is neither about mapping stakeholders nor is it about clean cooking energy markets. Instead, it is about institutions and their activities, projects and programs in the clean cooking sector. To further narrow down the scope, this section is about key government institutions that are currently engaged in the clean cooking sector.

### 3.2.1. Key Government Institutions

#### MINISTRY OF WATER, IRRIGATION AND ELECTRICITY (MOWIE):

**Mandates of MoWE (Pre-2015):** The MoWE is the federal institution responsible for **development, planning, and management of energy resources as well as for creation of policies, strategies, and programs**. The MoWE develops and implements laws and regulations for the energy sector, provides technical support to regional energy bureaus and offices, and signs international agreements. Following the government's restructuring of agreements in 2010, all duties and responsibilities of the former Ethiopian Rural Energy Development and Promotion Centre (EREDPC) were transferred to new departments under the MoWE, including the Alternative Energy Development and Promotion Directorate (AETDPD). Within the MoWE, a Rural Electrification Fund which has been established with the goal of debt financing small-scale rural energy initiatives. Responsibility for the development and deployment of small scale renewable energy technologies lies within the responsibility of the MoWE.

**Mandates of MoWIE (Post-2015):** The Ministry of Water, Irrigation and Electricity of Ethiopia is a federal organization established to undertake the management of water resources, water supply and sanitation, large and medium scale irrigation and electricity. The Ministry is a regulatory body which involves the planning, development and management of resources, preparation and implementation of guidelines, strategies, policies, programs, and sectoral laws and regulations. It also, conducts study and research activities, provides technical support to **regional water and energy bureaus** and especial support to four emerging regions (Gambella, Benishangul-Gumuz, Afar and Ethiopian Somali). In the case of transboundary water resources and regional developments pertinent to the sector, it engages in the negotiation and the signing of international agreements. The Ministry is headed by a Minister and three State Ministers. The State Ministers are managing: Water Supply and Sanitation Sector, Irrigation and Drainage Sector and Electricity Sector. Following the recent restructuring (2015/16), naturally, the new mandates required MoWIE to focus efforts on three key sectors: Water Supply and Sanitation, Irrigation and Drainages and Electricity (Both on-grid and off-grid), but no official mandate on non-electrical REs apart from some regulatory matters.

As can be seen from the new (currently in force) mandates of the MoWIE, there is no mention about energy except a passing remark about the provision of technical support to regional energy bureaus. Despite such silence about RE sector, frequent restructuring of the Ministry and vertical (within the ministry) and horizontal (between various ministries) movement of the institution (EEA, EESRC, EREDPC and Now AETDPD), the MoWIE has always been the natural home of the RE (including cookstoves) institution.

**EREDPC (Now AETDPD) Mission:** The mission of the EREDPC is to promote efficient and environmentally sound energy technologies in a sustainable manner, and facilitation of energy development in rural areas through the provision of information, technical assistance loan financing to private sector, community organization, non-governmental and governmental organizations in order to contribute to accelerated economic and social development. In spite of the fact that this mission statement old (belongs to the EREDPC) and may not reflect AETDPD's current realities, the Directorate has continued its operation along the same lines with the old mission statement, but with no clear mandates and policy oversight by its parent Ministry – MoWIE. The NICSP, which was among the key portfolios of the AETDPD until 2015, has been transferred to and made the responsibility of the MEFCC. However, the AETDPD and its staff are working on RE projects and programmes including the solar PV component of UNDP/GEF supported Rural Energy Technology (RET) project (that consists ICS and Solar PV) and the EU-funded SNV's National Biogas Programme – Ethiopia (NBP E+).

Note that paragraph (2) of the MoWIE establishment Proclamation states that **THE POWERS AND DUTIES GIVEN TO THE MOWIE BY THE PROVISION OF OTHER LAWS, CURRENTLY IN FORCE, WITH RESPECT TO WATER RESOURCES AND ELECTRICITY**, ARE HERE BY GIVEN TO THE MoWIE. What about non-electric energy? Except using the word “energy” only once (which appears to be by mistake) in the document, the word ‘energy’ has been avoided carefully and systematically in the new MoWIE establishment proclamation. There is no mention about it. So, where have the mandates for non-electric energy gone? Is there any legally mandated institution to guide the non-electric energy sector activities, mobilize resources and coordinate efforts of various donors and other stakeholders? The answer is obvious NO at the moment.

#### **MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE (MEFCC):**

Initially, the Ministry of Environment and Forest (MoEF) was formed by merging the Ethiopian Environment Protection Authority and Forest sector in 2010. The MEFCC evolved further when the Climate Change sector became part of the Ministry’s portfolio in recent years. The MEFCC is the Federal institution for managing the Environment of Ethiopia. Vision, Mission and mandates of the MEFCC are as follows:

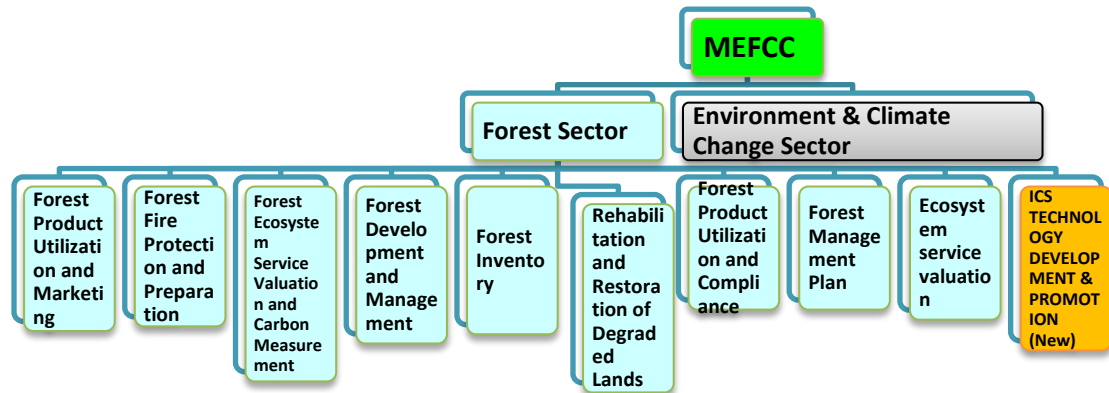
- **Vision:** As its vision, the Ministry aspires to see Ethiopia that has built Climate Resilient Green Economy and reach the Middle Income Country status by 2025 through ensuring sustainable environment and forest management, development and utilization.
- **Mission:** Preparing a system and ensuring implementation of environment and forest resources management, development, utilization and its sustainable contribution to poverty reduction, perform & coordinate research and technology transformation, promoting education and awareness raising, coordinating the implementation of Climate Resilient Green Economy (CRGE), building implementers capacity, promoting investment in forest sector and marketing, lead and follow-up implementation of international accords, and preparing situational progress reports on environment and forest related issues.
- **Mandates:** The Ministry is responsible to ensure the realization of the environmental rights, goals, objectives and basic principles enshrined in the Constitution as well as the Environment Policy of Ethiopia through coordinating appropriate measures, establishing systems, developing programmes and mechanisms for the welfare of humans and the safety of the environment. It is mandated to formulate or initiate and coordinate the formulation of strategies, policies, laws and standards as well as procedures and up on approval monitor and enforce their implementation. It is also responsible for the synergistic implementation and follow-up of international and regional environmental agreements, including those pertaining to hazardous chemicals, industrial wastes and anthropogenic environmental hazards in which Ethiopia is a party. As stated in the MEFCC establishment Proclamation No. 916/2015, the Ministry has a broad range of powers and duties in the environment, forest and climate change sectors (see Annex 5).

Since the transfer of the NICSP from MoWIE to MEFCC in 2015, the MEFCC assumed the responsibility for ICS technology development, promotion and monitoring the dissemination of ICS. A new Directorate – Improved Cookstoves Technology Development and Promotion Directorate has been established under Forest sector of the Ministry. Headed by a Director, the Directorate has nine experts working in various aspects of ICS development and promotion. Key tasks of the Directorate include identifying advanced and low-emission ICS for large scale dissemination, conducting ICS research and development, providing skills training, knowledge and technology transfer to ICS manufacturers, promoting wide-spread adoption of ICS, prepare project proposals for ICS funding, preparing producer and user training as well as quality control manuals, conducting training on and preparing proposals for emission trading for clean cookstoves, and monitoring, reporting and verification of emission abatement from ICS and clean cookstoves.

In addition to housing the NICSP and providing TA and support to other implementing partners such as REAs and WVE, the ICS Directorate is working on two other cookstove projects. These are (i) the

UNDP/GEF supported RETs project which has a clean cookstoves component and (ii) the SNV-SEECCS initiative, which the Directorate serves as a focal institution for the forthcoming implementation of the project.

**Figure 3.1: Forest Sector Institutional Set Up**



Arising from its cross-sectoral and cross-cutting nature, the issue of production and utilization of energy and clean cooking sector in particular impacts, among others, the environment, forest and climate change sectors all of which fall under MEFC’s portfolio. Apart from its regulatory roles and coordinating CRGE-related sectors and institutions for a common goal, the legislation does not explicitly specify the ministry’s mandates in relation to energy in general and clean cooking sector in particular. So, unless by way of interpreting the legislation and identifying the obvious relevance of clean cooking initiatives to its wider mandates, institutionally, MEFC is not mandated to engage in operational aspects of energy (production, distribution, marketing, etc) including clean cookstoves. On the other hand, however, the mandates of MoWIE and MoMPNG are limited to the electricity sector, and petroleum fuels respectively. According to the Minutes of Understanding for the transfer of NICSP from MoWIE to MEFC, the justification for moving the National Improved Cookstove Program to MEFC is the perception that the concept of improved cookstove is referred to biomass fuels consumption reduction, and hence the direct relevance towards MEFC’s mandate on forest protection and development, GHG mitigation, and CRGE.

**MINISTRY OF MINES, PETROLEUM AND NATURAL GAS (MOMPNG)**

Established in 1977 as Ministry of Mines, Energy and Water Resources, the MoMPNG has gone through several restructuring during the past four decades. It was renamed as Ministry of Mines and Energy when Water Resources evolved as an independent Commission (Water Resources Commission) in 1982. In 2002, the Energy sector was divided between two Ministries (Ministry of Infrastructure and Ministry of Agriculture and Rural Development); and the Ministry was renamed again just Ministry of Mines. This change lasted only about three years. Another wave of restructuring came in 2005, which reunited the mining and energy sector and renamed as Ministry of Mines and Energy once more. The fifth round of restructuring came in 2010 and the two sectors (mining and energy) were separated yet again leaving the mining sector as Ministry of Mines for the second time. The energy sector joined water resources and named as Ministry of Water and Energy. The sixth and most recent restructuring took place in 2015 resulting in fragmentation of non-electric energy sector mandate and restructuring of the mining sector as Ministry of Mines, Petroleum and Natural Gas as we know it today.



**Table 3.2: Number of Times the Mining and Energy Sectors were restructured between 1977 and 2015**

Year	Name	Note
1977	Ministry of Mines, Energy and Water Resources	Composed of three sectors – Mining, Energy and Water Resources
1982	Ministry of Mines and Energy	Water Resources became a Commission
2002	Ministry of Mines	Energy sector was divided between two Ministries – MoARD & Ministry of Infrastructure
2005	Ministry of Mines and Energy	Reunion with Energy
2010	Ministry of Mines	Water & Energy sector were combined & formed MoWE
2015	Ministry of Mines, Petroleum and Natural Gas	Energy sector lost mandate, fragmented

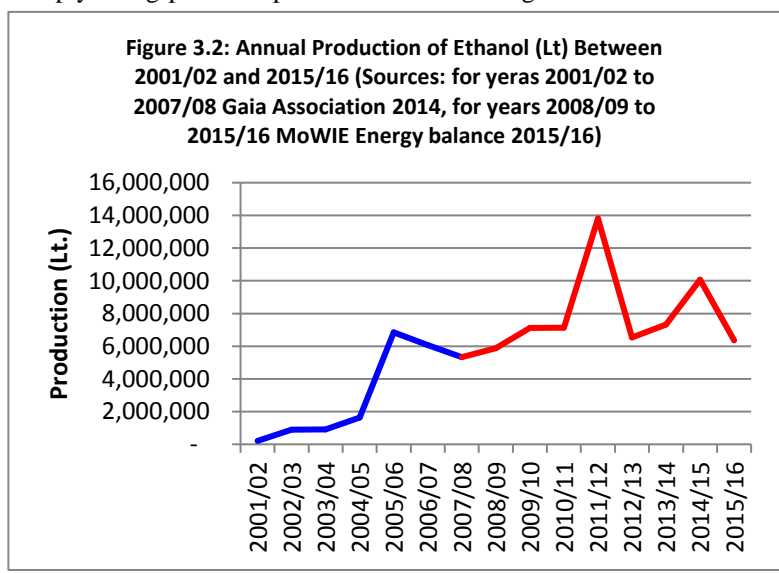
Following the 2015 restructuring, responsibility for overseeing and coordinating the development of bio-fuels sub sector was transferred from MoWIE to MoMPNG. The Biofuels Development Coordination Directorate (BDCD) under MoMPNG is now responsible for coordinating biofuels development efforts of various public and private sector actors. As biofuels development involves multiple stakeholders along its value chain (promoters, feedstock growers, processing plants, suppliers, blenders, retailers and consumers), stakeholder coordination is one of the key tasks of the BDCD. The Directorate serves as a Secretariat of a 23 member Bio-fuels Coordination Forum. In the late 2000s and early 2010 when the biofuels development discourse reached its peak, the forum was very active, convenes biannual stakeholder meetings and it was chaired by Minister of MoWE, who reports regularly and directly to the Prime Minister. Since mid-2010, neither the Forum nor the Directorate is as active as they were once. Despite long delays in pipeline Sugar Factories, bio-ethanol is still alive operating at very low scale; and the case for bio-diesel appears to be hanging on the balance, if not in its death row.

In terms of capacities, the Directorate has ten experts headed by a Director. Unlike many other Ministries, the petroleum sector of MoMPNG, which houses BDCD, does not have representation at the regional level. Such lack of structures at lower administrative echelons is likely to adversely affect the implementation of biofuels development initiatives.

At the moment, there is serious shortage of ethanol supply; and there is no more ethanol-benzene blending taking place. But, the Directorate receives small quantity of ethanol for distribution to its clients through a Charity, Gaia Association for domestic use. Owing to heavily subsidized price (Etb 11/Lt.) for domestic consumers (as opposed to Etb 18/Lt. for industrial consumers), Sugar Factories are often reluctant to supply ethanol for domestic cooking use.

**ETHIOPIAN SUGAR CORPORATION AND BIO-ETHANOL DEVELOPMENT CORPORATION**

Starting around 2005, domestic development and utilization of bio-fuels (ethanol and bio-diesel) was a talk of the town. Following the then sharply rising prices of petroleum fuels in the global market later in the decade, the policy debate surrounding bio-fuels development did not only reach new highs, but it also reached the circles of highest policy-making circles in Ethiopia. In effect, Ethiopia’s Council of Ministers adopted a strategy – The Biofuel Development and Utilization Strategy of Ethiopia – in 2007. The MoME was mandated to oversee activities of the sector, mobilize resources, coordinate initiatives and facilitate development and utilization of biofuels. Later when mandates for biofuel development were



transferred from MoME to MoWE (around 2010), a unit dedicated to coordinate stakeholders in the field of biofuels development was established and organized a number of stakeholder consultative forums. Following the most recent restructuring (in 2015) of MoWE into MoWIE, biofuels as a renewable energy sub sector was left without a ‘*Godfather*’. However, though sluggish, developments in the biofuels sub sector continued afterwards.

In March 2018, two public Corporations – Ethiopian Sugar Corporation and Bio-ethanol Development Corporation signed an agreement to set up two refineries in Kuraz Sugar Factory (South Omo) with a daily capacity of producing 1.5 million liters of ethanol. If and when the plan is put in practice, it is anticipated to increase the supply of ethanol by leaps and bounds – from the current annual average of about 10 million liters to about 45 million liters. While priority of the transport sector over residential is likely to continue even after massive increase in the supply of ethanol in the coming years, it is likely that any excess ethanol supply could begin flowing to the domestic cooking sector in the future.

One of the key policy objectives of the biofuel development strategy was *to substitute ethanol for domestic fuel as well as study and create favorable conditions for the domestic manufacturing, efficiency improvement and use of bio-ethanol stoves and equipment*. Later on, however, the emphasis shifted from using ethanol as a substitute domestic cooking fuel to its use as a transport fuel by blending it with Benzene. Ethiopia started blending ethanol (5%) with benzene (95%) and using it as a transport fuel in 2009. The ratio was raised to 10%:90% later in 2013. With regard to the use of ethanol as a cooking fuel in the residential sector, things did not go according to the original plan. That is, firstly, the center of gravity shifted away from domestic sector to transport sector, and secondly, production of ethanol was far below what was planned or expected initially. From the outset, Gaia Association (a not-for-profit organization) was keen in and promoted the use of ethanol for residential cooking by supporting the development and marketing of a Swedish made two burner ethanol stoves to households in Addis Ababa and some Refugee camps. Gaia’s initiative was confined to few thousand households (in the Capital and some Refugee Camps) and could not take-off of the ground primarily due to shortage of ethanol supplies, which continued to this date.

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## REGIONAL ENERGY AGENCIES

Arising from the federal structure of the Ethiopian State, Regional Energy Agencies (REAs) are crucial actors – both in terms of public policy processes and institutional arrangements for implementing public policy actions. REAs, just like all other sector offices at the level of National Regional States, often align their institutional arrangements, strategies, programmes, etc with those of federal institutions. But, constitutionally, they can also have their own internal arrangements. The usual practice is, however, to align and realign their operations as well as institutions as a mirror image of those at the federal level. In effect, any restructuring of an institution or reorientation of programme objective would almost always lead to similar changes and adjustments at the level of regional institutions and their operational arrangements.

Sector Bureaus and agencies at the regional level are affected not only by institutional restructuring at the federal level, but, as counterpart replica institutions, strengths and weaknesses of their peers at federal level do often get transmitted to and reflected in regional government institutions. REAs, are no exception to this general rule. Regional Water, Mines and Energy Bureaus and REAs have been in a constant struggle restructuring their institutions and realigning their objectives and operations with and to reflect changes made in institutions at the federal level. Such re-configuration of institutional arrangements at regional levels take place almost every time when federal institutions are restructured (regardless of the former’s interest for such changes). For example, when the MoWIE and MEFCC were restructured in 2015, some confusion and glitches were created hampering the smooth operations of ongoing programmes and projects.

In addition to compelling REAs to introduce organizational restructuring needed to reflect the new institutional arrangements at the level of federal ministries, additional efforts (organizing awareness workshop) were required to introduce the changes in operational/institutional arrangements as well as encourage REAs to do same so as to avoid potential misunderstandings and difficulties in operations of ongoing programmes and projects. Besides, such changes in institutional arrangements at federal level very often cascade beyond regions and affect institutions at zonal, woreda and even kebele levels – levels where projects are actually implemented.

It is not uncommon for the Government of Ethiopia (GoE) to restructure and reorganize its federal ministries and agencies; and such restructuring often follows the five-year election cycle. Institutional restructuring

may not be a bad thing in itself; and the State (with its legitimate powers) may have good reasons that necessitate institutional restructuring (keep its house in order). What may be not a good thing about institutional restructuring at the federal level is firstly, the frequency at which it takes place. Some of the federal institutions have gone through some kind of restructuring (some radical, other more reform-like) almost every five years following the election cycles.

Naturally, frequent re-organization and restructuring of institutions, in addition to adversely affecting smooth and expeditious implementation of ongoing initiative, could destabilize institutions leading to loss of focus and disillusionment among staff. Secondly, in Ethiopian context where the State draws its powers from its constituent National Regional States, the ways in which changes to federal institutions (ministries and agencies) are introduced and adopted are as important as the changes themselves. This is because, any institutional restructuring changes that take place at the level of federal institutions almost always trigger similar changes at the level of regional institutions with a cascading effect all the way down to the smallest administrative unit – the Kebele Administration.

Therefore, to mitigate undesirable consequences of changes in the constellation and configuration of federal institutions (institutional instability, staff morale, implementation speed, planning and predictability of future actions, etc) it is essential to actively engage and reach a consensus with those institutions, regional government institutions in particular, and stakeholders that would be directly affected by such changes.

### 3.1.2 Clean Cooking Activities: Programs and Projects

#### NATIONAL IMPROVED COOKSTOVES PROGRAMME (NICSP)

Origin and history of improved cookstoves (ICS) initiatives in Ethiopia go as far back as early 1970s, but more focused and organized ICS projects began to appear on the household energy map only after mid-1980s. Findings of several household energy studies conducted between 1979 and 1984 (CSA/ENEC, CESEN Ansaldo, WB/ESMAP, ILO/ENEC) identified household energy as one of the most pressing issue in the energy sector and the national economy as a whole. The studies unequivocally identified that (i) the household sector is the largest consumer of energy, (ii) solid biomass fuels mined from increasingly dwindling and degraded forest resource base is the major supplier of energy, (iii) the household sector is not only the largest consumer of energy, but also it relies almost entirely on solid biomass fuels for domestic cooking needs, (iv) as the largest energy consumer as it is, cooking devices (openfire) widely used by the household sector are extremely energy-inefficient.

According to the studies, rising prices of biomass fuels (caused by supply shortages) and declining agricultural productivity (due to soil erosion and loss of soil nutrients caused by deforestation and forest degradation), were not only affecting the energy security of poorer households, but they were also threatening agricultural productivity and incomes thereof - the very basis of livelihoods of millions of rural Ethiopians. In fact, findings of studies mentioned above have led to a new energy debate, i.e., the then much-talked-about and infamous 'household energy crisis'. The studies further recommended three types of household energy interventions: (i) demand management through introduction and large-scale dissemination of energy-efficient cookstoves, (ii) supply enhancement through reforestation, afforestation and introducing fuelwood plantations, and (iii) fuel-switching through shifting households' demand for cooking energy from traditional biomass fuels to electricity, kerosene and LPG. As a matter fact, some of these strategies, demand management and fuel switching in particular, have significantly contributed to shaping the household energy landscape that we see today in Ethiopia.

**Table 3.2: NICSP Main Programme Activities**

Returning back to ICS, dozens of cookstove projects supported by a range of international development partners were implemented by government organizations, NGOs and CSOs throughout the country between 1990 and 2010. However, implementation of the cookstoves projects was characterized by piecemeal approach, disjointed and haphazard implementation, poor institutional coordination and lack of capacity, lack of shared vision, multitude of actors and small market players with very limited technical and business management skills, poor product quality and lack of standards, and lack of innovation in terms of both financing mechanisms and business models as well as product development. As a result of all these negative factors, the cookstoves market remained underdeveloped and the sector's enormous potential for GHG emission reduction and CO2 abatement while improving households' access to clean, affordable energy remained unrealized.

No.	Program Activities
1	Establish management and coordination structures
2	Institutional capacity building at all levels accomplished
3	Promotion and IEC/BCC
4	Producers and Entrepreneurship development
5	Stove performance
6	Establish carbon financing scheme
7	Research and Development
8	Monitoring, Evaluation and Learning

It was in response to this sad situation that the NICSP was conceived and established under the then MoWE (now MoWIE) in 2013. As rightly argued in the NICSP's Implementation Plan (IP), the overarching principle of the Programme is to see the whole (the 'forest') first and then, the individual (the 'trees'). The conviction behind the NICSP's all-inclusive approach is that, if and when centrally coordinated under a single national programme (Programmatic Approach), the cookstoves sub sector has the potential to greatly contribute to the achievement of transformative changes. Understandably, the "trees" approach (individual cookstove projects), is what is impeding the cookstoves sub sector from contributing its fair share to green-growth path destined to sustainable development. The NICSP is designed to see the entire "forest" rather than individual "trees" under its single national umbrella.

The objective of the NICSP is to support the dissemination of 9 million improved cookstoves in Ethiopia up to 2016 that will lead to environmental protection and improvement of air quality conditions for cookstove users in urban and rural areas. The intended outcome is contribution towards meeting CRGE goals of reducing emissions from deforestation and forest degradation and ensuring access to clean energy

Prior to 2011 (Before GTP I), a little over seven million improved stoves were distributed across the nation. Under GTP I (2010/11 – 2014/15), the target was to distribute over 9.4 million ICS nationwide. According to information from NICSP, 8.87 million stoves (about 94% of the target) were actually distributed under GTP I. While the main focus of the programme under GTP II (2015/16 to 2019/20) was on raising consumer awareness, providing capacity building training and information-communication support to regional implementation partners and private sector ICS producers, the target is to distribute 11.45 million (additional) ICS nationally. As GTP II is still underway, actual performance against the target is yet to be measured. However, loss of momentum in accelerated deployment of ICS is outright clear. Admittedly, transfer of the NICSP portfolio from the MoWIE to MEFCC in 2015, has led to reduced performance in terms of numbers of ICS distributed during the past three years<sup>8</sup>. Moreover, sudden and not well planned transfer of NICSP to MEFCC left it orphan without integration to existing structure. This is one of the major limitations that caused for a decline in the dissemination of improved biomass cookstoves in the country. NICSP does not have energy program implementation strategy and hence, the sustainability of improved biomass cookstoves is deem after the phase out of the program. It is, therefore, highly recommended to reconsider and locate biomass cookstove programs in their rightful organization.

## AETDPD

Although it has lost the NICSP portfolio to MEFCC, has no clearly defined mission and vision; and more importantly, legally bestowed mandates at the moment, the AETDPD is active in certain limited areas of cookstoves business including design and development of prototypes, thermal efficiency testing and

<sup>8</sup> The Ethiopian Herald, 01 January 2018, Interview with the NICSP Programme Manager.

technical assistance on demand. The Directorate also co-manages two cookstove initiatives: (i) the UNDP/GEF supported Renewable Energy Technologies (RETs) project, and (ii) the EU funded, SNV managed national biogas programme.

- A. The UNDP/GEF Supported RETs Project:** The MoWIE/AETDPD jointly with the UNDP is currently implementing a small but nationwide five years project (2015 to 2019), Promoting Sustainable Rural Energy Technologies for Households and Productive Uses, which has two components – cookstoves and off-grid PV. Total project budget is about US \$ 6 million. The overall objective of the project is *to promote and encourage significantly greater use of energy efficient and renewable energy technologies for households and productive use in rural communities in Ethiopia*. The project intends to adopt a more private sector-driven and market-oriented approach in promoting RETs. Spatially, scope of the project is all off-grid communities in all nine regions of Ethiopia. This five-year project consists of four components and implementation is currently underway. The four components of the project are: (i) Strengthening Regulatory and Legal Frameworks Based on National Standards, (ii) Rural Public Awareness Campaign on RETs, (iii) Sustainable Financial Mechanism for RETs for households, and (iv) Business Incubator to Promote Greater Entrepreneurship for Investment in RETs. Activities of the Project at Regional level also converges with that of NICSP run by MEFCC as both MoWIE and MEFCC work with same Regional Energy Agencies and Bureaus. MoWIE implements this program in collaboration with MEFCC, DBE, UNDP and UNCDF.

Major project activities accomplished so far include:

- National standards approved and published for ICS and PV SHS (16Wp to 350 Wp). To put the new national standards in to practice, manuals were prepared and a series of cascading training provided to regional implementing partners,
- Laboratory equipment and instruments were purchased and distributed to regional incubation centers to help them comply with the national standards.
- Awareness raising campaign using radio spot messages and roadshows is underway,
- Credit risk guarantee fund (US \$ 1.4 million) established at the Development Bank of Ethiopia,
- A series of entrepreneurship skills development training conducted and 14 RET enterprises received innovation prizes of US \$ 5,000 each.

- B. National Biogas Programme Ethiopia + (NBPE +):** is the scaling up program of the National Biogas Programme of Ethiopia, following completion of the first phase of the NBPE (2009 to 2013) and the second phase (2014 to 2017) that was extended with no cost extension until March 2019. NPBE+ was launched in 2017. While the first phase and the second phase of (NBPE) was implemented in four regions (Tigray, Amhara, Oromia and SNNP), the scaling up program NBPE +, which builds on the achievement of the previous phases, is designed as a five year programme running from 2017 to 2022. The overall objective of NBPE+ is to improve the living standards of farmers and their families, in the Ethiopian regions of Afar, Amhara, Benishangul-Gumuz, Gambela, Oromia, SNPPR, Somali and Tigray while reducing the over-exploitation of biomass and greenhouse gas emissions. By developing a viable bio-digester sector, the programme also aims to contribute to economic and business development as well as creating socio-economic and environmental benefits, through a sustainable energy mix.

NBPE+ is a public-private partnership at federal, regional and district level funded by the EU and the government of Ethiopia. SNV is the overall programme manager and also provides technical assistance to the implementation. The Ministry of Water, Irrigation and Electricity (MoWIE) executes the programme on behalf of the Government of Ethiopia.

Centrally managed by SNV, the NBPE+ is a very well structured programme with Coordination Offices at national and regional levels. The Coordination Offices are embedded within respective government institutions at national and regional levels, but similar structures do not exist at lower administrative echelons, i.e., zones and woredas. At zonal

and woreda levels, programme implementation becomes sole responsibility of government structures.

To date, over 19,000 biogas digesters are installed throughout rural Ethiopia under the two programmes.

## GIZ ETHIOPIA

### A) GIZ – Energy Coordination Office (ECO)

Working with the Ministry of Water and Energy the ECO has since 2010 been actively working to promote renewable energy in Ethiopia. Key achievements include:

- ❖ Installation of 100 photovoltaic solar systems in off-grid and remote public health centres and four community centres,
- ❖ Ethiopia's first solar technology training centre has been set up at Selam Vocational Training Centre, in Addis Ababa, in collaboration with the Ethiopian Alternative Energy Promotion and Development Centre,
- ❖ Construction of four pilot micro-hydropower plants in three villages of the Southern Nations, Nationalities and People's Region, with a total capacity of 125 kW,
- ❖ Establishment, training and capacity building for more than 650 small-scale producers of improved, energy-efficient cooking stoves in 310 districts and seven regions which has led to commercial distribution of an additional 500,000 cook stoves.

### B) GIZ – Energizing Development (EnDev) Ethiopia (2010 – 2020)

Commissioned by German Federal Ministry for Economic Cooperation and Development (BMZ), EnDev Ethiopia a ten-year programme, multi-donor energy access partnership with MoWIE serving as a lead executing agency. The overall aim of EnDev Ethiopia is to support the establishment of self-sustaining markets for modern energy supply, with a focus on rural areas. Focusing mainly on types of renewable energy technologies (RETs) namely (i) energy-efficient cookstoves, (ii) photovoltaic systems, and (iii) converting/upgrading traditional water mills to off-grid electricity mini-grids, EnDev Ethiopia contributes to improved energy access for off-grid households, rural social institutions and small businesses in rural areas.

Achievements of EnDev Ethiopia include:

- ❖ Installation of photovoltaic solar systems in more than 200 off-grid social service institutions (mostly Public Health Centers) providing access to modern energy services including, refrigeration and laboratory equipment,
- ❖ Training to dozens of PV equipment dealers and retailers which contributed to commercial sales of about 12,000 SHS and 300,000 solar lanterns providing modern energy access to about 430,000 people in rural off-grid communities,
- ❖ More than 650 small-scale producers of energy-efficient cookstoves established their businesses in seven regions of Ethiopia. Since 2012, an estimated 2.2 million improved cookstoves (mostly

#### Box 3.2: European Union Support to EnDev Ethiopia

Since 2017, the European Union (EU) Delegation to Ethiopia provides additional support to Energizing Development. The support will be directed towards developing and growing the market for modern renewable energy technologies and services as well as energy efficiency solutions. With the extra resources from the EU and EnDev core donors it will be possible to reach around 500,000 people until 2020. 100 social institutions, predominantly rural health centres and schools that currently do not have access to electricity from the national power grid will receive solar power technology to run their facilities and equipment. In addition, measures will help establish 100 production sites with an enhanced manufacturing of cookstoves, which can be used for cleaner cooking in households in rural areas. These households so far depended on firewood to fuel their cookstoves. 1,100 improved cookstoves will be provided to social institutions and 2,000 will be sold to businesses. The manufacturing of 240,000 improved cookstoves will be supported to go on sale – accompanied by targeted promotional activities. The EU support in Ethiopia will further strengthen the commercial distribution of quality solar systems leading to sales of 100,000 solar lanterns and 1,300 solar home systems to households and businesses. Moreover, 30 traditional water mills will be equipped with technology generating renewable energy. They will thereby grant access to electricity and enable the socio-economic development of rural communities. (Source: EnDev Ethiopia, April 2018)

Mirtand Tikikil stoves, for baking and cooking respectively) are produced and sold by businesses supported by EnDev.

- ❖ Six pilot micro-hydropower plants have been constructed in five villages in South-western Ethiopia. A preliminary assessment of more than 400 potential micro-hydropower sites will be completed in 2018. Following recommendations of a subsequent feasibility on selected sites about a dozen micro-hydropower plants will be developed as mini-grids to provide access to electricity in several rural off-grid communities.

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## **WORLD VISION ETHIOPIA (WVE)<sup>9</sup>**

World Vision Ethiopia (WVE), with financial support from World Vision Australia (WVA) and Standard Bank is implementing Energy-efficient Cookstoves (Mirt and Tikikil) Scale Up Project in 12 of its Area Development Programs (ADPs) in several rural areas in Oromia (10 ADPs) and Southern Nations, Nationalities and Peoples' Regions (two ADPs). The cookstoves project was started in 2013 with the aim of forest degradation caused by demand for fuelwood. The project is also intended to achieve other co-benefits including economic, health, environmental and livelihoods.

Business model adopted by the cookstoves project is that of setting up and organizing cookstoves producers in to cooperatives to run the cookstoves businesses. Such rural-based producers' cooperative approach does not only democratize job opportunities created by the cooperatives, but, by decentralize the cookstoves operations, takes the products one step closer to the often difficult-to-reach rural consumers. Some of the major achievements of the project include the following:

- ❖ Training to over 50,000 people cooperatives development and improved cookstoves manufacture,
- ❖ Establishment of 290 Cooperatives with 49,170 members,
- ❖ Innovative financing to 2,473 women owned enterprises,
- ❖ 25 Mirt improved cookstoves producers Cooperatives were set up and established with full-fledged legal status. These ICS Producers' Cooperatives, in addition to providing employment opportunities for more than 300 rural people, have produced and sold 49,170 Mirt ICS in a space of less than three years.

In terms of the overall developmental benefits, the WVE ICS project, apart from creating livelihood (jobs) opportunities for more than 300 rural people, has reduced the risk of in-door air pollution (IAP) related health hazards, reduced the burden of collecting/purchasing and transporting firewood (cash expenditure or time and effort) in more than 49,000 rural families. According to WVE (2016) report, average daily fuelwood consumption of households who shifted to the use of ICS (Mirt and Tikikil) dropped from 12.3 Kg to 5.6 Kg – equivalent of 46% savings. At the rate of 2.32 tons of CO<sub>2</sub> per year per household (WVE estimate), the WVE ICS project expects to reduce a total of 660,000 tons of CO<sub>2</sub> emissions in the residential cooking sector until 2022. Back in 2016, the project was anticipating carbon revenue from sale of 660,000 tons of CO<sub>2</sub>. If and when emissions reductions due to ICS are successfully sold in the global market, the revenue will be ploughed back into the Cooperatives' coffers to boost their financial sustainability further.

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## **OTHER INTERVENTIONS**

There are several other small scale and short term improved cookstove program that have been implemented by government organization, development partners, and the private sector. The World Bank funded Development Response to Displacement Impact Project (DRDIP), the FAO Technical Cooperation Program, and the Paradigm East Africa Manufacturing (EzyLife Ethiopia) are to mention few of them.

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<sup>9</sup><https://www.wvi.org/sites/default/files/Cook%20Stove%20Magazine%20May%2019%202016.pdf>

DRDIP is intended to alleviate livelihood and environmental impacts in rural kebeles that are primarily affected because of refugee settlements. This project is implemented by Regional Agriculture Bureaus and Offices. The project supports affected rural Kebeles by building health posts, rural schools, providing water and road access, and doing conservation works. As part of the water conservation work, fuel saving cookstoves, biogas and solar lighting products are disseminated to poor rural households believing that use of these technologies would help to improve the livelihood of the households and also alleviate the burden on the local environment. MEFCC closely works with Regional Agriculture Offices on the implementation of fuel saving cookstoves part of this project.

The United Nations Food and Agriculture Organization (UNFAO) Technical Cooperation Program is implemented in partnership with MEFCC. The Program intends to build the technical capacity of associates by providing technical training for dissemination of improved cookstoves in four refugee camps in Gambella Region.

Paradigm East Africa Manufacturing is a social enterprise that intends to distribute fuel saving biomass cookstoves in Ethiopia. The enterprise locally assembles a fuel saving cookstoves known as EZYLife. It closely works with microfinances to arrange consumer financing so that low income households could afford to adopt the stove.

### **3.3 Institutional Capacities**

Institutions are created to deliver public goods and services; and they are expected to deliver in the best possible manner. For institutions to deliver public goods and services in ways that are both efficient (doing it in the right way) and effective (doing the right thing), governments (and donors) need to invest in building capacities of the institutions that are mandated specifically to deliver on certain public policy agenda (in this case, clean cooking).

Donors, working closely with respective recipient country governments, spend a great deal of resources every year supporting efforts to build effective, inclusive and accountable government institutions in developing countries including Ethiopia. The belief is that these institutional capacity building reforms will lead to better, effective institutions that are able to provide rule of law, support economic growth and reduce poverty including energy poverty through basic public service provision.

But, building effective government institutions proved difficult and results are rather mixed at best. In almost every single development project implemented across all sectors of the economy over the past two decades, there is institutional capacity building component with no exception. Hearing about institutional capacity development needs and initiatives thereof has been and still is a common sight in hundreds of workshops that were conducted in Ethiopia every year for the past two decades or so. Looking back in to previous efforts, one can safely conclude that first of all, results of previous capacity building efforts in delivering the intended benefits are rather mixed, and secondly, building capacities of government institutions proved more difficult than it was initially anticipated. Now, the question is why is it so difficult to build better, effective institutions? True, it takes years and even decades to build effective public institutions, but it also takes, on the part of high-level policy-makers, creating vision, providing leadership, ensuring institutional stability, providing clear mandates, and committing sufficient resources for institutions to effectively exercise their mandates. It is with such institutional mandates and resource requirements as a back-drop that we shall present our assessment findings in the proceeding sections.

#### **3.3.1 MEFCC: NICSP and ICS Directorate**

Following the transfer of the NICSP to the MEFCC, the Ministry, under its Forest Sector, is implementing the Cookstoves programme. The NICSP management team, embedded in the MEFCC, has a capable team of six experts specializing in various fields in the cookstoves supply chain. However, unlike the NBPE+, the NICSP does not have coordination offices at the regional level. As such, it relies entirely on the staff and resources of the Regional Energy Agencies for the implementation of the programme within their respective jurisdiction. The NICSP is in its final year and, if it is not extended farther, the programme is scheduled to phase out in less than eight months (end 2018). After the phase out, a new Directorate, ICS Directorate under the Forest Sector is expected to take over the responsibility of programme implementation on its own and in coordination with other line Ministries and stakeholders in the cookstoves sub sector. But, how well prepared is the ICS Directorate to assume this responsibility?



The ICS Directorate is a relatively new Directorate, which just finalized the process of staff recruitment. Apart from a Director and few other posts, many posts are still vacant and recruitment is still underway to fill in the vacant posts. Those staff members who are hired and those who are yet to be recruited may be well qualified, but it is unlikely that they possess skills and experiences that meet the complexities of work that the cookstoves sub sector along its value chain (design, prototype development, performance testing, pilot production, acceptability assessment, test-marketing and commercialization) would require. Experience suggests that acquiring such specialized skills along the value chain takes several years. Staff capacity development should be given due emphasis and be a continuous part of program activities implementation plan.

Another key institutional capacity issue at MEFCC is the issue of infrastructure and facilities. Even if the ICS Directorate either quickly develops specialized technical capacities of its existing staff or hire some with the requisite skills, it still needs space, infrastructure and facilities (workshop, testing laboratory and equipment) to work on the design, development and testing of cookstoves. At the moment, neither the ICS Directorate of MEFCC nor the NICSP have such resources at their disposal; and it takes considerable time and resources to develop one. Fortunately, such facilities and skills do exist locally, but managed and operated by another Directorate (AETDPD) in another Ministry (MoWIE). Momentarily, the ICS Directorate (MEFCC) and the AETDPD (MoWIE) seem to have sort of informal collaborative arrangements through which the former can gain access to resources owned and operated by the latter. How long this arrangement could continue for? Only time can tell. But, why all this tussle and hassle when everything could have put under a single roof? This is one of the key challenges that we shall address in more detail in Section 3.4 (Institutional Coordination).

### 3.3.2 MoWIE: AETDPD

With its roots (origin) going as far back as to late 1970s, the AETDPD is one and the only oldest public institutions in the ICS sub sector and the RE sector as a whole. Despite frequent and sometimes ravaging institutional instability<sup>10</sup>, persistent loss of mandates, and human resources retention challenges it faced during the last two decades, the AETDPD is the most resourceful public institution in the entire RE sector of Ethiopia. Thanks to ‘founding fathers’ of the institution, the AETDPD, despite loss of its mandates, still boasts highly skilled and experienced staff of over 40 experts (of which significant proportions are Senior Specialists), close to three decades of direct involvement and unique experience in the ‘A’ to ‘Z’ of Cookstoves programme management and operations, workshop and laboratory equipped with machines, tools, equipment, and facilities required for the designing, prototype production and thermal efficiency testing of cookstove and related technologies.

Having lost its wider RE mandates, and cookstoves portfolio more recently (2015), the AETDPD continued its engagement with the cookstoves sector, but in very limited areas including prototype development?, thermal efficiency testing, technical assistance to line ministries, regional partners, and ICS producers, co-managing ongoing projects including UNDP/GEF RETs project and EU/SNV NBPE+. Is that what an institution with 40+ skilled personnel, 30 years of direct experience and equipped with a workshop and laboratory is for? Isn’t this resources and capacities that are lacking elsewhere, i.e., MEFCC’s ICS Directorate? Why is it so difficult to re-organize and **STREAMLINE** our RE sector institutions so that we can put these treasure to effective use? Are we really capable of coordinating other stakeholders (often too many) in the clean cooking sector when we are unable to organize ourselves and put our ‘house in order’? (for more see Section 3.4 below).

### 3.3.3 Regional Energy Agencies (REAs)

Constitutionally, all nine National Regional States and two City Administrations are autonomous; and as such, they can have their own independent institutional arrangements in their respective regional government ministries known as Bureaus). However, for the sake of maintaining smooth and effective working relationship, regional states often follow institutional configurations that are almost exactly similar with those of their peers at the federal level.

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<sup>10</sup> The RE (and ICS) sector has moved vertically (from ENEC up to EEA, then down to EESRC, then to EREDPC, and again down to AETDPD); and horizontally (from MME to MoARD, then back to MME, then to MoWE, and finally to its current host, MoWIE) during the last three decades.

With some variations in some regional states, Water, Mines and Energy Bureaus (WMEB) are regional institutions mandated to oversee, guide and coordinate efforts in the wider RE sector and the clean cooking sector in particular. Actual day to day management and operations of the RE sector is the responsibility of the REAs which directly report to their respective WMEBs. Strategically located closer to the wider rural consumers, REAs are the ultimate owners of and crucial implementation partners in any RE related initiative. Although they are vulnerable to undesirable effects (e.g., institutional weaknesses) that often cascade down from their federal peers, in terms of staffing, REAs are often better than their counterparts at the federal level. In fact, contrary to the tradition of waiting for energy sector resources to flow down to the regions, some REAs were capable of convincing their respective regional governments to allocate budgets (from its own coffers) to support the deployment and widespread adoption of ICS by rural households.

The REAs employ a large crew of hundreds of energy experts throughout their portfolios and all the way down to zones and woredas. However, they very often face skills and technical capacity constraints. At lower administrative levels (woredas) frequent staff turn-over is often reported in several woredas. Moreover, some woreda energy experts often complain about issues pertaining to human resources management in general and lack of training opportunities and deployment to tasks that do not fall under their job descriptions.

### 3.4 Institutional Arrangements and Coordination

It has been repeatedly argued that the energy sector and the clean cooking subsector in particular cuts across several sector and issues. Similarly, the sector involves multitudes of diverse groups, actors and stakeholders often with diverging interests and outlooks. For example, the clean cooking sector in Ethiopia involves dozens of stakeholders (public institutions, donors) and multitudes of actors (private sector stove producers, fuel suppliers and millions of consumers), which makes the sector one of the most complex and difficult to navigate. At the federal level, some of the key public sector institutions that have interest in and are involved directly and indirectly with the clean cooking sector include MoWIE, MEFCC, MoMPNG, Sugar Factories and Ethanol Processing Plants, MoT, MoANR, MoH, MoWC.

Although their ultimate goal might be the same (overall socio-economic development), some of these public sector institutions may have similar interests, but others may have different and even sometimes contradicting interests (institutional mandates) in cookstove programmes. For example, while higher energy efficiency could be in the best interest of public institutions interested in reducing the financial burden of energy expenditure on consumers (MoWIE) and forest resource conservation (Forest sector) (MEFCC), other institutions could be more interested in reducing in-door air pollution and women's drudgery (MoH, MoWC respectively); and still other institutions could be interested in reducing GHG emissions (Environment, Climate Change sectors of MEFCC), or saving meager foreign exchange earnings by blending ethanol with benzene as a transport fuel (MoT) rather than residential cooking fuel. Such often diverging interests of various public institutions may not be a problem by themselves as long as the Cookstoves/clean cooking under consideration are capable of meeting all or at least some of those interests. The real problem arises when all public institutions involved in Cookstoves/clean cooking sector are unable to create a clear and shared vision and common understanding so as to achieve a much bigger national goal rather than working for narrow institutional interests. For multiple institutions to work together towards a bigger common goal, it takes effective coordination of efforts (resources, inputs and activities) to avoid or at least mitigate the odds of duplication; and such inter-agency coordination has been and still is in short supply in the Ethiopian Cookstoves/clean cooking sector.

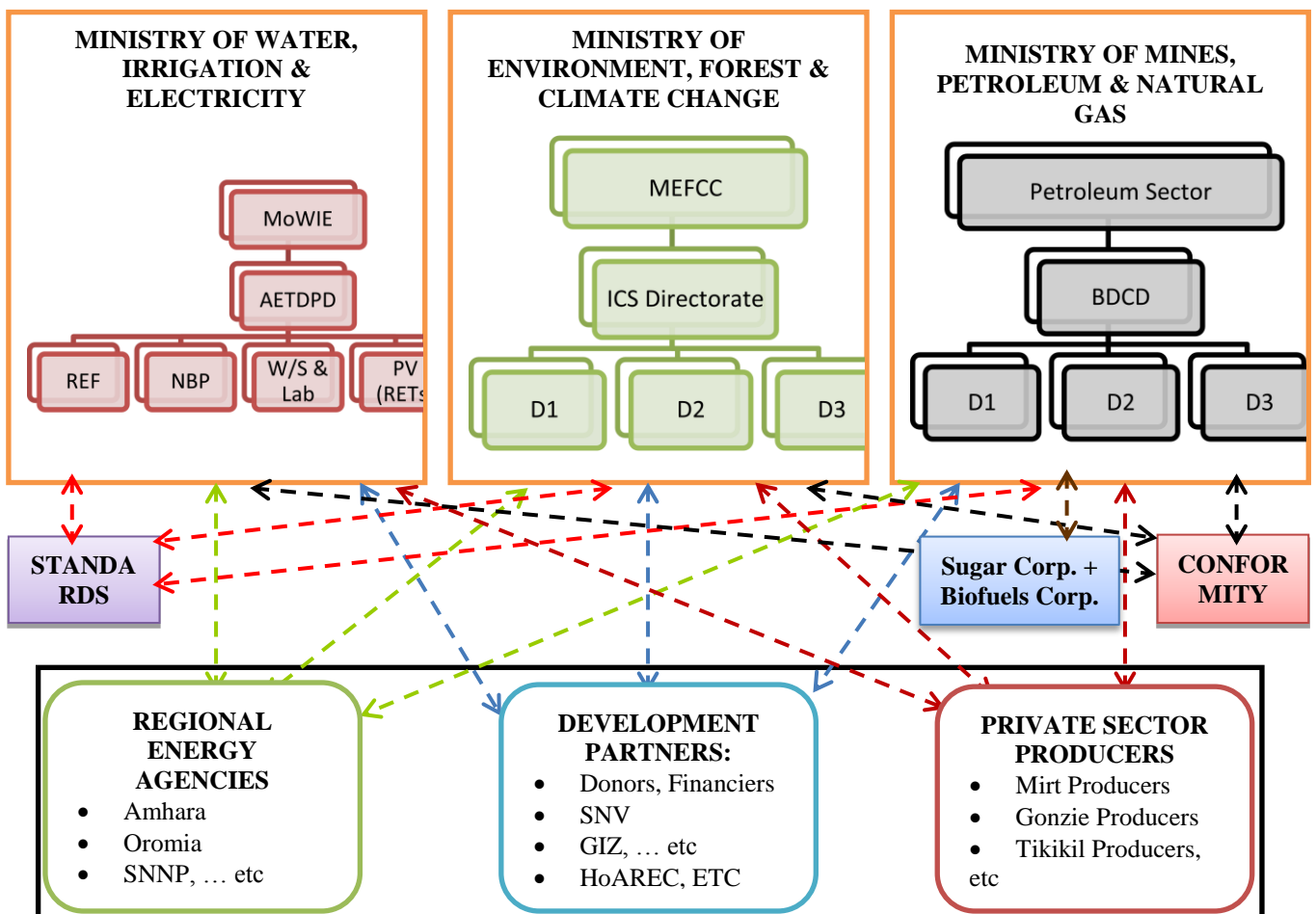
#### Box 3.3: Multi-stakeholder Processes for Climate Governance

The CRGE has been developed through the mobilisation of a wide range of stakeholders. It also states that it 'will continue to conduct extensive stakeholder consultation'. This is crucial here since, as noted above, the ICS program has a cross-sectoral range and it is relevant to several international initiatives. Further, there are a multitude of ICS-related activities and projects that are already ongoing at the regional level. This situation implies that there are many stakeholders that are by default involved with the ICS program. The programmatic approach demands that all stakeholder relationships and activities are coordinated effectively and efficiently for successful program design and implementation. Also, achieving the ambitious challenge set under the CRGE requires that all institutions and persons work in collaboration and in synergy. (Source: NICSP, Investment Plan: 2013)

For over two decades, the Cookstoves/clean cooking sector has been plagued by disjointed operations, duplication of efforts and a complete lack of institutional coordination (among government institutions), save the wider and more complex stakeholder coordination. The most recent (2015) restructuring of federal

government institutions, by fragmenting Cookstoves/clean cooking operations over two or three federal institutions, took the pervasive issue of lack of institutional coordination to the next higher level. In fact, speaking in strict legal terms, with the AETDPD and MoWIE abdicating their Cookstoves/clean cooking mandate in favour of the MEFC in 2015, one can argue, there is no legally mandated central government institution to guide initiatives and effectively coordinate efforts in the clean cooking sector today in Ethiopia. With the prevailing fragmented and obscure mandates, a person or a stakeholder institution working in Cookstoves/clean cooking sector may have to shuttle between three or more federal institutions (e.g., to MoWIE/AETDPD for technical assistance, stove production molds, and workshop and laboratory facilities, to MEFC/ICS Directorate for operational and issues related to implementation, to Sugar Corporation and MoMPNG/Biofuel Development Coordination Directorate or to the Ministry of Trade for issue related to ethanol fuel).

**Figure 3.3: Schematic Representation of Existing Complex Web of Institutional Arrangements**



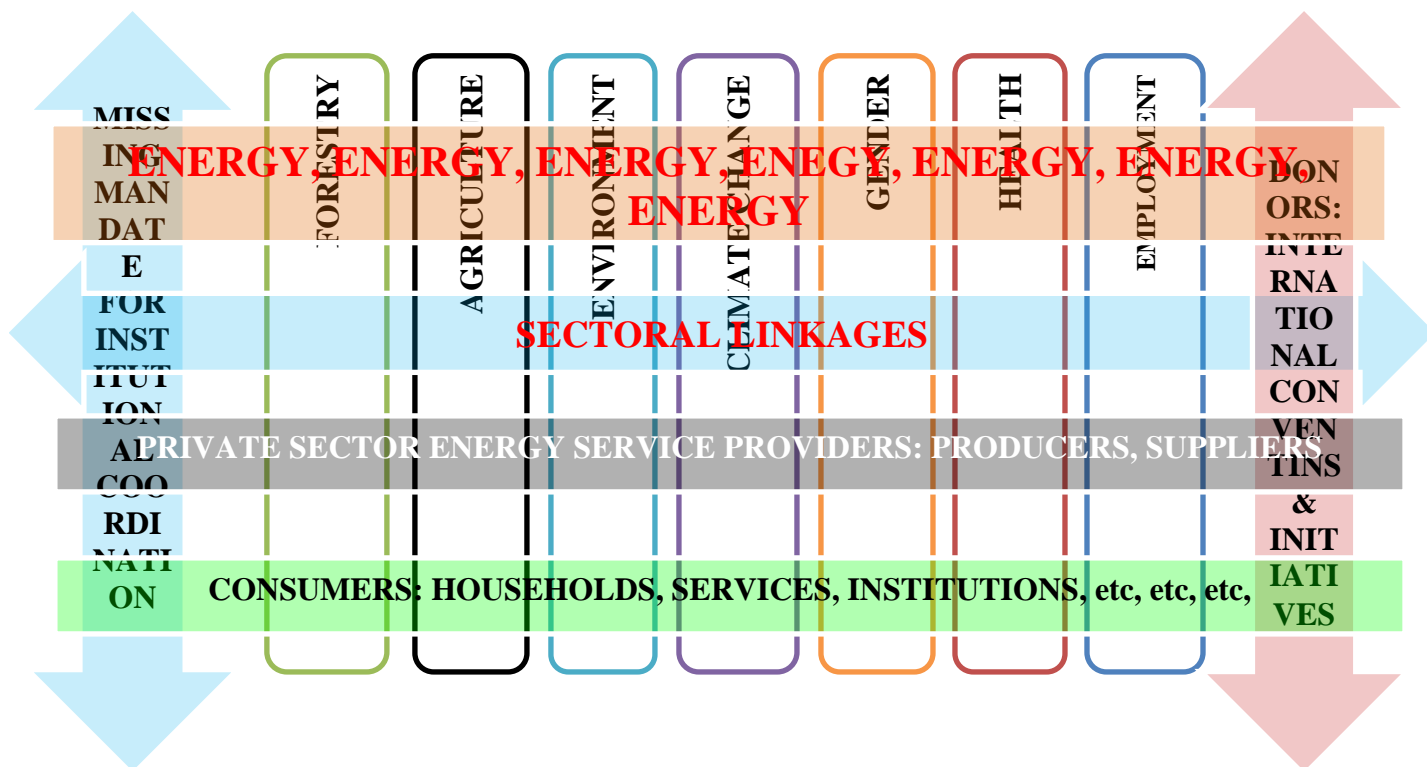
From interviews conducted with Cookstoves programme implementing agencies, it was learned that the prevailing poor coordination and fragmentation of mandates across various federal government institutions is adversely affecting implementing government institutions themselves, save other stakeholders who seek their services. For example, if a staff member from the NICSP needs services of AETDPD/MoWIE (e.g., expertise, access to workshop, laboratory, or stove production molds), then he or she needs to go a lengthy process of formal communications – which is often likely to be met with reluctance or resistance or even outright rejection. Note that these resources and services sought by a staff member from NICSP were once at NICSP’s direct and immediate disposal.

It was also learnt from the interviews that the recent transfer of the NICSP operations from MoWIE to MEFC has been a source of confusion and misunderstanding between the new host (MEFC) of the

programme and REAs. The NICSP had to spend time and money organizing a series of workshops intended to re-introduce the programme and staff of the new ICS Directorate of the MEFCC. The REAs, learning from the mistakes of their federal peers, took a wise decision and maintained their existing institutional arrangements despite changes that took place at the level of federal institutions.

The need for doing away with fragmented responsibilities inexorably led to the prevailing awkward, unproductive and unnecessarily complex web of institutional arrangements (see Fig. 3.3) is too clear to deserve further explanation. What is needed is, therefore, streamlining and consolidating the fragmented responsibilities for cookstoves sector coordination under a single, fully mandated umbrella institution that could serve as a ‘one-stop shop’. Such institution with full mandates, adequate resources and, above all, clear vision and mission to centrally coordinate efforts in the cookstoves sector and effectively deliver the intended outputs, is lacking in Ethiopia at the moment (see Fig. 3.4 last column on the left).

**Figure 3.4: Schematic Representation of Cookstoves Sector Institutions and Stakeholder Coordination Matrix**



### 3.5 Key Issues and Recommendations

A number of key issues pertaining to the wider RE sector and Cookstoves/clean cooking sub sector deserve the attention of high-level policy makers in Ethiopia. Attention at higher level of the executive is required mainly because, first of all, a public policy action agenda – access to clean and affordable energy for residential cooking is far from over; and secondly, existing institutional mandates and arrangements are unlikely to effectively address the public policy action (clean cooking in this case) agenda and deliver the intended policy action outputs, i.e., widespread dissemination and adoption of clean cooking technologies/fuels in ways that ensure the achievement of the overarching CRGE objectives. Therefore, based on the findings of this assessment, the following key issues are identified and recommendations made in relation to clean cooking sector institutions and institutional arrangements:

- 1) **Legally mandated central government institution is needed for clean cooking sector:** Review of sector policies and legislations conducted as part of this assignment indicate that following the recent (2015) restructuring of MoWE (now MoWIE), in legal terms, there is no central government institution with mandates to provide guidance and oversight as well as coordinate efforts in the clean cooking sector. As far as the energy issue is concerned, the primary focus of the MoWIE is

electricity access expansion; and in terms of legal institutional mandate, the ministry has nothing or very little to do with clean cooking initiatives. The responsibility for the implementation of NICS programme was recently transferred to the MEFCC. However, according to MEFCC's own establishment legislation, its primary duties and responsibilities are more of regulatory and coordination (not operation or implementation of projects) of environment, forestry and climate change related initiatives by line ministries and other stakeholders. Strictly speaking, the MEFCC has neither legal mandate nor does it have technical capabilities to oversee and guide efforts in the clean cooking sector. This effectively means, there is an institutional vacuum for clean cooking at the moment; and this vacuum needs to be filled in urgently by either setting up a new institution or upgrading or merging existing ones (e.g., ICS Directorate and AETDPD) into one institutions with full mandates, adequate resources, and above all, clear vision and mission.

- 2) **Fragmentation of responsibilities for clean cooking sector made coordination of efforts more difficult than ever before:** Duplication of efforts and lack of effective coordination of market players and cross-sectoral institutions and other key stakeholders has always been a serious challenge in clean cooking sector. Unfortunately, the coordination challenge has risen to the next higher level following the transfer of the NICSP from MoWIE to MEFCC in recent years. The new institutional arrangements, leaving considerable skills, capacities and other resources (staff, workshop laboratory) behind with the MoWIE, has created a coordination nightmare among the two concerned ministries as well as the ministries and other stakeholders who seek their services and technical support in clean cooking sector. Therefore, in the interest of avoiding duplication of efforts, hence resource wastage, as well as delivery of public services in an efficient and effective manner, the AETDPD of MoWIE and the ICS Directorate of MEFCC should be merged to form one capable, central mandated clean cooking sector institution to oversee and guide efforts of the cookstoves sector. Such a merger, in addition to resolving the issue of coordination between the two institutions, could also address the issue of institutional capacities that are evident with the new ICS Directorate at the MEFCC.

It should be noted from the outset that the intent of this recommendation (streamlining RE sector institutional set up either by merging existing structures or by creating new institutional set up, or a combination of both) is not about accusing one or the other institution. Rather, the objective is to overcome the pervasive institutional coordination problems and to create institutional systems and structures that are capable of effectively advancing the clean cooking and wider RE sector development agenda. The proposed new institutional set up, if and when officially accepted, can be housed anywhere, any ministry, were it fits best for the purpose of advancing the clean cooking and wider RE agenda.

- 3) **Set up Fully Mandated and adequately Resourced RE Sector Institution:** To overcome challenges related to institutional coordination and fragmentation of mandates summarized above, it is highly recommended that new RE sector institution be set up and made operational as quickly as it is reasonably possible. This can be done by consolidating RE and clean cooking mandates scattered between the three Ministries (MoWIE, MEFCC and MoMPNG) and by combining the electric energy sector with non-electric sector (see Fig. 3.5 for a proposed institutional set up). Obviously, establishing a Ministry (either by creating brand new or by restructuring existing ones) is not something that can be accomplished over night; it takes time, energy and resources. The implication is that while maintaining the ultimate goal of establishing the RE sector with a full-fledged ministerial portfolio, a number of intermediate measures will have to be taken to prepare a solid and sound foundation. Depending on the buy-in of the proposed recommendation, the preparatory phase could take one to two years.

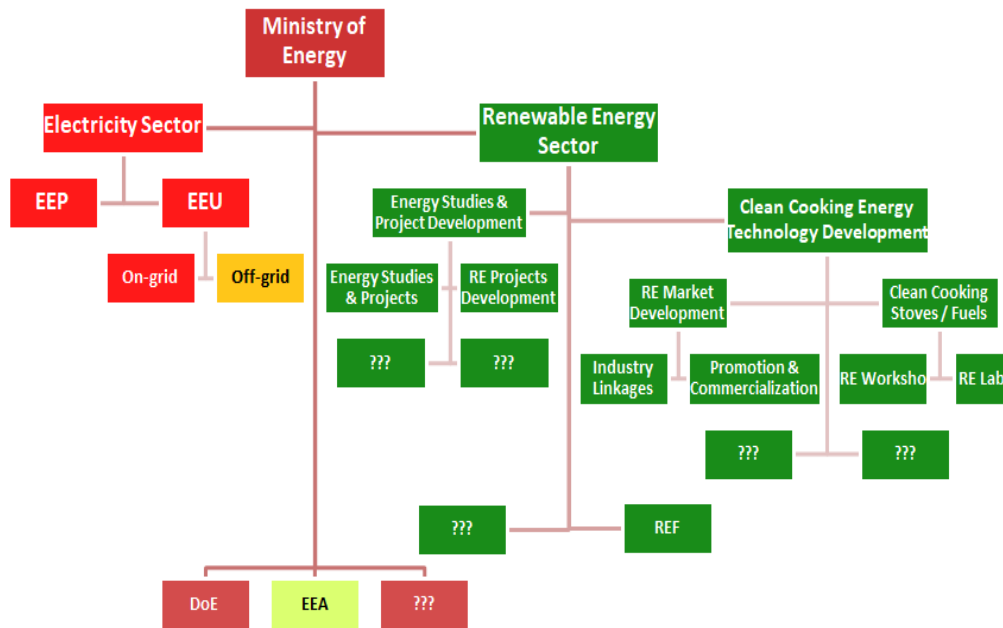
Naturally, activities of the interim period do not and cannot take place in a vacuum; and hence, it is recommended that a Task Force with clear duties and responsibilities and representing all key sectors and stakeholders should be set up and serve as a transitional functional arrangement in the sector. The following are some of the intermediate measures that should be accomplished during the interim period:

- **Establish Renewable Energy Task Force:** As repeatedly argued, fragmentation of RE mandates between various ministries and agencies is a serious challenge that needs to be overcome urgently if currently undergoing development initiatives of the sector have to be more effective in delivering the goods. Among other things, this calls for putting an end to fragmentation of responsibilities through effective coordination of stakeholders and their efforts in the sector. This is what the sector

is lacking at the moment and this gap needs to be filled by setting up a strong Task Force (TF) comprised of representatives of the donor community, senior public officials, managers and experts representing all relevant public and private sectors. As a transitional arrangement, the TF could serve a number of functions including:

- *Serve as a stakeholder coordination platform to create synergies, review prevailing institutional coordination gaps and its implication on the RE sector growth (stoves, fuels, funding, technology development, private sector support, etc) including clean cooking. In this regard, the TF could serve as a Steering Committee or Coordinating Committee for RE sector activities until proper institutional arrangements are set up and become fully operational. The Task Force organizes and conducts regular meetings, keeps record of meetings and decisions made and reports to a designated State Minister. Decisions will have to be approved by a designated State Minister and distributed to all stakeholders for action. The SEECSS or the NICSP could serve as a Secretariat of the Task Force until completion of its mission. To be more effective in accomplishing its mission, it is advisable that the Task Force members not only come from across all relevant sectors and institutions, but they should be high level executives and decision makers,*
  - *Review existing institutional opportunities, constraints and challenges of the RE sector institutions; assess, analyze and propose options for viable options for RE sector institutional set up and stakeholder coordination including re-organizing RE sector institutions and consolidating mandates under single umbrella institution capable of coordinating all other sectors and players in the RE sector,*
- **Escalate the Issue of RE Sector Institutional Set up to the Level of the National Parliament:** Members of the Parliament may not be fully aware of the institutional challenges that the RE sector has been and still is facing. Given the sector's relevance and enormous contribution to the CRGE (emission abatement) and the vision of achieving status of middle income country by 2025, it is crucial to escalate the issue of RE institutional challenges to the National Parliament through one of its Standing Committees. In addition to raising awareness and informing their decision, bringing members of the Parliament could serve as an avenue to solicit their recognition and support in legal matters as well as resource allocation for the sector. In this process bringing the issue to the attention of Parliament, the TF could serve as a liaison between the RE sector stakeholders and one of the relevant Standing Committees of the House of People's Representatives to advance the RE agenda at the level of the highest law-making body.
  - **Set up Fully Mandated and Resourced RE Sector Institution:** If and when the TF is capable of making its case for consolidation of mandates to high-level public officials of the executive organ and secure approval of the Parliament, the ultimate result would be setting up RE sector institution with clear mandate and mission to oversee and guide the effective implementation sector's policies, strategies and programs. The RE institution could take different forms; it could be a Center, or a Commission, or a full-fledged sector restructured within one of the existing ministries led by a State Minister. The key issue is, mandates of the new RE institution should be compatible with the massive potential of the sector and what the institution is expected to deliver.
- 4) **Establish and support for a strong clean cookstove association** – The private sector in the cookstoves industry in Ethiopia is very weak. This is partly due to failure in mobilizing private sector investment in to the sector. Such situation is primarily responsible for lack of innovation, low quality products, low level of productivity and undeveloped distribution system for improved and clean cooking sector in Ethiopia. Strong partnership between public organization and the private sector is highly needed to build the capacity of the private sector so that it would be enabled to take the leading role in technology development and dissemination. Establishment of improved and clean cookstove association would also help to effectively implement and maintain quality and standards of cookstoves, educate the public, and influence policy makers so that regulations would help the development of the sector. Strong association should also facilitate relationship among various interest groups as the outcomes of clean cooking ramification to health and gender issues.

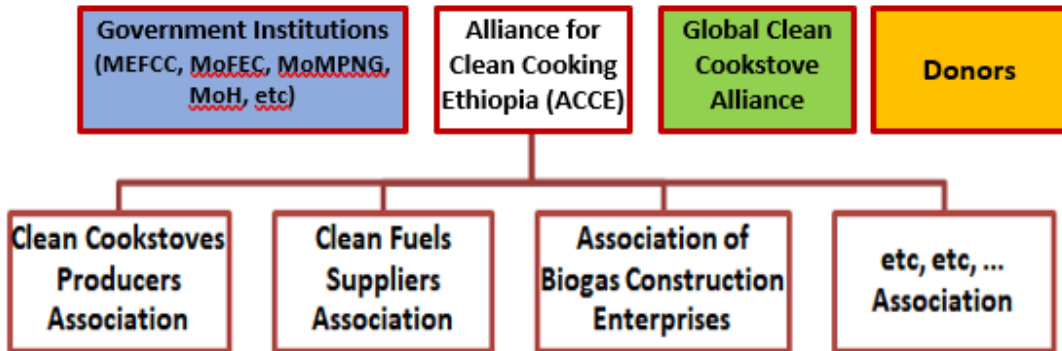
Figure 3.5: Proposed Institutional Set Up of Renewable Energy Sector



- 5) **Institutional stability and strengthening capacities is important:** Institution that has been and still is – to an extent – (the AETDPD of MoWIE) has witnessed continuous sometimes vertical but very often lateral movement during the last two decades or so. Its infrequent vertical movement has been more downward rather than upward trajectory. Laterally, the AETDPD has been moving between four or five different ministries in a space of about 20 years. Still worse is the fact that parent ministries themselves were subjected to frequent changes and restructuring every five years or so. Such frequent movement (between ministries) and restructuring (within ministries) has had some destabilizing effects (including loss of mandates and portfolios) on the hitherto mandated institution for clean cooking sector (AETDPD) and also some REAs who are forced to constantly realign their institutional configurations with institutional changes made at the level of federal institutions. Therefore, in the interest of ensuring certain levels of institutional stability, it is very important to firstly minimize the frequency of institutional restructuring at the federal level and, secondly, if and when institutional restructuring is mandatory, then, REAs as well as subordinate institutions (in this case the AETDPD) should be not only consulted, but adequately engaged in the entire process of institutional restructuring.
  
- 6) **Organize, Set up and Operationalize Private Sector Platform:** Strictly speaking, the role of the private sector in the actual delivery of energy products and services is simply indispensable. Owing to its highly diffuse nature (thousands of small ICS producers and retailers, several hundreds of BCEs, PV product suppliers and retailers/installers, etc), coordination of private sector operators in the RE sector has remained a serious challenge. In fact, lack of effective sector coordination mechanism (both on the part of public sector institutions and on their own part) meant that the private sector players do not have opportunities to influence policies that affect them directly and voice their interests and concerns that matter to them. In response to such organizational vacuum, recently there are some ongoing efforts to organize the private sector players and enterprises in to some form of association. These include the SNV supported BCEs, the GIZ – EnDev initiative to organize ICS producers in to associations and the Solar Development Association – Ethiopia. However, all these initiatives are at their embryonic or early developmental stages, at best. Representation, networking, advocacy and influencing policy are all difficult to achieve without robust organizations representing clean cooking and the wider RE sector. Similarly, the sector is unable to benefit from resources and experiences of its global peers and apex alliances such as Global Cookstoves Alliance. Therefore, it is highly recommended that (i) all private sector actors engaged in clean cooking be supported to set up organize themselves in to associations, (ii) existing associations – including sister associations such as Solar Development Association – be

strengthened, (iii) associations formed in all allied sectors should form a National Alliance (see Fig. 3.6) with the view of representing Ethiopian clean cooking or RE sector in global fora. Development partners that are promoting clean cooking such as SNV, GIZ and others together with sector government organization including MEFCC, MoWIE and MoMPNG should help support the private sector and related sector industry association form the Alliance for Clean Cooking Ethiopia.

Figure 3.6: Example: Alliance for Clean Cooking - Ethiopia Organizational Structure





## 4. Technology and Innovation

The development of clean cooking technology requires a concerted effort from all stakeholders working in the area. In the development of clean cooking technologies, the major initiators are either government institutions or NGOs working in the society. The demand for new and innovative technologies often was not based on the societies interest (Troncoso et al. 2007). This holds true for Ethiopia but some of the cookstoves were designed to meet the needs in certain part of the country. While the designed cookstove were disseminated in other parts without adjusting to the needs of the other society. That could be one of the reasons for lack of adoption for improved biomass cookstove developed earlier.

### 4.1 Cookstove Innovation History

The improved cookstove development started in the government institution in the 1970s. The work started by improving the enclosed *injera* baking stoves used in selected regions of the country and then testing and improving it to obtain *Mirt* and later on *Gonzie* stove. The major stoves developed for pot-sized stoves (non-baking cookstoves) were *Tikikil* and *Laketch* stove. *Laketch* was massively distributed throughout the country. The local technological development of cookstove is a contribution of various stakeholders: government, multi-lateral institutions, academia and research institutions and innovation funds supporting private companies.

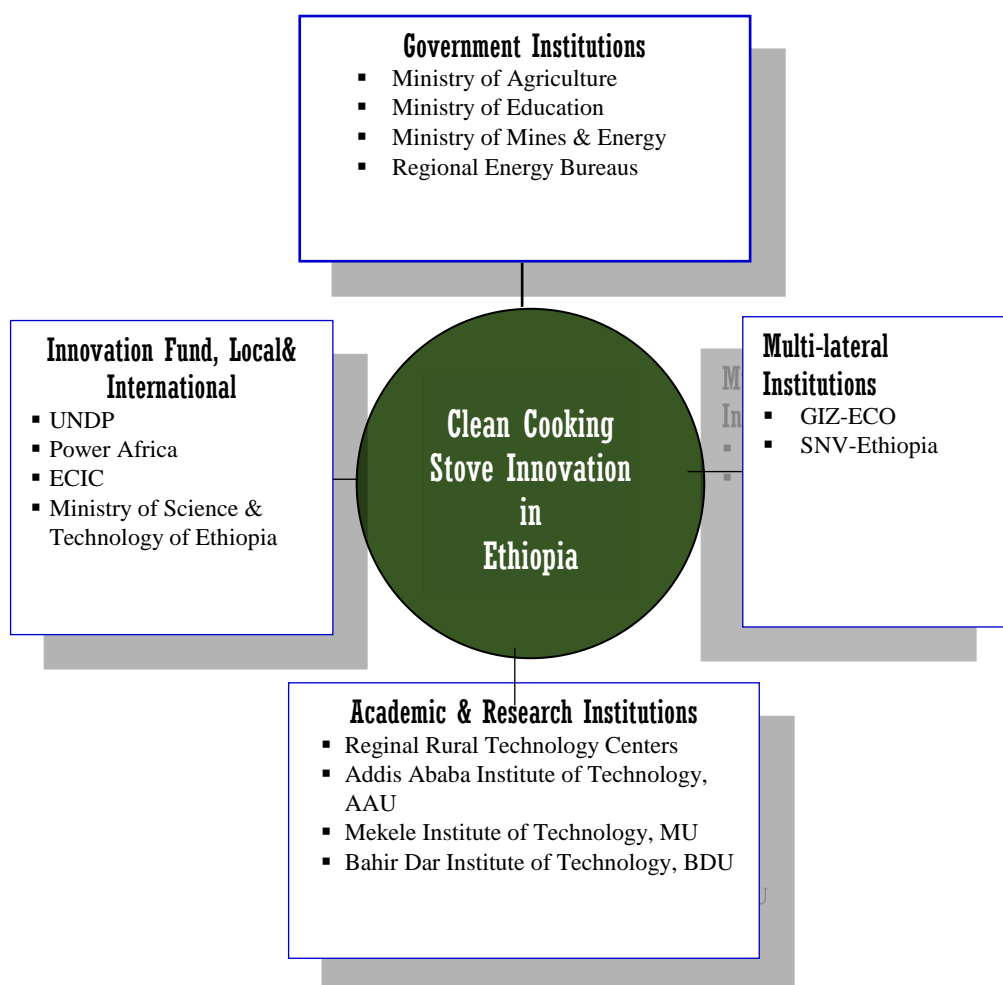


Figure 4.1 Stakeholders participating in the innovation of clean cooking

Some of the disseminating agents have registered the carbon savings in dissemination of the ICS in selected parts of the country. World Vision Ethiopia and World Food Program registered the potential savings in emission as programs of activities. A study conducted on *Mirt* stove indicated that 2.15 tCO<sub>2</sub>e per annum

could be saved in disseminating the stove (Dresen et al. 2014). Similarly, World Food Program and World Vision Ethiopia through Project Design Document (PDD) registered a carbon saving potential of 1.14 CO<sub>2</sub>/device/year (WFP & WVE 2013).

The development of biomass cookstove started in the government institution responsible for the dissemination of appropriate energy technologies in the 1970s. Among institutions that contributed to the development of biomass cookstoves in Ethiopia the government took the prime initiative followed by multi-lateral cooperations, and more recently the academic and research institutions. Currently several institutions including the Alternative Energy Development and Promotion Directorate of MoWIE, GIZ-ECO, SNV, research & academic institutions are working on development and promotion of both clean and fuel efficient cookstoves in Ethiopia.

## Government Institutions

Early effort in the development of *injera*<sup>11</sup> baking stove and pot-sized non-baking biomass stove was started by studying the enclosed traditional stove so that their performance was improved through experimental evaluation. In the case of the *injera* baking stoves, most widely used traditional and improved stoves in Ethiopia were collected to evaluate their performances. Evaluation of the attributes of these stoves helped the development of *Mirt* stove. *Mirt*stove was massively promoted through GIZ-ECO. The other biomass stove was the development of *Gonzie* stove for *injera* baking and pot-sized stove integrated.

## Multi-lateral Cooperation

The biomass cook stoves which are currently promoted through GIZ-ECO are the *Mirt*, *Tikikil*–pot sized stove, and *Institutional Rocket Stoves (IRS)*. GIZ-ECO in collaboration with stove producers has been disseminating the three stoves. *Mirt* is widely distributed by private businesses in urban and semi-urban areas where as *Tikikil* was mainly distributed through humanitarian organization to highly vulnerable settlements such as refugee camps and communities in highly degraded areas. Institutional rocket stove (IRS) is disseminated in restaurants, prisons and university cafeterias in the country World Vision Ethiopia is another actor which has been working in the cookstove sector in collaboration with GIZ-ECO to disseminate biomass stoves to rural areas taking the combined emission saving to be considered for carbon saving projects such as voluntary market and CDM outlets.

SNV using the National Biogas Programme of Ethiopia (NBPE) support a researcher to design *injera* baking biogas stove bringing a result which could further be refined to obtain a wide spread use of the stove (Hivos 2018).

## Research and Academic Institutions

Relatively few researches were done on development of fuel saving or clean cookstove. But, fundamental research on characterization of baking pan for *injerawas* one of the research outputs in recent years conducted at Addis Ababa Institute of Technology (AAiT). The research shows that an 8 mm thin industrial ceramic baking pan could be used to bake *injera* with reduced electric consumption (Hassen 2014). In addition, recently natural draft gasifier *injera* baking stove have been developed at AAiT (Adem 2017). There are also solar and biogas *injera* baking stoves developed at academic institutions, Mekele Institute of Technology and Bahir Dar Institute of Technology, respectively.

## Innovation Funding – Local & International

The Ethiopian Climate Innovation Center (ECIC) and Innovation Against Poverty (IAP) of SNV provided financial support to refine and scale up the effort started by a number of researcher associated with private companies such as GM Clean Energy: *Injera* biogas stove and composite *Mitad* and Gogle Energy Saving Stove – Highly efficient fuel saving stove burning special charcoal briquettes (ECIC 2018).

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<sup>11</sup>*Injera* – a local flatbread

## 4.2 Standardization of Cookstove

There are a number of test protocols to evaluate the performance of cookstove, but laboratory test results and field test results could not much. The recent categorization of stoves based on tiers showed a promising guideline to differentiate between the performance of poor and best stove. The International Workshop Agreement (IWA) 12 based on ISO norms have been approved as a guiding principle to categorize the performance of stoves. The agreement states laid out framework for evaluating cook stove performance. The rating system will define tiers of performance in the areas of fuel efficiency, emissions of fine particulate matter (PM 2.5) and carbon monoxide (CO), indoor emissions (particulate matter 2.5 and carbon monoxide), and safety. Each area will be ranked separately (ISO 2012). Table 1 shows a summary of tier category based on performance of stoves.

Table 4.1. IWA 12 Tier categorization based on performance of stoves (ISO 2012).

	Emissions				Efficiency / Fuel use		Indoor Emissions		Safety
	High Power CO		Lower Power PM		High Power	Lower Power	CO	PM	
	(g/MJ <sub>d</sub> )	(mg/MJ <sub>d</sub> )	(g/min/L)	(mg/min/L)	Thermal Efficiency (%)	Specific Consumption (MJ/min/L)	(g/min)	(mg/min)	
<b>Tier 0</b>	>16	>979	>0.20	>8	<15	>0.050	>0.97	> 40	< 45
<b>Tier 1</b>	≤ 16	≤ 979	< 0.20	≤ 8	≥ 15	≤ 0.050	≤ 0.97	≤ 40	≥ 45
<b>Tier 2</b>	≤ 11	≤ 386	≤ 0.13	≤ 4	≥ 25	≤ 0.039	≤ 0.62	≤ 17	≥ 75
<b>Tier 3</b>	≤ 9	≤ 168	≤ 0.10	≤ 2	≥ 35	≤ 0.028	≤ 0.49	≤ 8	≥ 88
<b>Tier 4</b>	≤ 8	≤ 41	≤ 0.09	≤ 1	≥ 45	≤ 0.017	< 0.42	≤ 2	≥ 95

The cookstoves which were introduced and widely in use in Ethiopia could be categorized based on the guidelines set by the international workshop agreement – IWA 12. The cookstove technologies existing in Ethiopia are classified into *injerabaking* and pot-sized stove so that improvements to be made are focused in each area.

### *Injera* baking stoves

Most biomass stoves which are used for baking *injera* lies in Tier 0. This indicates that concerted effort should be exerted to alleviate the poor efficiency of the stoves which are used by majority of the people in Ethiopia. Figure 2 indicates the tier categorization of the *injera* baking stoves existing in Ethiopia based on fuel use. The other evaluating parameters emissions, indoor emission and safety test results could not be obtained from reports.

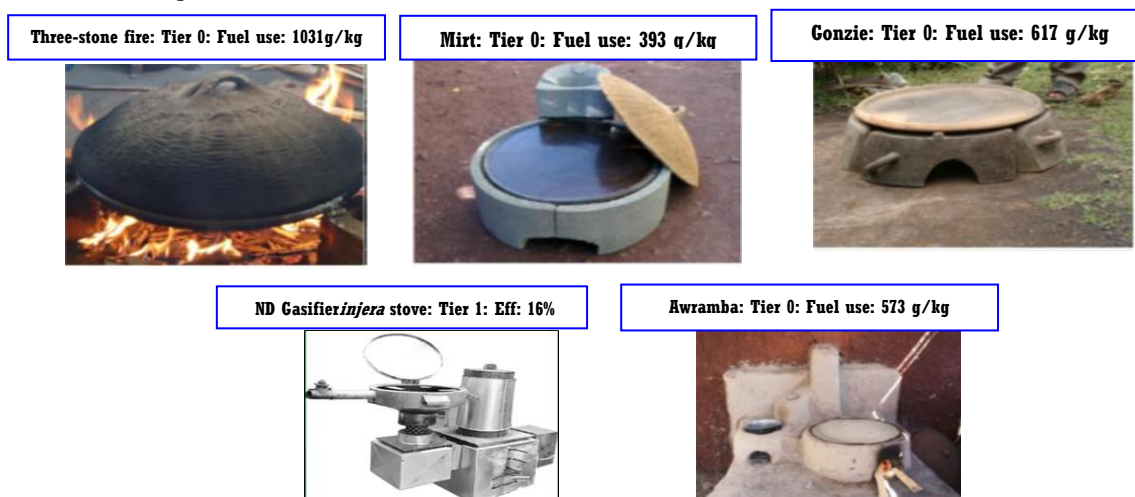


Figure 4.2 Injera baking biomass stove with Tier classification existing in Ethiopia (Adem 2017; Dresen et al. 2014; Gulilat, Wedajo, and Gulilat 2014; Tarekegn et al. 2013)

## Pot-sized stoves (non-baking stoves)

Non-baking Cookstove refers to cookstoves that are used for ‘*wot*’ cooking, heating water or coffee brewing. The popular non-baking fuel saving cookstoves existing in Ethiopia are *Tikikil* and *Laketch* which can be categorized for fuel efficiency as Tier 1 and Tier 3, respectively. The rest of the cookstoves, solar cooker, Ethanol and Fireless stove, including *Tikikil* shown in Figure 3 have smaller quantity of distribution. The solar cooker and fireless stove/cooker can be categorized as Tier 4 for their emission performance. There are efforts undergoing to standardize cookstove in Ethiopia at the Quality Standards Agency of Ethiopia. Similar with the other types of stoves, pot-sized stoves in Ethiopia are categorized in tiers based on their efficiency or fuel use.



Figure 2.3 Pot-sized cookstoves with tier classification existing in Ethiopia (Business Connect 2018; ERG 2009; GAIA 2015)

The long term solutions for developing countries such as Ethiopia is clean cooking using the cheapest possible energy source such as electricity, LPG, or natural gas. To achieve this, improving the performance and disseminating to the society through research collaborations of the government, private and multilateral institutions remains to be a challenge to be addressed.

## 4.3 Capacity for Innovation

The innovative capacity of a nation can be evaluated by looking into the number of scientists, engineers and the degree of protection of intellectual property and the focus on the specific area of interest. In Ethiopia, the number of scientists and engineers working on clean cookstove is limited or none. Similarly, the number of intellectual properties (Patents) generated is not as such high requiring protection. These could be improved through government, private, and multilateral cooperation to build human resource capacity through provision of technical and financial supports.

### Human resource capacity

The human resource capacity focused on improving the existing cookstove or introducing new ones is not sufficient. Even if the number of students graduating from higher institutions and TVET is increasing considerably, an increase in terms of knowledgeable and skillful actors is not forthcoming requiring a great deal of additional efforts to train and utilize these resources.

## Budget

Comparing the budget allocation for research on the area of cookstove requires revisiting in every sector. In addition to research on cookstove, the budget could be tailored to build the innovation capacity of SMEs working in the clean cooking sector. In order to make improvements on existing cookstove technologies, standard laboratories should also be established in the country which requires a corresponding budget implication.

### 4.4 International experiences in the cookstove sector and lessons learned

There are several successful international experiences to learn lessons from. These experiences are both in technology development, innovative financing and distribution models that help cookstove enterprises reach large number of customers in a relatively short period of time.

#### A. Burn Manufacturing – Kenya

##### A1. Production and Distribution Channel

The Jikokoa is designed and manufactured by BURN in Kenya. Burn also distributes the cookstove through main supermarket chains in Kenya, Uganda and Tanzania. Burn is the first modern manufacturing facility for fuel efficient cookstoves in East Africa. The company is a for-profit company which sells cookstoves without subsidies. Burn is currently expanding around the region, in Tanzania and Uganda most notable. Since late 2013 they have sold over 459,436 stoves and changed the live of 2.5 million people, saving over \$117 million. The stove is sold through a number of innovative distribution channels, including more than 400 retail points in Kenya, as well as 100 Equity Bank branches. Burn created employment for 250 full time workers.



## A2. Technology Innovation

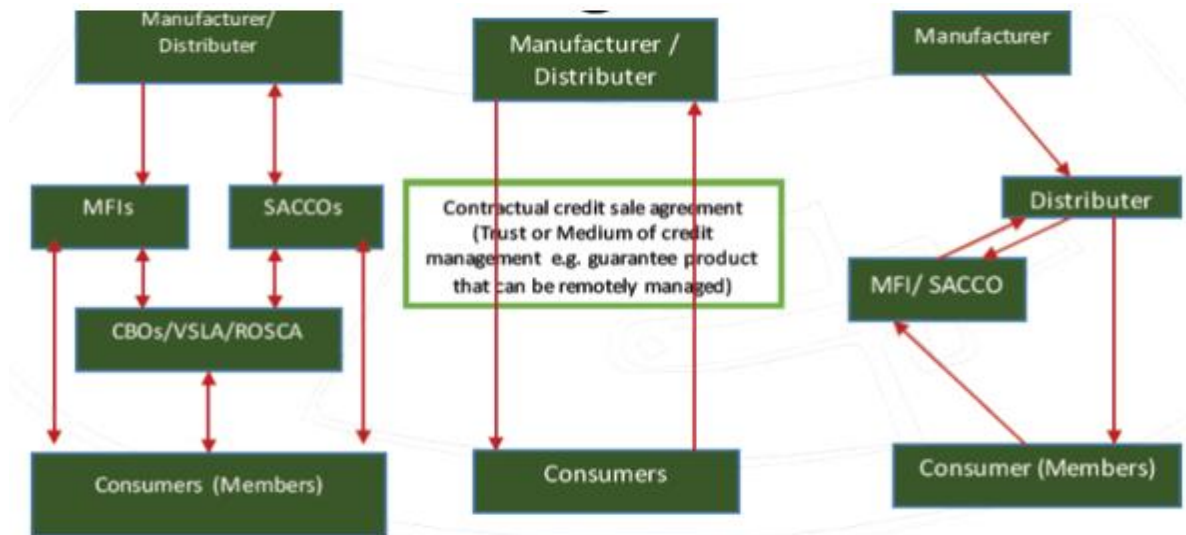
This year Burn launched the Kuniokoa, the most fuel-efficient natural-draft wood stove in Africa, and the design team in Burn is hard at work in with the new Kenya Design Center creating the next generation of stoves for Africa.

The Kuniokoa is the most fuel-efficient ‘Rocket’ stove ever tested by University of Washington, attaining a High Power Thermal Efficiency of 40.4% and achieving an ISO/IWA Tier ‘3’ in 6 out of 8 categories. According to the University of Nairobi, the Kuniokoa uses 31% less fuel and produces 71% less low-power PM2.5 than the leading US/Chinese Rocket Stove.



## B. Credit financed distribution model (PAYG Model) - Kenya

User financing has been an evolving trend with innovative and simplified credit systems from Micro Finance Institutions to community loan associations. According to GACC (2015b) willingness to take up financing was dependent on the perceived level of “formality” of the financing option. As research indicated, in Kenya, the most preferred consumer financing options were informal and semi- formal mechanisms that did not rely on engagement with a formal finance institution. Besides, as one of the biggest challenges in switching from solid fuels to cleaner-burning fuel such as ethanol or LPG , the initial cost of the stove and the inaccessibility of small quantities of fuel. To tackle this challenge Kenya recently announced innovations including smart fuel canisters and PAYG aim to enable both stove financing and sale of clean fuel in more affordable quantities. The Kenya PAGE distribution model is presented below:



## C1. Improved Cooking Stoves Programme – Public Private Partnership in Ghana

The Gold Standard Programme of Activities aims at significantly reducing wood fuel consumption of low-income Ganesh households by providing them with affordable improved cook-stoves produced in the Republic of Ghana in replacement of their low-efficiency three-stone fires and traditional stoves. The Improved Cookstove Programme works in partnership with the private sector. The Programme established an efficient cookstove distribution channel which the privates sector accesses to distribute fuel efficient cookstoves.

Man and Man is an improved cookstove manufacturing company in Ghana. This company already manufactures and distributes efficient charcoal cook stoves to wholesale customers under the ‘Holy Cook’

brand in Ghana. Their current production capacity is 500 stoves/week. The company is now building a new production facility that will employ 55 employees and produce 10,000 stoves a month at full capacity. Working with the distribution network, Man & Man will be able to distribute fuel saving cookstoves to the households at a very affordable price.

#### **D. Vietnam Household Biogas**

The Biogas Program in Vietnam increased clean energy access in communities across rural households. The program is implemented by the Vietnamese government in collaboration with SNV. It also created local jobs by training local workers to build and maintain biogas digesters that provide rural farming communities with clean and affordable energy. The initiative began in 2003 and targets to construct 200,000 locally produced household digesters for farmers by 2020.

This project generates carbon credits by reducing CO<sub>2</sub>e emissions. While the funds received by the project are payment for its environmental outcomes, it also benefits the aforementioned development goals. Recognizing these co-benefits allows us to more accurately measure the project's total contributions beyond its climate benefit.

#### **E. Lessons Learned**

Experiences from successful international clean and fuel saving cookstove programs show that engaging a private sector which has a profound technical knowledge and skill with access to finance, and a distribution network that is well built by public private partnership are key elements for success. Many successful clean cooking programs work with fewer highly qualified product manufacturers but many product distributors. Working with fewer private product manufacturers helps achieve high-volume high-quality products at prices affordable to consumers. The distribution network, however, requires engagement of high number of individuals and businesses to transport and retail the products.

### **4.5 Key issues and recommendations**

The major issue to be addressed in this section includes the absence of a well-organized research organization working in the development of clean cook stove in the country both at the national or regional level. To alleviate this problem, all the players in the development of clean cooking needs to ensure a predictable funding and regulation for long-term strategic partnerships with academia, research institutions, government and private companies. In addition, the facilitator for the development of clean cooking should encourage research institutions and companies which form strong partnership in the form of incentives.

The uncoordinated efforts addressing the clean cooking throughout the country are not basing their study from the end-user perspectives. That is, most technologies are top-down approach rather than bottom-up or a combination of the two. There is a tendency of distributing a fuel saving stove designed and manufactured to meet the needs of a certain society in to another area with entirely different cooking habits without proving the appropriateness of the cookstove. The technology of clean cooking requires knowing the indigenous knowledge existing in the community and supplementing this with experiences of other emerging countries which have recently moved to very clean cooking.

#### **University – Industry Collaboration**

Universities in the country conduct uncoordinated research on biomass cookstove for both cooking and *injera* baking throughout the country. The focus ranges from biomass up to the use of solar for cooking (Tesfay, Kahsay, and Nydal 2014). A review of the various *injera* baking technologies shows research directions in clean cooking (Adem and Ambie 2017). The research output in the universities is not obtaining greater attention in order to disseminate or scale-up technologies reversed or invented at the local universities. Universities, government organizations working in the area, private sector and multilateral cooperating institutions should work together to narrow the gap between research and real world so that research outputs become problem solving and become a commercial products focusing on clean cooking.

The use of the limited resource in the country efficiently requires sharing information which universities are doing what in the area of clean cooking. This vital database will serve not only the actors, universities, companies and multilateral organizations, but also policy makers to predict the energy security of the country in the area of clean cooking.

### **End users perception**

Women in rural part of the country do not perceive indoor air pollution as a significant health hazard, prioritize other basic developmental needs over clean cook stoves, and overwhelmingly rely on a free traditional cookstove technology and are therefore not willing to pay much for a new clean cookstove. Such perceptions should be changed with creating awareness about the value of the technology in terms of reduced fuel use and emissions in the households.

### **Cost reduction of cookstove through research**

The cost of purchasing the clean cooking stove is another parameter which is related with the development of cookstove technology to reduce its cost and making it simple to use so that peoples at the rural area can afford and use with minimum skill for operation. An example of such intervention was the introduction of vegetable oil stove (Siemens-Bosch Stove) to the northern part of Ethiopia for distribution. The stove was not affordable to the rural poor.

### **After sales service/ follow-up**

The cookstove technology requires inflow of information or feedback from users in order to improve its quality. There are parameters which cannot be obtained from tests conducted in the laboratory which should be obtained from the users. Such as convenience in using the stove, and problem with the design. If such mechanisms are set in place, the technological improvement will be enhanced so that designers and manufactures bring improved solutions to customers.



## 5. Distribution Model and Financing

### 5.1 History of Improved and CleanCookstoves Development and Distribution

Improved stoves have been developed and promoted in Ethiopia since the 1970s. Early actions include the development and introduction of electric Injera baking by the Ethiopian Electric Light and Power Authority (EELPA, the predecessor of EEP/EEU), and development and promotion of wood saving stoves by the Rural Technology Promotion Centers (RTPC) of the Ministry of Agriculture (MOA) and the Technology Adaptation Center of the Ministry of Education (MOE). A chronological list of the main improved stove related studies and programs implemented in Ethiopia since the 1970s is shown in the following box (extracted from a study by SNV in 2011).<sup>12</sup>

Introduction of Injera baking with electricity (early 1970s)	The government through the power company, the Ethiopian Electric Light and Power Authority (EELPA) introduced the <i>Injera</i> baking electric mitad in the mid 1970s to utilize surplus generating capacity in the national grid.
Introduction of kerosene stoves	The government introduced kerosene cookstoves in the early 1980s as part of its program to alleviate the burden on the biomass resource and address the household cooking energy crises. Kerosene stoves used to be imported by the government and distributed to the households through the cooperative outlets for consumer goods that were established by the government. Importation and distribution of kerosene stoves were later adopted by the private businesses.
Other actions before 1985	There have been R&D and pilot projects for improved biomass stoves and for domestic biogas in the 1970s and 1980s. The Ethiopian National Energy Committee (ENEC), Rural Technology Promotion Centers (of the MOA) and the Technology Adaptation Center (of the MOE) were among the more active at the time.
CEPPE project (1986)	Report of the Household Fuel Survey in Addis Ababa, Cooking Efficiency Programme Planning in Ethiopia (CEPPE) (ILO/ENEC, 1986).  The focus of this project was the design of a strategy for a major dissemination action for stoves and appliances in Addis Ababa. Different types of stoves were developed by stove technicians and women's groups then tested in forty households.
The World Bank financed Energy I project (1988-1996)	This project had two components for improving the household energy supply in Ethiopia. The first component, called the Cooking Efficiency Improvement and New Fuels Marketing Project (CEINFMP), developed and promoted a charcoal stove (called <b>Lakech</b> ) and a biomass Injera stove (called <b>Mirt</b> ). It also made tests and trials on other stoves. The second component, called the Crop Residue Briquetting Pilot Project, tried to promote crop residue briquettes as substitutes for wood fuels. Five briquette plants were to be installed to produce fuel briquettes from coffee, cotton, wheat, and sugar cane waste.  The Energy I project had a market development component for products from the Calub gas field. A study to increase the uptake of <b>LPG cooking</b> was made under this component. The study recommended low cost gas bottles and stoves. It also tested the viability of Injera baking with LPG.

<sup>12</sup>SNV (2011). Stakeholder Consultation for a Clean Cooking Stoves Network of Ethiopia

EREDPC Rural Energy Development Project (2002-2003)	This was a continuation of the Energy I project and had four components. The fuelwood supply enhancement component promoted production of fast growing fuelwood planting. The charcoal production improvement component promoted low-cost improved charcoal production kilns and also piloted charcoal production from crop waste such as cotton stalks. The improved rural wood stove project developed the <b>Gunzie</b> stove and piloted it in rural areas. The last component reviewed and the market barriers for the rural energy.
GIZ household energy project (1998-present)	The GTZ has been promoting two ICS in urban and semi-urban areas of Ethiopia since 1998. These are (a) the <b>Mirt</b> wood Stove (for baking) which has been promoted since 1998, (b) the <i>Tikikil</i> wood stove for households which is promoted since 2009.
EREDPC Energy Access Project (2003-2011)	The EAEDPC is promoting the <i>Gonzie</i> biomass stove for rural areas since 2005 and the <b>Mirt</b> stove for urban areas since 2009. The EAEDPC is implementing this program in six regional states (Amhara, Oromiya, SNNP, Tigray, Gambella, BenishangulGumuz).
Ethanol cooking by Gaia Association (2005 – ongoing)	Gaia Association has piloted the ethanol stove for domestic use since 2005. The stove has been piloted in Addis Ababa and in refugee camps in Somali and Tigray regions.
National Biogas Program of Ethiopia (2008 – ongoing)	The National Biogas Program Ethiopia (NBPE) was launched in 2009. To date the program has installed 19,000 bio digesters.

- A vegetable oil stove (the Siemens-Bosch stove) was tested by the HOAREC for distribution in north of Ethiopia in 2011. Tests and pilot projects for solar cookers have been implemented since the 1980s. Solar cookers have been promoted by Selam Technical and Vocational Center, NGOs, and private companies.

Stove distribution to consumers in large scale started in the mid-1980s with the introduction of the Lakech charcoal stove. Prior to this stove development works were limited to demonstration and piloting mainly from projects under MOA and MOE. The models adopted for distribution of different types of Cookstoves is listed below. These distribution models can be broadly grouped into five distribution models as shown in Table 5.1 below.

- a) Lakech charcoal stove distributed in urban areas through stove producers and distributors in urban areas
- b) Mirt Injera stove distributed initially in urban areas but later in rural areas through stove producers in urban and rural areas
- c) Electric cookers produced locally and imported which are being distributed by producers and distributors in urban areas
- d) Gunzie Injera stove distributed in rural areas through stove producers located in rural areas
- e) Domestic biogas systems installed mainly in rural areas by local masons
- f) Electric Injera stoves produced and distributed in urban areas
- g) LPG stoves imported and distributed by the private sector
- h) Ethanol fuel and stoves distributed by 2 commercial companies operating in Addis Ababa
- i) Other stove technologies (solar, oil) distributed as pilots in selected areas
- j) MOA under its Sustainable Land Management Programs (SLMPs) and several other NGOs freely distribute fuel saving biomass stoves such as Mirt, Gunzie, and Tikikil in rural areas

Even though government supported cookstove programs started in the late 1970s, the private sector had been involved in the importation, manufacturing and distribution of cookstoves such as LPG, kerosene, and charcoal stove much earlier than this.

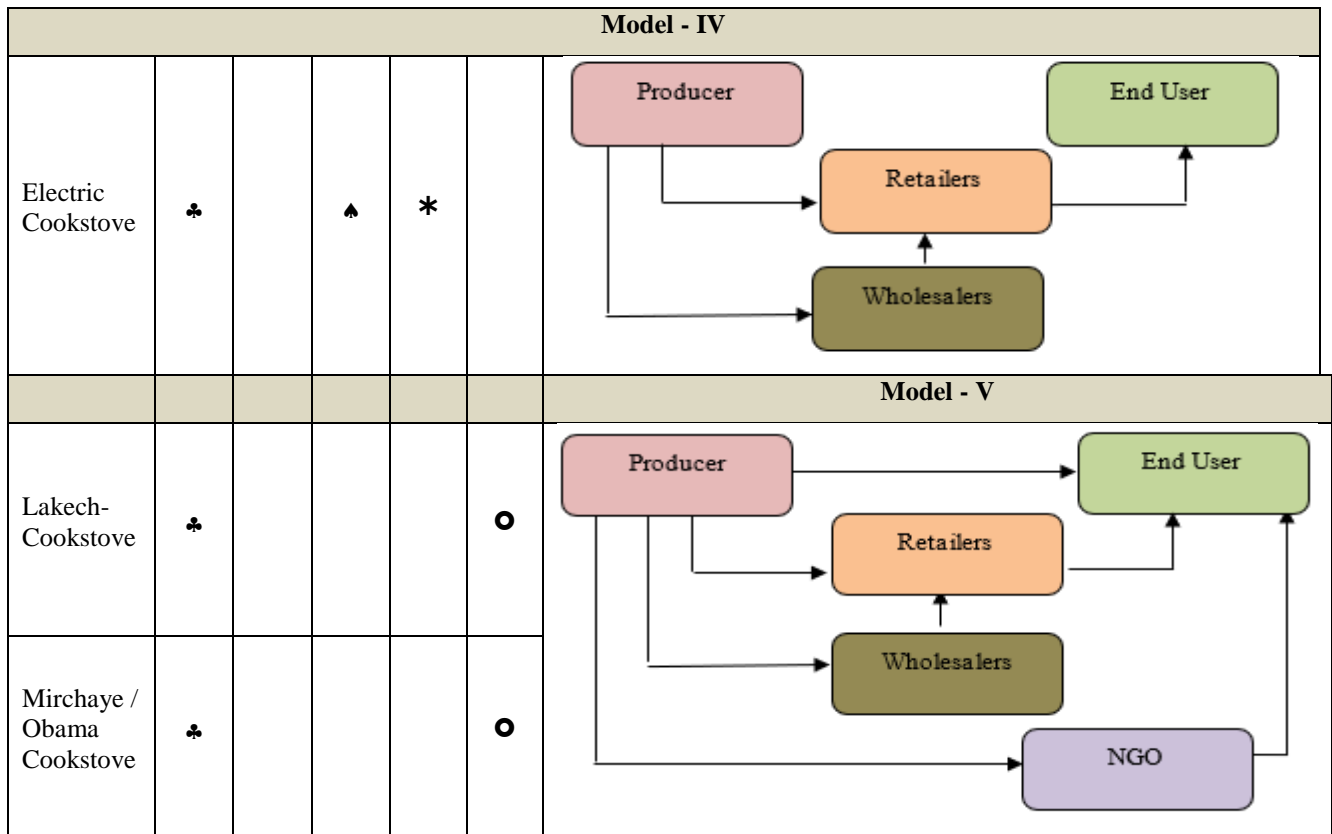
## 5.2 Distribution Models Adopted

Several researches revealed that the distribution of ICS in Ethiopia is one of the largest challenges for building successful ICS/CCS business especially in the rural part of the country. The adopted ICS distribution models are grouped in to five categories based on end consumers' settlement patterns as urban households, rural households, peri-urban households, institutions and refugees. The following table describes the stove types and their target markets.

**Table 5.1 Broad categories of distribution models for improved and modern cookstoves.**

Improved Cookstove	♣ Urban HH	◆ Rural HH	♠ Peri-urban HH	* Institution	○ Refuges	Distribution Models
<b>Model - I</b>						
AwirambaInjera baking stove		◆				
Traditional enclosed mud Injera baking stove		◆				
<b>Model - II</b>						
YekumMirtInjera baking stove	♣			*		
Electric Injera baking stove	♣			*		
<b>Model - III</b>						
Mirt – Injera baking stove	♣	◆	♠	*		
Gonziye – Injera baking stove		◆				
Tikikil multi-fuel cookstove	♣	◆	♠		○	
Flexy multi-fuel cookstove	♣	◆	♠		○	
Biogas	♣	◆	♠	*		

Improved Cookstove	♣ Urban HH	◆ Rural HH	♠ Peri-urban HH	* Institution	○ Refuges	Distribution Models
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**AwirambaInjera baking stove:** Awiramba stove is accepted by the Amhara Regional Water and Energy Bureau as clean and fuel saving cookstove and is being promoted to rural households. There are trained stove producers who build this stove by moving from house to house. The stove installation decisions are made based on market demand. Since the Awramba stove is a fixed stove type which is built from locally available mud there is no need to transport the completed stove nor the raw materials needed for manufacturing. The cookstove program in Amhara region now promotes this stove.

**Traditional enclosed mud stoves for injera baking:** Traditional enclosed mud stoves are built by local community groups. The stove is a fixed type and has chimney. The stove producers collect demand for the stove in the community and build the stove on site. Energy Bureaus and Offices do not promote this stove as they do not believe that this stove reduces firewood consumption. Health Bureaus and Office, however, highly promote this stove as the chimney helps to remove the smoke from the cooking place and believe that it helps to reduce Household Air Pollution (HAP). Similar to the Awramba stove, the traditional enclosed mud injera stove is also built by stove producers in the neighborhood.

**MirtInjera baking stove:** Mirt stove is an injera baking stove that uses biomass fuels. Mirt is promoted in urban, rural and peri-urban households and few institutions like universities, hospital and restaurants. The market for Mirt stove is larger in urban areas than in rural areas. The urban infrastructure, mainly better access road and transportation facility, is largely contributing for the success of the dissemination in urban areas. The Mirtinjera stove is a high mass stove which weighs about 40 kg. This has been one of the major barriers for a wide scale distribution of the stove especially in rural areas. There are more than 700 small-scale enterprises that are trained to manufacture and distribute Mirt stove in the country. These small-scale stove producers sell Mirt stoves directly to end users. There are very small number of retailers who are involved in Mirt stove distribution. Almost all local manufacturers are single person enterprises and most have not made any real attempt to increase production capacity to serve a larger market. Often, stove production is a supplementary income option for those involved in the production and sales of Mirt stove. The local Energy Office, Women Affairs Office and Agriculture Office are involved in the promotion and distribution of Mirt stove by offering large orders to stove producers and assisting in the transportation of the stoves to rural households. However, the Health Office has less interest in the dissemination of the Mirt stove as the stove

has no chimney. Recently, GIZ Office in collaboration with the Tigray Region Bureau of Mines and Energy introduced Mirt with an integrated chimney. This attracted the health extension workers to be involved in the promotion and dissemination of the stove.

**YekumMirtInjera baking stove:** This stove is basically Mirt stove but clad with metal and has a metal stand similar to electric injera baking stoves. It also has a chimney for the removal of the smoke from the kitchen. The market segment for this stove is mainly micro enterprises such as injera bakers and restaurants. However, there are several urban households who are using the stove especially in major regional towns where firewood is still the major fuel for injera baking. YekumMirt Stove is also adopted by households and businesses in areas where power interruption is quite frequent. These stoves are manufactured and distributed by small scale producers who own small metal manufacturing shades. They buy the Mirt stove from local producers and build the metal cladding around it, attach a chimney and fix a metal stand for it. The added value raises the prices of the stove up to five times more than the regular Mirt Injera stove. Producers of these stoves usually sell the product directly to the consumers but in few cases some retailers also do the distribution.

**Electric Injera baking stove:** The Electric Injera baking stoves market is the urban households and businesses. Electric injera stove producers sell the stove directly to end users and also to retailers. The price of the stove ranges between 600 to 3,500 birr depending on the quality of the stove. Unlike other types of ICS, there are more retailers involved in Electric injera baking stove business. The high price of the stove motivates retailers to be involved in the distribution as it leaves an attractive margin to them. Low electricity tariff and cleanliness of the stove entice households and businesses that are connected to the grid to adopt the stove. In urban areas the purchasing power of consumers creates a wider market for suppliers. Electricity is the cleanest cooking energy of all fuels used by the households.

**Gonziye – Injera baking stove:** Gonziye is a high mass fired-clay stove which has four parts that form a complete stove. The stove is classified as Injera baking stoves and can be adjusted to accommodate cooking pots. The stove has been produced and disseminated in rural areas. Most rural micro enterprises that produce Gonziye stove are rural women groups with 10 or more members. The members of the micro enterprises are responsible to do the promotion and distribution. Agriculture and Energy Offices in the regions promote the stove in rural areas.

**Tikikil multi-fuel cookstove:** Tikikil stove is a fuel saving stove developed with rocket stove design principle. The first version of Tikikil stove, designed by GIZ in collaboration with MoWIE, only works with firewood. Later on, by incorporating feedback from users and producers of the stove, the design was modified to burn charcoal briquettes as well. The Tikikil stove is supported by GIZ office through provision of training to small scale artisans. Most of Tikikil stove producers abandoned the business because of very low demand for the product. The market for Tikikil is bulk orders from NGOs and humanitarian aid organizations for distribution in refugee camps and to households in vulnerable settlements. Regional Agriculture and Energy Bureaus and Offices support the stove but the market uptake is very limited.

**Flexy multi-fuel cookstove:** Flexy multi-fuel cookstove is a rocket stove that burns firewood, charcoal and charcoal briquette. It has been promoted in refugee camps by NGOs. The stove developed by a local cookstove enterprise called Gogle. Very few numbers of Flexy stoves have been sold in the retail market to households. Flexy stove is also suffering with similar marketing challenge as Tikikil stove.

**Biogas for Cooking:** Institutional biogas was introduced in the 1980s and earlier by the MoA. Institutional biogas systems in Ethiopia are characterized by frequent failure and abandonment. This is mainly due to lack of proper management and follow up in terms of feedstock preparation and supply. Domestic biogas systems were introduced rather recently by SNV and MoWIE under the National Biogas Program (NBP) which is supported by the Dutch government. In the last decade about 20,000 domestic biogas digesters were disseminated in various regions in the country. The NBP trained masons for the construction of biogas plants. The Program also worked with private businesses for the manufacturing of certain components of the biogas system such as the stove parts. The Program is well adopted by the Regional government Bureaus and promoted in rural areas. Biogas technology is disseminated through trained individuals and cooperatives.

The installation of the technology involves customers through providing raw materials like rock, mud, and other locally available materials. NBP aims to disseminate 35,000 more digesters during the second phase of the program. Biogas is a clean cooking technology and is categorized in Tier 4 group for its Household Air Pollution level.

**Electric Cookstove:** The electric cookstove is eventually becoming well preferable by urban households. These stoves come with several version and sizes. The costs of the stoves also vary from product to products with a selling range of 300– 2,000birr. The Electric stove producers act as a whole seller and distribute them to the retailers and retailers play the major role to disseminate the stoves to end users. The majority of urban households are shifting to this product as electricity become comparatively low prices than other fuel like LPG, kerosene and charcoal. The involvement of development partners in the dissemination of electric cookstove is very low. Electricity is the cleanest cooking fuel and is of Tier 4 category.

**Lakech-Cookstove:** Lakech stove is a charcoal stove and has been promoted for more than two decades. The informal sector is highly involved in the production and disseminating of the stoves. The stove is predominantly produced in large towns like Addis Ababa and transported to different regions. In this distribution model both wholesalers and distributors are highly involved. The stove comes with different quality and price. Unlike to other types of stoves business, the Lakech stove business is taking as major business area by many retailers since the stove is very well accepted by urban households countrywide.

**Mirchaye / Obama-Cookstove:** Mirchay or Obama stove is using briquette fuel and has similar appearance with Lakech stove. The stove is comparatively new to the market and becoming preferable by refugee camps. Households are also buying the stoves direct from stove producers. The marketing and dissemination nature of the stove is taking after the Lakech stove practice.

**LPG stoves:** LPG stoves and fuel container cylinders are all imported and distributed by the private sector. Stoves vary in type from a single burner to four burner stoves for household use. Commercial and institutional LPG stoves differ both in size and number of burners. LPG used to be imported by the government and its price was also regulated just like other petroleum fuels. However, in the last couple of decades LPG price has not been regulated and, importation and distribution of the fuel has also been done by the private sector. Distribution of the fuel is limited only to major cities and it faces frequent interruption of supply. LPG is a fuel usually used by high income households because of its high price. LPG is one of the clean household cooking fuels which is grouped as Tier 4 stove for both performance and Household Air Pollution.

**Ethanol stoves:** Ethanol stove currently is imported. There have been a couple of trials by private companies and the government for local manufacturing of the stove but it does not seem successful. Frequent disruption of ethanol fuel availability also contributed to the lack of interest by the private sector and other institutions in being consistent in their effort on research and development. Gaia Association is a local NGO which started the promotion and distribution of ethanol fuel for household cooking use in Ethiopia. Gaia Association has also introduced ethanol in refugee households in order to alleviate the potential burden on the local biomass resource due to unsustainable harvest as cooking fuel. Commercial dissemination of ethanol cookstove is limited only to very few households in Addis Ababa. This is mainly because of factors such as inadequate and unreliable supply of ethanol fuel, undeveloped fuel distribution network, and absence of the ethanol cookstove on the market. The stoves that were imported by one private company have been distributed to consumers through a couple of outlets for household consumer goods. Currently, distribution of the fuel is done by three commercial companies which are based in Addis Ababa. Ethanol is a clean cooking fuel categorized as Tier 4 in terms of Household Air Pollution level and performance.

### 5.3 Main Challenges of Existing Distribution Models

The current distribution channels for fuel saving and clean Cookstoves are not well developed to effectively distribute the products to consumers. The distribution models are mainly determined by the product type and the geographical location of producers and end users. The ICS/CCS need to find cost-effective distribution

methods that are suited to the nature of the market and local infrastructure. Besides, the 'last mile distribution challenge' is not exclusive to a particular sector. Different types of ICS/CCS are facing different challenges therefore distribution systems need to be adapted accordingly. Some of the major bottleneck are:

**Lack or limited availability of CCS technology:** the only promoted CCSs are LPG, Electric stoves and Ethanol stoves. These technologies are only available in urban setting with limited accessibility.

**Absence of conventional distribution chain:** The ICS/CCS markets often lack the presence of distributors and distribution infrastructure like logistics and transport, retail outlets, and warehouses.

**Irregular and unreliable cash flows:** End users are usually cash-poor and cash flows depend on several factors. Most end users are not able to make one time full payments to acquire ICS/CCS. Financing would help improve adoption rate of these stoves. Efforts that help improve distribution channels need also be combined with end-consumer financing mechanisms.

**Fragmented and decentralized demand:** Settlement patterns of rural end users of potential ICS/CCS users are usually scattered. Demand for these stoves is also scattered and raises serious logistical issues for transportation of raw materials and finished products. At times, program such as Sustainable Land Management Programs, collect and aggregate demand from a certain area for micro enterprises that produce the stoves to supply. In most cases, however, producers do not have a continuous market for the stoves as aggregating demand would be a challenge for them. Distribution of stoves in small quantities to great distances would make the ultimate price of the stove higher than that the consumer can afford. Such situations ultimately discourage and make producers loose interest to continue in the business.

**Suppressed demand for ICS/CCS:** While there is a clear need for reducing cooking energy consumption and clean household air, translating these needs into demand is yet to be developed. Converting this suppressed demand into real demand requires to build mechanisms that help develop the market such as awareness-creation, promotions and development of the supply chain.

**Demand is fairly elastic:** Rural households are price-sensitive. However, increasing end users prices to cover costs of decentralized distribution and cutting costs through lower product quality will affect the stove market.

## 5.4 Financing for Improved and Clean Cooking

For business development supports to be effective, they should be tightly integrated to the effort to foster access to finance. Financial institutions such as commercial banks, Micro Finance Institutions (MFIs), the World Bank (WB) and other development programmes mainly provide funds to support ICS promotion efforts. Even though support to promotion activities are very important to develop the sector, financial leverages to enterprises that are engaged in the manufacturing and distribution of cookstove is also critically important. Prices of some fuels saving cookstoves and most clean cookstoves are usually high for the majority of households to adopt. Creating a mechanism to make consumer financing available for clean and fuel saving cookstoves would help accelerate adoption of such technologies. Financing should also have aspects which encourage local saving groups such as rural Saving and Credit Cooperatives (SACCOs) and traditional saving groups (such as '*Equb*') which can be conditions as matching funds to access consumer financing from more formal finance sources.

Most ICS and CCS manufacturing enterprises have very low level technical skills and operate with rudimentary working facilities. This has direct impact on the scale of production, and quality and standard of the products they produce which ultimately make the price of the products higher. The supply chain for most ICS is not well developed. This limits accessibility of the products by the rural consumers or price would be beyond the reach of the most rural households. Program financing that are currently available through the Development Bank of Ethiopia is not accessible to most ICS/CCS producers as they are not able to meet the loan requirement. So far only one or two ICS producers managed to access the loan and are currently struggling to make effective use of it.

## 5.5 Key issues and recommendations

**Production of CCS/ICS:** there are more than 1,000 trained stove producers available countrywide. The vast majority of enterprises engaged in the ICS production and distribution are very small and informal. In order to achieve the national target set for adoption of ICS/CCS, the current form and scale of production need to be changed significantly. Strong support to and promotion of the sector is highly required to mobilize significant private sector investment.

**Promotion and Marketing:** Lack of consistent promotion and market activities to support the commercialization of ICS, particularly in rural area, is hindering the overall ICS market development efforts. Several stove producers report that inadequate marketing and promotions as one of the major factors for low level demand for ICS/CCS. Currently, promotion of ICS/CCS is being done by sector government organizations, cookstove enterprises, bilateral organizations, NGOs and GOs. These institutions adopted different types of promotional methods and tools based on the ICS technology, the market segmentation as well as project budgets. However, these efforts have not been consistent and strategically planned to bring the required impact. It is important to properly study and assess the choice of promotion tool as per the target group and the impact required to bring.

**Technology research and development (R&D):** Currently available ICS/CCS have been in the market for many years without significant improvement. There are very few private sector organizations and institutions that are engaged in ICS technology development. These institutions may have workshops, laboratories and other basic testing equipment for performance and emissions measurement. Cookstove development efforts by most of these originations is mostly related to fuel saving cookstoves and very limited or no effort has been dedicated for development of CCS. Technical supports from National Cookstoves Program should also make such facilities available for innovators to test and develop prototypes. Platforms for exchange of information and experience sharing must also be established for collaboration and utilization of limited resources including finance, technical knowhow, testing and production facilities.

**Partnership/Synergy:** Clean cook stoves address multiple interests from different sectors including energy, forestry, health, gender, agriculture, environmental and other others. However, efforts on development, promotion and marketing of ICS/CCS are less coordinated among the players. Partnership and cooperation would also help to raise and address policy and regulatory hurdles.

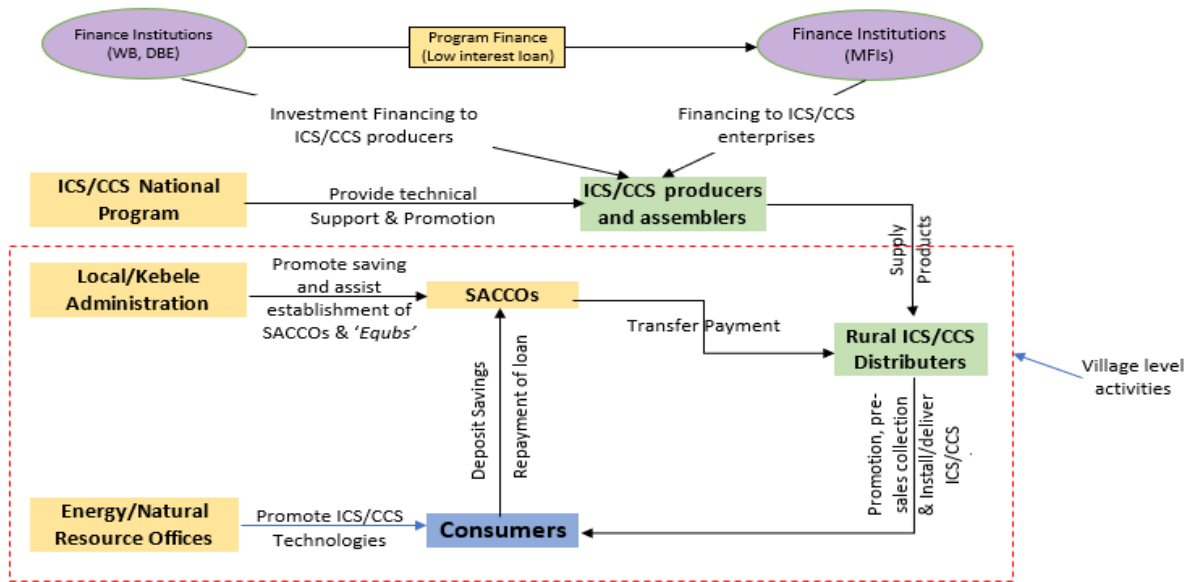
**Networking:** establishment of association or alliance group for ICS/CCS would help build partnership amount the stakeholders in the sector to streamline capacity building effects. Well-developed partnership and networking among the players in the ICS/CCS sector would also help to obtain technical supports, set product quality standard and monitoring mechanism, and attract resources such as finance to the sector.

**Finance:** Business development support, in order to be effective, should be tightly integrated in the effort to foster access to finance. Financial institutions like banks, MFIs, WB and some other development programmes are mainly provide capital to ICS enterprises to increase production and promotion efforts. Nevertheless, it has been often proofed that lack of access to effective financing services for cookstoves, as the technologies are not understood or well known by the financial service provides. Technology, marketing and financial advisory services are very important at all levels. Advisory services can be given to enterprises, innovators, promoters, financial institutions, development partners, and associations.

National ICS/CCS programs need to integrate technical and financial supports, and intensive awareness creation and promotion campaigns for successful widescale adoption of the technologies. The schematics below depicts how technical supports and financing in the value chain of ICS/CCS products can be planned.



**Figure 5.1 Schematic for program supports and roles of various intuitions in the ICS/CCS supply chain**



## 6. Conclusions and Recommendations

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### 6.1 Policies and Strategies

National policies are generally supportive of natural resource protection and conservation, environmental sustainability and domestic technological development. Energy sector policies all give cooking high priority for policy and strategic action although the degree to which they understood the level of impacts and links across sectors varied significantly.

***The Energy Policy of 1994:*** is still in effect as the new energy policy of 2013 is still waiting approval by the Council of Ministers. The 1994 energy policy accords high priority to a shift from use of traditional energy sources to modern energy, energy efficiency and environment sustainability, all of which are directly relevant to clean cooking. The policy strongly recommends two strategies for the residential cooking sector: supply of alternative fuels to biomass, and energy efficiency in cooking. However, with respect to clean cooking, the policy has a number of shortcomings including:

- Too outdated to reflect current realities and new developments in clean cooking sector. The inter-sectoral linkages of clean cooking (e.g., with health, gender and climate change) were understood narrowly than today
- Policy implementation strategies were not addressed,
- Sector governance issues were not given due attention,
- It does not contain a framework for monitoring and evaluation for monitoring implementation and subsequent outcomes of the policy.

***The Draft National Energy Policy of 2013:*** Having waited approval of Council of Ministers for over five years now, this draft policy itself needed a revision even before it was actually put to practice. Compared to the 1994 policy, the draft policy, however, puts the sector in a contemporary context by linking it with the economic and social sectors as well as environment and climate change. Clean cooking and bioenergy policies include promotion of clean and efficient technologies, particularly for the household sector; and sustainable bioenergy production. The new policy recommends stronger governance including capable institutions and decentralized decision making on standards and their enforcement for clean cook stoves.

***The Biofuels Development Strategy:*** Following the approval of the biofuel development strategy by the Council of Ministers in 2007, there were high hopes and considerable activities and investments on biofuels development in the country. Given their perceived potential to reduce on imported petroleum fuels, ethanol and biodiesel received more attention by the GoE; and initiatives aimed at developing these resources received considerable support to make them competitive in the local as well as global market. In addition to replacing up to 20% domestic gasoline and diesel consumption, it was also hoped ethanol can contribute significantly to meeting household energy demand for cooking. Today, ten years later, contrary to the then massive interest and enormous hopes and expectations, very little has been achieved in terms of ethanol production (three percent of 1.3 billion liters planned under GTP 2); and nothing in terms of biodiesel production.

***The Biomass Energy Strategy (BEST):*** Issued in 2013 but not endorsed yet, the strategy proposed increasing the biomass energy supply base with promotion of fast growing trees, increasing biomass fuel use efficiencies, and integration of the BEST strategy into energy policy and a special policy on charcoal. Energy consumption studies conducted as part of the strategy formulation processes found out that estimated current levels of biomass energy consumption were much higher (54%) than previously thought and that consumption of charcoal has grown alarmingly between 2000 and 2013 in both rural and urban areas. Wood and charcoal consumption estimates from this strategy are much larger than those from recent national energy balances, raising the issues of data validity and the impact this has on policies and strategies. If indeed wood and charcoal consumption levels are as estimated in the strategy, then more focused efforts and significant investment would be required to improve the efficiency of charcoal stoves and accelerating their diffusion. However, the BEST consists lots of valuable information that could contribute for the development of the sector, due to the fact that the BEST is not endorsed yet, it is not much known by most of the stakeholders. Though BEST was led by AETDPD during its development, it was not well pushed by AETDPD to the endorsement level. This has been clearly indicated in the recent study ‘Strategic Evaluation of EUEI PDF’s Biomass Energy Strategy (BEST) Activities’ commissioned by EUEI PDF and focuses on

five Sub-Saharan Africa including Ethiopia. Hence, as both the supply enhancement as well as ICS is now under MEFCC, it is recommended that MEFCC to lead the endorsement of this valuable document by reviewing it once more as it was issued in 2013 and make it available for all stakeholders for its further use. This can also be done through the support of the SECCS project.

***The National Improved Cookstoves Investment Plan (IP):*** Launched in 2013, the IP promotes a coherent, coordinated and programmatic approach to the ICS sector. It seeks to address market barriers by supporting development of the supply chain, ICS product development so that stoves meet consumer requirements better, and increase financing for ICS from domestic and external sources. A revision or update of the IP will benefit from a wider approach to ICS sector development including giving more emphasis on development and promotion of stoves for modern fuels (biogas, electricity, LPG), promotion of clean cooking in the residential and commercial sectors, understanding the drivers for cook stove adoption by consumers.

***The Second Growth and Transformation Plan:*** GTP 2 for the energy sector puts a very ambitious target for the clean cooking sector: 11.45 million ICS, 31,400 domestic biogas, 20,000 biofuel stoves, 412 million liters of ethanol for cooking (4.1 million ethanol stoves), 270 million liters of bio-oil derived fuel for cooking (1.8 million oil stoves), and 5,000 solar cookers. The budget requested for the biomass component of the plan was ETB443 million.

***The Forest Development, Conservation and Utilization Proclamation:*** The legislation promotes forest protection through better management including with engagement of local communities, forest development through promotion of forest technologies and markets for forest products. The proclamation states that movement of forest products (which would include fuelwood and charcoal) should be regulated with requirements for permits.

***Environment and Climate Change Policies:*** Policies that are relevant to the clean cooking sector are contained in the Environment Policy, the CRGE, the climate resilience CR strategy for the water and energy, and the CR strategy for agricultural and natural resources. The Environment Policy puts biomass energy in a broader context with linkages to the natural resource degradation, climate change and gender. The CRGE considers protecting and rehabilitation of forests, and transition to modern and energy-efficient technologies as two of the four pillars of the strategy. The CR strategy for water and energy puts biomass energy efficiency as one of the four key strategies for the sector. Clean cooking features highly in the INDC where the forest sector contributes 50% of the total emission reduction from Ethiopia and clean cooking 20% of the ER from the forestry sector.

***The Health Policy:*** Ethiopia's national health policy emphasizes prevention of diseases, occupational and environmental health, and providing healthcare to women and children. These are directly related to reducing or eliminating indoor air pollution from the home which affect mainly women and children. The national policy on women recommends integration of gender issues into sector development programs, and it ensures women's right for full participation in the economic and social programs that affect them.

***The Science, Technology and Innovation Policy:*** The policy promotes green technologies to address environmental problems associated with deforestation and forest degradation. It also recommends afforestation and reforestation with fast growing trees to meet demand for wood products including energy, and to build local technological capacity including building a national center for energy research.

## **6.2 Institutions and Programs**

Based on findings of the assessment (existing institutions and institutional arrangements as well as ongoing clean cooking projects and programs), ostensibly, a number of key issues pertaining to the wider RE sector and cookstoves sub sector deserve the attention of high-level policy makers in Ethiopia. Attention at higher level of the executive is required mainly because, first of all, a public policy action agenda – access to clean and affordable energy for residential cooking is far from achieved; secondly, with its 20% contribution to emissions from the forest sector, emission abatement potential of the residential cooking sector is enormous and, third, existing institutional mandates and arrangements are unlikely to effectively address the public policy action (clean cooking in this case) agenda and deliver the intended policy action outputs, i.e., widespread dissemination and adoption of clean cooking technologies in ways that ensure the achievement

of the overarching CRGE objectives. Therefore, based the findings of this assessment, the following key issues are identified and recommendations made in relation to clean cooking sector institutions and institutional arrangements:

- 1) Legally mandated, capable central government institution is needed for clean cooking sector:** At the moment, there is either no mandated, champion government institution to lead the clean cooking sector, or, whatever vague mandates may exist, they are fragmented between various ministries and government agencies (see # 2 below). Currently, there is an institutional vacuum in the clean cooking sector the wider renewable energy sector; and this vacuum needs to be filled in urgently. Without clearly stipulated legal mandates, a public institution would not be able to formulate its vision and mission with a reasonable clarity; and any effort without clear vision and mission statements can only be in-efficient and in-effective in delivering public policy outputs (in this case, widespread adoption of clean cookstoves). Therefore, if the ongoing and forthcoming GTP targets are to be achieved and, above all, if the nation is to benefit from the massive emissions abatement potential of the clean cooking sector as rightly noted in the CRGE, then it is high time for Ethiopia to re-constitute a strong and capable central government institution with clear mandates, vision and mission to provide guidance and oversight as well as coordinate efforts in the clean cooking sector.
- 2) Fragmentation of responsibilities for clean cooking sector made coordination of efforts more difficult than ever before:** Arising from its cross-sectoral and cross-cutting nature, poor coordination and duplication of efforts have always been serious challenges in Ethiopia's Cookstoves sector. Unfortunately, these pervasive challenges have risen to the next higher level in recent years when the MFCC assumed a new operational role of ICS development and dissemination. The new institutional arrangements, leaving considerable skills, capacities and other resources (staff, workshop, laboratory) behind with the MoWIE, has created a coordination nightmare among the two concerned ministries as well as other ministries and stakeholders who seek their services and technical support in clean cooking sector. Therefore, in the interest of avoiding duplication of efforts, hence resource wastage, as well as delivery of public services in an efficient and effective manner, the AETDPD of MoWIE and the ICS Directorate of MEFCC should be merged to form one capable, central mandated clean cooking sector institution to oversee and guide efforts of the cookstoves sector. Such a merger, in addition to resolving the issue of coordination among the two institutions on the one hand and between the institutions and other stakeholders on the other, could readily fill in the existing institutional vacuum as well address the issue of institutional capacities that are evident with the young ICS Directorate being established under the MEFCC.
- 3) Institutional stability and strengthening capacities is important:** Effective delivery of public policy outputs presupposes, among others, some degree of institutional stability. In fact, in terms of delivering the intended outputs, institutional stability is as important as the institution itself. Despite this, however, institutions overseeing the cookstoves sector, in addition to continuing loss of mandates, have been subjected to frequent restructuring and lateral movement between various ministries during the past two decades. This is the case with the AETDPD of the MoWIE. Very often, such institutional restructuring goes further and includes parent ministries themselves. In addition to leading to loss of focus and momentum in operations, such frequent institutional reshuffling has had destabilizing effects on the institutions under consideration. Yet another destabilizing effect of frequent restructuring of central government institutions is on their regional counterparts. As witnessed thus far, almost every institutional restructuring at the federal level triggers similar changes at the level of regional counterparts; and REAs are a case in point. The REAs, after constantly, re-configuring their institutions to align them with their federal counterparts, defied the most recent restructuring made at the federal level and continued with their existing institutional arrangements. Therefore, in the interest of ensuring certain level of institutional stability, predictability and planning with a degree of certainty, it is very important to firstly minimize the frequency of institutional restructuring at the federal level and, secondly, if and when institutional restructuring is mandatory, then, REAs as well as subordinate institutions (within ministries) should be not only consulted, but adequately engaged in the entire process of institutional restructuring.

### 6.3 Technology and Innovation

R&D on clean cooking has stagnated and no capable organization working on technology development and innovation on cookstoves. Lack of R&D, or, at least, stagnation thereof, is primarily due to unpredictable funding (both GoE and donors) and lack of appropriate regulatory framework that fosters and incentivizes long-term and strategic partnerships with academia, research institutions, government and private companies. As a result of lack of well-organized and resourced, R&D on clean cooking, it is natural to witness wasting of meager resources by adopting untested top-down approached which often are not informed by consumer needs and preferences. If Ethiopia has to reverse the prevailing undesirable situation and achieve its CRGE targets (substantial abatement potential in the cooking sector) through the green-growth path, then the nation needs to invest in developing its cookstoves industry by (i) a more programmatic approach and, (ii) by coordinating stakeholders and facilitating partnerships with donors, industry players, higher learning and training institutions to conduct R&D and encourage innovation in clean cooking technology development and subsequent large scale adoption of high-quality, high-performance clean cookstoves among the majority of Ethiopian households. Some of the key areas identified for clean cooking technology development and innovation are outlined below:

- ❖ **University – Industry Linkages and Collaboration:** The University-Industry nexus is needed to narrow down the gap between research outputs and the real world. To make research outputs relevant to the issue at hand (socio-culturally acceptable, commercially viable and energy-efficient and clean cookstove), the cookstoves R&D needs to be informed by the needs of the market players.
- ❖ **Consumer Needs and Preferences:** As crucially important as they are for a successful adoption of any given technology (in this case clean cookstoves), consumer needs and preferences are often treacherous and hence easy to forget. For example, in many rural areas women, the primary victims, may not understand and appreciate health risks associated with indoor air pollution resulting from the use of solid biomass fuels on traditional stoves. They often compare and prioritize other basic sustenance needs over clean cooking. They cannot (and shall not) be expected understand the economics clean cooking as long as traditional biomass fuels are collected ‘freely’, which serves as a disincentive for rural households to invest in energy efficiency. Therefore, R&D on clean cooking technologies and innovations, when addressing consumer needs and preferences, also need to be informed by the context of market-failure.
- ❖ **Enhancing Cookstoves Affordability without Compromising Quality and other Important Features:** As contradictory as it appears, affordability of clean cooking technologies is the key for a success. Fortunately, clean cookstoves are manufacturing-based technologies; and almost all technologies that are manufactured have a room for reducing costs, hence improving affordability of the products by their intended users. However, such gains (affordability) should not be made at the cost of other equally important features. Therefore, it is imperative for any R&D work on clean cookstoves to achieve cost reduction, but without significantly compromising the other important features of the stoves.
- ❖ **Follow up and Monitoring:** Continuous improvement and innovation of any technology is difficult without a flow of information between the parties involved (innovators and consumers). Consumers’ feed-back is a life-line for any innovation; and it is more so with clean cookstoves in Ethiopia, because they are at their early stages of development. Therefore, it is very important for any R&D effort on clean cooking to set up and maintain a feed-back loop through M&E so as to continually innovate and improve the technologies in question and keep pace with ever-changing consumer needs and preferences.

### 6.4 Distribution Models and Financing

- ❖ **Transitioning from too many small operators to fewer large clean cookstoves manufacturing enterprises to benefit from cost reduction from economies of scale and also maintaining high product quality**
- ❖ **Clear and consistent messaging in and persistent promotion and marketing to create demand for clean cookstoves,**

- ❖ Variety of clean cookstoves including ethanol, biogas and electric are needed to address sifting consumer needs and preferences,
- ❖ Pricing of clean cooking fuels such as ethanol and LPG, particularly in relation to taxes levied on them, needs to consider the wider national and global benefit in terms of the burden of disease due to Household Air Pollution, heavy reliance on the biomass resources which leads to forest degradation and emissions that would be release to the environment.
- ❖ Effective sector coordination and streamlined regulatory frameworks are needed to standardize dissemination approaches, avoid duplication efforts, wasting resources and achieve synergies,
- ❖ Networking and voicing: so far there is no any association or alliance group formulated with regard to cookstove partners. Setting-up of ICS associations and be structured in order to respond to its members' demand from different angles, such as access to finance, ICS production and marketing efforts,
- ❖ Setting up minimum quality standards is key to boosting consumer confidence and hence, market growth.
- ❖ Supporting business development services including technology, marketing and financial advisory services to clean cooking sector, by enhancing the image, visibility, profitability and even bankability of market actors, would help improve the scaling up and growth trajectory of the sector.

## Annex 1. Documents reviewed

### Policies and Strategies

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- Constitution of the FDRE (Proclamation No. 1/1995)
- EUEI PDF (2014) *Biomass energy strategy Ethiopia*. European Union Energy Initiative [S. Geissler, D. Hagauer, A. Horst, M. Krause & P. Sutcliffe]
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- GoE (1997) *Environmental policy of Ethiopia*
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- GoE (2011) *Ethiopia's programme of adaptation to climate change*
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- GoE (2016) *Growth and Transformation Plan II 2015/16-2019/20– Volume I: main text*
- GoE (2016) *Growth and Transformation Plan II 2015/16-2019/20– Volume II: policy matrix*
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- MOH (2015?) *National health promotion and communication strategy (2016-2020)*
- MOWIE (2013) *National Improved Cook Stoves Investment Plan*
- UNHCR, 2014. *Global Strategy for Safe Access to Fuel and Energy (SAFE)*
- World Bank (2013) *Sustainable Land Management Project II (SLMP-2): project appraisal document*. Report no. PAD525
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### Other documents

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- Africa Clean Cooking Energy Solutions Initiative (November 2012) *State of the Clean Cooking Energy Sector in Sub-Saharan Africa*
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- CSA, NBE, World Bank (February 2017) *Integrated surveys on agriculture, Ethiopia socioeconomic survey (ESS), 2015/2016*
- ESMAP and GACC (2015) *The State of the Global Clean and Improved Cooking Sector*
- IRENA (2011) *Good Practice Policy Framework For Energy Technology Research, Development And Demonstration (RD&D)*
- IRENA (2014) *Evaluating Renewable Energy Policy: A Review of Criteria and Indicators for Assessment*
- SNV (?) *Successful Distribution Models for Clean Cooking: Lessons Learned from Ten Innovative Case Studies at the Bottom of the Pyramid*
- UNDP (2008) *Capacity Assessment Methodology: User's Guide*
- WHO, IEAGACC, UNDP, World Bank (Feb 2018) *Achieving Universal Access to Clean and Modern Cooking Fuels and Technologies*

## Web sites

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- <https://chilot.me/nationa-policies-and-strategies/>
- <https://ethiopiareddplus.gov.et/redd-readiness/redd-national-strategy/>

## Institutions and Programs

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- EU (2015): Action Document for Ethiopia: Biogas Dissemination Scale-Up Project – National Biogas Programme of Ethiopia (NBPE+)
- FDRE (2015): Proclamation No. 916/2015 Definition of Powers and Duties of the Executive Organs of the Federal Democratic Republic of Ethiopia Proclamation
- Gaia Association (2014): Holistic Feasibility Study of a National Scale-up Program Regarding Bio-ethanol Stoves and Micro Distilleries.
- MoME (2007): The Biofuel Development and Utilization Strategy of Ethiopia
- MoWE (2013): National Programme for Improved Household Biomass Cook Stoves Development & Promotion in Ethiopia
- OECD (2007): Improving Public Sector Efficiency: Challenges and Opportunities
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## Technology and Innovation

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## Annex 2. Analysis of sector policies and strategies

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
Constitution of the FDRE (Proclamation No. 1/1995)	<p>The constitution of the FDRE, which came into effect on 21 August 1995, guides all laws, practices and decisions of organs of state. Areas of interest for the clean cooking sector and related sectors include the following:</p> <p>Right to development</p> <ul style="list-style-type: none"> <li>- Nationals have the right to participate in national development and, in particular, to be consulted with respect to policies and projects affecting their community.</li> </ul> <p>Rights of Women</p> <ul style="list-style-type: none"> <li>- Women shall; in the enjoyment of rights and protections provided for by this Constitution, have equal right with men.</li> <li>- Women are entitled to affirmative measures to redress the negative historical legacy. The purpose of such measures shall be to provide special attention to women so as to enable them compete and participate on the basis of equality with men in political, social and economic life as well as in public and private institutions.</li> <li>- Women have the right to full consultation in the formulation of national development policies, the designing and execution of projects, and particularly in the case of projects affecting the interests of women</li> <li>- The State has the obligation to allocate ever increasing resources to provide to the public health, education and other social services</li> </ul> <p>Environmental rights</p> <ul style="list-style-type: none"> <li>- All persons have the right to a clean and healthy environment.</li> </ul> <p>Environmental objectives</p> <ul style="list-style-type: none"> <li>- Government shall endeavour to ensure that all Ethiopians live in a clean and healthy environment.</li> <li>- The design and implementation of programmes and projects of development shall not damage or destroy the environment.</li> </ul>	-

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- People have the right to full consultation and to the expression of views-in the planning and implementation of environmental policies and projects that affect them directly.</li> <li>- Government and citizens shall have the duty to protect the environment.</li> </ul>	
<b>Energy</b>		
Energy policy (1994)	<ul style="list-style-type: none"> <li>- Rationale: the critical importance of energy in the economy and for social services; develop least-cost development consistent with country's resources and policies</li> <li>- Policy objectives: reliability of supply, shift from traditional to modern energy, promote development of indigenous resources, increase energy efficiency, environmental sustainability</li> <li>- General policy: enhance development of hydro resources for power generation, promote development of natural gas and oil, agro forestry, alternative sources for household and other sectors, energy conservation in all sectors, environmental sustainability, self-reliance in technology, community participation and particularly women, public awareness on energy issues, enhance institutional and legal framework</li> <li>- Priority policies: high priority on hydropower development, shift to modern energy, standards for energy efficiency, development of human resources, competent sector institutions, incentives for private sector, environmental sustainability</li> <li>- Policy on energy resources: traditional fuels – afforestation, reduce negative impacts of agricultural waste use; modern energy – hydropower as backbone of sector development strategy, develop geothermal, coal, natural gas, explore for oil; alternative energy – solar and geothermal for process heat and power generation, wind for water pumping, coal as alternative fuel</li> <li>- Policy on energy supply: households – balance between demand and supply, stable prices, increase supply of alternative fuels; transport – improved and appropriate transport technologies, conservation to reduce petroleum product use, fuel substitution for petroleum; agriculture – modern energy for sector; industry – energy supply compatible with industry development, economic and efficient supply</li> </ul>	<ul style="list-style-type: none"> <li>- Based on the rationale that energy is critical to the economy and social development and the need for sector policy that is least cost and consistent with country resource endowments</li> <li>- The objective is to ensure reliable energy supply, shift from to modern energy from traditional energy,</li> <li>- Priority is for development of RE resources, particularly hydropower, shift to modern energy (mainly from biomass fuels used in households for cooking to modern fuels), energy efficiency, environmental sustainability, private sector participation, institutional development for the sector</li> <li>- Resource policy focused on hydropower as source of modern energy; afforestation to increase fuelwood supply; geothermal, coal and natural gas as supplementary to hydropower in modern energy supply; solar and wind given limited role, mainly for thermal power (solar), and water pumping (wind)</li> <li>- Household energy is specifically addressed under supply side policies with focus on increasing supply of alternative fuels (to biomass) with the aim of creating sustainable balance between demand and supply (but what alternative fuels, to whom, where is not indicated)</li> <li>- Conservation and energy saving measures were promoted by the policy (under energy conservation and efficiency)</li> <li>- Cross-sectoral policies: environmentally sustainable energy development, transport and use; energy science and technology to build national capabilities; specifically to undertake research in increasing efficiency of traditional stoves to arrest deforestation and other environmental impacts; public awareness and education;</li> <li>- Strategies were not identified within the policy or other strategy documents emanating from the policy.</li> <li>- Measures were not explicitly identified for shift from traditional to modern energy? What fuels, for who, where?</li> <li>- M&amp;E framework for policies, review process were not in place</li> <li>- Health impacts of biomass fuel use in household not identified as an issue</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Policy on energy conservation and efficiency: household energy – increase energy efficiency and energy saving; industry –improve energy efficiency; transport – energy efficiency and reduce petroleum consumption; agriculture – meet energy for agriculture through local produced modern energy sources; commercial sector – energy efficiency</li> <li>- Policy on cross sectoral issues: energy institutions, human resource development and energy education, energy planning and management, energy science and technology (traditional energy – to increase reliability of supply, arrest deforestation, environmental pollution), electricity (national capacity in design, development , O&amp;M, build capacity for domestic manufacture)</li> </ul>	<ul style="list-style-type: none"> <li>- Climate change links were not identified (although the link between biomass energy use and climate change is clearly stated in the Environment Policy of 1997)</li> <li>- Policy making vs. analysis of policy options</li> <li>- <b>Relevance (relevant to country context, sustainable development and inclusive growth, support for sector reforms and service delivery, governance, cross-cutting areas – gender, livelihoods, culture, biodiversity, vulnerable groups, capacity building.):</b> sketched some inter-sectoral and cross-sectoral links related to cooking (deforestation, land degradation) but failed to identify other key links including health, climate, gender which would have had impact in the way the sector develops (e.g. stove development for IAP reduction)</li> <li>- <b>Effectiveness (policy costing and financing, cost-effectiveness, continued commitment, fiscal decentralization, MRV/data):</b> how policies will be implemented (strategies) were not provided (either within the policy or in a separate strategy document). This limited the</li> <li>- Equity: policy does not differentiate consumers or target groups by geography, income or gender; policies are not specifically targeted (but this could have been addressed under strategy)</li> <li>- <b>Institutional credibility (institutional set up, capacity, ownership, record of policy implementation; policy costing and financing):</b> raised the need for strong institutions, better planning, human resources, self-reliance in technology</li> </ul>
Biofuel Strategy (2007)	<ul style="list-style-type: none"> <li>- Rationale: rising demand for biofuels, environment impacts of fossil fuels and global effort to shift from fossil fuels to RE and EE, import of petroleum and impact on trade balance, potential of large labour force, land and climate, enhance rural development and employment</li> <li>- Goal: produce adequate biofuels to substitute imported petroleum, for export</li> <li>- Objectives: substitute fossil fuels with biofuels to save foreign exchange, contribute to rural development through jobs in biofuel feedstock production, manufacturing, transport and distribution, reduce environmental pollution from petroleum fuels used in vehicles</li> <li>- Principles: ensure food security; ensure maintenance of economic, environmental and cultural values; ensure participation of farmers and pastoralists in benefit sharing; by products to be used for economic benefits, GHG reduction</li> <li>- Strategy: <ul style="list-style-type: none"> <li>- (1) technology transfer, R&amp;D</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- The objectives are stated around substituting imported petroleum with domestic production of biofuels (should have included – substitution of non-sustainably harvested and used solid biomass with sustainably produced biofuels, and other applications)</li> <li>- Key strategies for meeting objectives include technology transfer and R&amp;D, promoting production of ethanol from sugar cane molasses and biodiesel from Jatropha, castor oil and palm oil; increasing biofuels use for transport and for cooking; regulations in support of transition to biofuels including standards and blending mandates for transport</li> <li>- Cross-sectoral issues addressed include strong stakeholder engagement, international cooperation, efficient coordination and leadership (including a biofuel forum), and increasing finance for biofuel development</li> <li>- Relevance: the biofuel strategy was highly relevant at the time when it was issued when there was great international interest for biofuels. Significant international interest was shown to develop biofuels in Ethiopia (potential investors in feedstock production, and biofuel processing).</li> <li>- Effectiveness: key measures that were put forward in the strategy have not been implemented – e.g. increasing ethanol production from state sugar factories. As a result</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- (2) biofuels development – (a) ethanol from sugar cane, encourage private developers to develop sugar plantations, develop local and international markets for ethanol; (b) biodiesel – biodiesel from <i>Jatropha</i>, castor oil and palm tree; allocate land for biodiesel feedstock, support participation of farmers and coops in feedstock development; coordinate biodiesel production with agricultural extension work;</li> <li>- (3) increase biofuels use: (a) ethanol – blending of ethanol with gasoline; government agencies to lead the use of ethanol; vehicle import regulations support import of vehicles with potential for high ethanol mix in fuel; use of ethanol as household fuel, and create conditions for domestic manufacture and EE of ethanol stoves and equipment; develop export market for ethanol; (b) biodiesel – promote use of biodiesel for transport; regulations to support of vehicles that use biodiesel blends; biodiesel for domestic cooking and lighting (R&amp;), standards for biodiesel, develop local and international markets</li> <li>- (4) stakeholder engagement –government sugar industries to play lead role; incentives for private sector for production of ethanol from sugar cane; local and foreign investment for biodiesel; support for construction of biodiesel processing plants, support farmers develop biodiesel source plantations in deforested areas</li> <li>- (5) efficient coordination and leadership – biofuels coordinating unit to be established under MME, forum to be created for stakeholders, public awareness, communication of strategy to the international community</li> <li>- (6) increase finance for biofuels –increase federal government investment, provide support for biodiesel processing plants, support to ethanol processing plants; financial support for tech transfer; to facilitate finance (grants and loans) and provide financial incentives for enterprises engaged in biofuels development;</li> <li>- (7) international cooperation – tech transfer, seeds, processing tech), R&amp;D with other countries</li> </ul>	<p>strategies for utilization (e.g. increasing ethanol blending levels for transport, expanding use in cooking) have not happened. Also some of the measures proposed, such as use of bio or vegetable oils for cooking could not be realized due to availability of the fuel as well availability of appropriate cook stoves</p> <ul style="list-style-type: none"> <li>- Institutional credibility: a department for biofuel coordination was set up after the strategy was issued; a national biofuel forum was also set up to coordinate activities across government ministries and among government and other stakeholders</li> </ul>
Draft new energy policy (2013)	<ul style="list-style-type: none"> <li>- Rationale: fast economic growth, major shift in economic structure and income level, rapid growth of industry,</li> </ul>	<ul style="list-style-type: none"> <li>- Rationale for the new policy is based on new socio-economic context (changing economic structure, rapid industrial growth, rising incomes) which is changing what energy is used where and for what purpose (e.g. electric rail, biofuels). The new policy was also necessary to address issues that had not been addressed in the energy policy of</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Economic transformation will transform energy demand and supply, appropriate policy must be in place for consistent with current socio-economic realities</li> <li>- Develop new directions which have not been addressed by the existing policy including energy supply (e.g. biofuels), energy demand (e.g. electric rail, biofuels for transport), health impacts (e.g. air pollution from vehicles and stoves), reducing greenhouse gases, technology localization, alignment with recent strategies (CRGE), regional energy integration</li> <li>- Vision: to be the renewable energy hub for the East Africa region by 2015</li> <li>- Mission: support socio-economic development and transformation through sustainable, reliable affordable energy services</li> <li>- Issues: energy poverty or very low energy access, high dependence on non-sustainable biomass, inefficient production, transport and use, low institutional capacity, low private participation, high dependence on petroleum imports, financing, climate change, data availability and reliability, standards and enforcement, technology transfer</li> <li>- Clean cooking related issues: biomass: non sustainable use, socio-economic impact on women and girls, technology transfer, financing for consumers, R&amp;D, promotion, lacking market links</li> <li>- Energy policy goal: to ensure availability, access, affordability, safety, reliability of energy services</li> <li>- Policy objectives: improve security and reliability of supply, increase access, promote efficiency, conservation, cleanness, strengthen sector governance, environmental and social safety and sustainability, sector financing</li> <li>- <b>Promote efficiency, cleanness, technologies for conservation</b> <ul style="list-style-type: none"> <li>- improve household and service sector bioenergy use efficiencies</li> <li>- Promote efficient household, service, industrial appliances</li> <li>- Promote public awareness for conservation</li> <li>- Increase capacity for R&amp;D, distribution, management</li> <li>- Strengthen inter-sectoral links for promotion of efficient technologies</li> <li>- Standards and enforcement</li> </ul> </li> </ul>	<p>1994 including climate change and health. The new energy policy aligns the sector policy with broader national strategies such as the CRGE and frames the policy in the current regional and international context.</p> <ul style="list-style-type: none"> <li>- The vision of the new energy policy is to make Ethiopia the renewable energy hub of East Africa. The mission is to ensure sustainable, reliable and affordable energy for socio-economic development of the country.</li> <li>- Policy objectives include improving security and reliability of supply, increasing access, promoting efficiency, conservation and cleanness, strengthening sector governance, environmental and social safety and sustainability, and sector financing</li> <li>- Cooking and bioenergy related policies are stated in four main areas: (a) promoting efficient and clean technologies with specific policies to improve household and service sector bioenergy efficiencies including with improved appliances, (b) supply side policies in the areas of sustainable forest management and supply, efficient bioenergy production, ensuring energy supply security (integrating energy into rural development packages), (c) demand side policies to accelerate distribution of efficient end use devices and introduction of alternative household fuels and technologies, (d) improving the governance and institutional frame for the above in technical standards and enforcement, appropriate regulations for bioenergy supply, enhancing domestic technical capacity, increasing the role of the private sector, and raising public awareness</li> <li>- <b>Relevance (relevant to country context, sustainable development and inclusive growth, support for sector reforms and service delivery, governance, cross-cutting areas – gender, livelihoods, culture, biodiversity, vulnerable groups, capacity building):</b> The rationale for the policies in the biomass and clean cooking sub-sector is not as strongly stated as in the national environment policy of 1997 where negative impacts were quantified (in lost agricultural and livestock production)</li> <li>- The cooking context is more broadly understood with its inter-sector and cross-cutting links including climate change, environment and natural resources, gender, health</li> <li>- The policy is aligned with current country socio-economic context, national strategies, specifically the climate resilient green economy strategy and sector development strategies and programs</li> <li>- The policy also indicates areas for improved governance including decentralized decision making, stronger institutions and better coordination (through energy forums, for example); it also points to the need for standards for efficient appliances</li> <li>- The policy does not address directly minority and vulnerable groups and their special circumstances – these include vulnerable households living in degraded areas (e.g. households living in areas identified for the sustainable land management or SLM program) and special groups such as refugees and host communities</li> <li>-</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - <i>analysis and comments</i>
	<ul style="list-style-type: none"> <li>- <b>Supply side policy instruments – bioenergy</b> <ul style="list-style-type: none"> <li>- <u>Sustainable forest management</u>: increase supply (private, public), improve management (public, private), improve monitoring of forests, carbon financing for forest management</li> <li>- <u>Enhance efficient bioenergy production</u> – regulations for charcoal, improve environment for private sector, improve local capacity for appliance manufacture, market based private sector role for biogas, technology transfer, R&amp;D</li> <li>- <u>Supply security</u>: sustainable harvest, public awareness, increase supply of ethanol, modern cattle raising, promote biogas and bio oil, financial support to stakeholders, energy into rural development package, promote biogas, biofuels, solar energy and electricity in rural areas</li> </ul> </li> <li>- <b>Demand side policies – household sector</b> <ul style="list-style-type: none"> <li>- Objectives: improve access o clean and affordable technologies, promote efficient end use devices <ul style="list-style-type: none"> <li>- Accelerate distribution of efficient end use devices</li> <li>- Introduce alternative household fuels and technologies including electricity for Injera baking in rural and urban areas, financing for affordability, R&amp;D for low cost and more efficient appliances public awareness, standards</li> </ul> </li> </ul> </li> <li>- Demand side policies – service sector <ul style="list-style-type: none"> <li>- Objectives: ensure use of modern and efficient energy technologies</li> <li>- Promote RETs, energy efficiency, standards, public awareness, switch to alternatives fuels (electricity, LPG, liquid biofuels), incentives for EE and conservation</li> </ul> </li> </ul> <p>Governance</p> <ul style="list-style-type: none"> <li>- Objective: Improve sector governance backed by sound legal frame for reforms</li> <li>- Review legal framework, increase participation (e.g. energy forum), strengthen capacity of sector institutions, promote enabling environment for decentralized decision making,</li> </ul> <p>Institutions and capacity</p> <ul style="list-style-type: none"> <li>- Objective: strong sector institutions (authority, resources)</li> <li>- Institutions for coordination (cooperation, exchange of info, transparency), management, decentralized decision making,</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Effectiveness (policy costing and financing, cost-effectiveness, continued commitment, fiscal decentralization, MRV/data)</b>: th e policy recognizes the role of strong institutions with the requisite authority and with sufficient resources to implement strategies</li> <li>- The new policy shows the government’s continued commitment to the improved and clean cooking sector</li> <li>- The policy gives high priority to efficiency improvement which is usually the least cost option for consumers as well as the country level</li> <li>- The biomass and household cooking sector suffer from inadequate sector data (particularly verified data)</li> <li>- Review of past improved and clean cooking stove results and impacts would have enriched analysis and policy making</li> </ul> <p><b>Institutional credibility (institutional set up, capacity, ownership, record of policy implementation; policy costing and financing):</b></p> <ul style="list-style-type: none"> <li>- The new energy policy has been reviewed by stakeholders several times but it is yet to become national policy (when approved by the Council of Ministers).</li> <li>- The institutional frame has been split into two recently and the national improved cook stoves program (NICS) is housed under the MEFCC while some technical capability is left at the AETDPD under the MOWIE</li> <li>- Capacity to manage the clean cooking program is not adequate (in either ministry or even combined). The NICS program has not been able to fill positions and there</li> <li>- Financing for the NICS program (costed in the NICS Investment Plan, 2011) has fallen much short of the plan</li> </ul>

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	<p>capacity building, adequate resources, centres of excellence for technology</p> <ul style="list-style-type: none"> <li>- Integrated energy planning – integrate energy into other sector programs, coordinate local to national plans, promote inter-sectoral energy planning, maintain and upgrade sector data</li> </ul> <p>Pricing</p> <ul style="list-style-type: none"> <li>- Objective: Introduce appropriate pricing policies</li> <li>- Allow market mechanisms, apply long term cost-effectiveness and financial viability, targeted and time bound subsidies, clear signals to consumers</li> </ul> <p>R&amp;D</p> <ul style="list-style-type: none"> <li>- Objective: Strong R&amp;D institutions for expansion of modern energy services</li> <li>- R&amp;D in academic institutions, promote tech transfer, R&amp;D on EE end use devices (stoves, others), policy research, forum for cooperation, energy in school curricula and TVET, resources</li> </ul> <p>Environmental and social impact</p> <p>Objective: ensure environmental and social impacts are minimized</p> <ul style="list-style-type: none"> <li>- Environmental and social impact assessment, green and carbon neutral development, arrest biomass energy related environment and social impacts, resources including climate finance, minimize IAP</li> </ul> <p>Gender</p> <ul style="list-style-type: none"> <li>- Objective: Ensure participation and benefit to women in the sector</li> <li>- Modern and cleaner energy access to women, promote women engagement in management and decision making in plans and programs, efficient and convenient household energy appliances to reduce IAP, credit</li> </ul> <p>Regional and international cooperation</p> <ul style="list-style-type: none"> <li>- Objective: Enhance regional and international cooperation and increase cross border energy trade</li> <li>- Promote regional and international cooperation, promote Ethiopia as renewable energy rich, engage in regional and global energy fora, attract climate funds, promote favourable domestic investment climate for international investment</li> </ul>	
Biomass energy strategy of Ethiopia (BEST) (2013)	<ul style="list-style-type: none"> <li>- Objective: articulate clear long-term vision for biomass energy and formulate BEST; BEST will support MOWIE and regional agencies manage biomass energy resources properly</li> </ul>	<ul style="list-style-type: none"> <li>- The Biomass Energy Strategy of Ethiopia (BEST) was an initiative of the GIZ and MOWIE and developed with support from the EUEI PDF. The PDF facility supported several African countries develop biomass energy strategies during 2010-2013.</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Specific objectives: provide clear baseline for biomass energy sub-sector, evaluate institutional challenges and major trends, build consensus and awareness among stakeholders</li> <li>- Vision: biomass energy is sustainably used for socio-economic and environmental benefit of citizens <ul style="list-style-type: none"> <li>- Biomass will continue to be important source of energy</li> <li>- Large scale replacement not feasible because of availability and prices of alternatives</li> <li>- Electricity can be used but better employed for productive purposes</li> <li>- Biomass resources need to be used sustainably to support rural development and income for people</li> </ul> </li> <li>- Goal: improved access to sustainable and affordable biomass energy for all by 2030</li> <li>- Objective 1: sufficient biomass energy supply <ul style="list-style-type: none"> <li>- results (1): expand and improve production of fast growing trees in existing and new plantations; (2) sustainable management and harvesting of biomass from forests and woodlands, <b>enrichment planting on degraded lands</b>, (3) supply from enrichment planting of communal enclosed areas, (4) on farm tree planting</li> </ul> </li> <li>- objective 2: increase efficiency of charcoal production <ul style="list-style-type: none"> <li>- results (1): efficient charcoal production, (2) processing of charcoal dust and carbonizing agri and process waste</li> </ul> </li> <li>- objective 3: energy efficiency in household and enterprises <ul style="list-style-type: none"> <li>- results (1): standard design for efficient stoves and mitads approved (2) revolving credit through MFIs and rural credit and savings coops, (3) substitution of agri-residue by electricity and other renewables</li> </ul> </li> <li>- objective 4: institutional capacity building <ul style="list-style-type: none"> <li>- results (1): detailed capacity gap analysis, (2) national charcoal policy for legal and transparent framework</li> </ul> </li> <li>- objective 5: BEST integrated into national energy policy and CRGE <ul style="list-style-type: none"> <li>- results (1): integrate charcoal policy into the new energy policy, (2) BEST into CRGE, (3) address opportunities to substitute charcoal with fuelwood, fuel briquettes</li> </ul> </li> <li>- other observations from the strategy: <ul style="list-style-type: none"> <li>- need attention to use electricity efficiently</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- A biomass energy strategy was deemed important in the case of Ethiopia because of its continued and growing dependence on biomass and the need to use the resource more sustainably.</li> <li>- The BEST conducted biomass energy use surveys in 13 Weredas (26 Kebeles) and in each Wereda town to collect biomass energy use households and service establishments</li> <li>-</li> <li>- The strategic vision was sustainable use of biomass energy for socio-economic and environment benefit of citizens. The goal (mission) of the strategy was stated as improving access to sustainable and affordable biomass energy for all by 2030.</li> <li>- Strategies were formulated in three areas: biomass energy supply, biomass energy demand, and the institutional frame.</li> <li>- (a) biomass energy supply: expand and improve production of fast growing trees in existing and new plantations, sustainable management and harvesting of from forests and woodlands, increase charcoal production efficiency, process agricultural and process waste into charcoal</li> <li>- (b) biomass energy use efficiency improvement: fuel efficient stoves and mitads development, revolving credit for stove producers and users, replacement of agri-residue used for cooking with electricity and other renewables</li> <li>- (c) institutional strategies: assessment of capacity gaps in government, national charcoal policy for transparent and legal charcoal production and use, full integration of the BEST into national energy policy and the CRGE</li> <li>- The BEST provided results framework and action plan for activities under the strategy</li> <li>-</li> <li>- This strategy estimated 122 million tons of biomass was consumed as fuel in 2013, significantly higher than the 79 million tons estimated by MOWIE for the same year (Energy Balance, 2012/2013)</li> <li>- There has been alarming growth in charcoal consumption according to this strategy document with more than 4 million tons of charcoal consumed in 2013 compared to just 48,000 in 2000. The strategy states that prior to 2000 charcoal use was significant only in Tigray and Somali regional states while by 2013 charcoal use was significant in all regional states.</li> <li>- BEST estimated 4 million tons of charcoal was consumed in rural areas in 2013 compared to just 1.2 million tons in urban areas</li> <li>-</li> <li>- The massive move to charcoal use in both urban and rural areas (if indeed true) is an important consideration for new policies and strategies for several reasons: (a) charcoal production has much more damaging to deforestation than use of fuelwood, charcoal production technologies are very inefficient in Ethiopia, technology development and promotion for charcoal is not given adequate consideration in national programs</li> </ul>



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	<ul style="list-style-type: none"> <li>- potential of electricity substituting wood fuels is limited (b/s of demand in other sectors, export)</li> </ul>	<ul style="list-style-type: none"> <li>- Reasons for the shift to charcoal in rural areas is explained as rising rural incomes, increasing access to fuel markets in rural areas, reduction of transport costs due to access by road, and declining access to wood in immediate vicinity of demand</li> <li>- This raised a key issue for the sector, that of reliable supply and demand data for biomass fuels</li> </ul>
National Improved Cook Stoves Investment Plan (2013, Version 8)	<ul style="list-style-type: none"> <li>- The goal (or vision) of the NICS is to contribute to realization of the CRGE vision of reducing emissions from deforestation and forest degradation and ensuring access to clean energy</li> <li>- protect and re-establish forests (for economic and ecosystem services)</li> <li>- expanding electricity generation from RE</li> <li>- objective (or mission): to support dissemination of 9 million ICS (in 4.5 million households) by January 2018 through building sustainable and vibrant market and institutional capacity for ICS</li> <li>- The intended outcomes are: carbon sink or savings of 2.1t/y per household; total abatement of 14MtCO<sub>2e</sub>, avoid 1000-2000 deaths per year from IAP, 5000 private sector jobs; one of the cheapest means for GHG reduction at USD 2.4/tCO<sub>2e</sub>; very strong gender differentiated impacts in favour of women and children (mainly girls) under 15</li> <li>- main activities: develop regulators, tech procedures and standards; institutional and technical capacity building (federal, regional, Wereda); CB for private ICS companies, loans/financing for producers, distributors and retailers; customer support mechanisms; market promotion and development; establish technical testing laboratories; introduce carbon financing; establish baselines and M&amp;E framework, manuals and standards</li> </ul> <p>strategies:</p> <p>institutional strategies:</p> <ul style="list-style-type: none"> <li>- establish supportive policy environment including clear procedures and standards for program integration, harmonization and alignment, innovation;</li> <li>- focus on institutional CB in systems and procedures, human resources, local ownership and sustainability;</li> <li>- strong coordination mechanisms at federal and regional levels for active engagement of stakeholders and for integration of energy programs with other programs; facilitate learning</li> </ul> <p>market development strategies:</p> <ul style="list-style-type: none"> <li>- program management approach and implementation</li> </ul>	<ul style="list-style-type: none"> <li>- The investment plan recognizes the multi-dimensional impacts and therefore the cross-sectoral linkages of clean cooking in the Ethiopian context and the need for coherent and coordinated action. Points out that past sector interventions had little coordination. promotes programmatic (coherent) approach instead of ad hoc and piecemeal actions by numerous projects and project actors</li> <li>- The IP recommended results-based management built on solid MRV and M&amp;E systems</li> <li>- End of program study was to be conducted to document lessons from program implementation and for program scale up for distribution of 30 million advanced cooking technologies by 2031</li> <li>-</li> <li>- Evaluated barriers for the clean cooking sub-sector including institutional, markets and distribution, technical, and financing.</li> <li>- <u>Institutions</u>: limited coordination of stakeholders resulting in promotion of different priorities (not necessarily conflicting priorities) such as the interest of the health sector for clean stoves with chimneys while the energy sector priority may be in fuel saving. The IP suggested that government engagement is extensive but capacity is not adequate.</li> <li>- <u>Markets</u>: some of the major barriers identified include access to production inputs (such as raw material for stove manufacture); stove producers are generally very small workshops using basic production methods and facilities thus low production volumes and productivity; limitation in transport and distribution infrastructure results in limited availability and access of ICS and adds to costs; existing distribution models have not managed to use existing distribution channels; distribution and marketing support has been limited to building production capacity (setting up stove producers) and <b>not the developing the supply chain</b> (therefore key distribution actors have not received incentives to reach customers); marketing messages have not been effective because the messages may not be effective or communication may be ineffective; market monitoring and reporting is weak to provide valuable information for market development</li> <li>- <u>Products</u>: some ICS may not meet customer requirements for the technology and meeting customer needs better requires monitoring and feedback to product development which is generally lacking; product development capabilities (including testing and evaluation of stoves) is not adequate to meet the requirements of the NICS program (although the IP recognizes some existing technical capacity at MOWIE, capacity will not be adequate for such a large scale program as the NICS);</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- introduce carbon financing</li> <li>- modify government approach to make it aligned with market activities</li> <li>- information tech based reporting tools</li> <li>- remove sector barriers (partnership with MFIs, support innovation, increase resource flow to local/Wereda level, increase skills of government staff, co-develop fuel supply chains</li> <li>- business support – stove producer business skills, business incubators (venture capital, business plans and market analysis), support distributors</li> <li>- enhance consumer demand – flexible payment terms, more tailored marketing messages and targeted promotion, improve stove production processes for good standards</li> </ul> <p>technology strategies:</p> <ul style="list-style-type: none"> <li>- improve testing and evaluation capabilities (tiered testing – national, regional, Wereda); establish labs at federal and regional levels; build field testing capacity</li> <li>- enhance stove design and production capacity – designs to better meet consumer requirements, producer certification, improving production techniques</li> <li>- for emerging regions – evaluate institutional capabilities, markets, cooking practices, technology choice; tailor approach for marketing and awareness raising strategies</li> </ul> <ul style="list-style-type: none"> <li>- total budget: 33.56 MUSD</li> </ul>	<ul style="list-style-type: none"> <li>- <b>Financing:</b> budget allocated by the government is limited (at the federal, regional and Wereda levels), the case is dire at the Wereda level where most of the program activities fall; resources available from development partners have been limited with external funding available through only a few bilateral organizations (GIZ, SNV); customer financing options have been slow to develop; existing distribution models rely on subsidies (sometimes direct and substantial [e.g. domestic biogas], or indirect and limited [e.g. improved wood stoves]) which challenge the market based model that programs seek to promote</li> <li>- focused/limited to promoting improved households stoves for biomass fuels (not clean cooking)</li> <li>- consider other elements of the cooking environment including kitchens, cooking practices (collecting fuel, preparing fuel, feeding fuel, tending to stoves), fuel access issues</li> <li>- need for more detailed data on cooking fuel uses and practices in both rural and urban areas; whether and how consumers are using improved stoves, what drives their decision to obtain and use the stoves</li> <li>- market segmentation for clean cooking – not made or inadequate (e.g. estimate of the potential market for electric Injera baking or cooking)</li> <li>- issues</li> <li>- need for reliable baseline and end of project data: little verification is available on the number and type of stoves distributed, whether and how they are used</li> <li>- program evaluation has not been made so far (e.g. midterm evaluation)</li> <li>- the service sector is not addressed in the program</li> </ul>
SE4All Global Action Agenda (April 2012)	<ul style="list-style-type: none"> <li>- The UN initiated the Sustainable Energy for All (SE4ALL) agenda in 2012.</li> <li>- The SE4LL has three objectives for 2030: (1) ensuring universal access to modern energy services; (2) doubling the global rate of improvement in energy efficiency; and (3) doubling the share of renewable energy in the global energy mix.</li> <li>- Actions are divided into seven “sectoral” areas: <b>(1) modern cooking appliances and fuels;</b> (2) distributed electricity solutions; (3) grid infrastructure and supply efficiency; (4) large-scale renewable power; (5) industrial and agricultural processes; (6) transportation; and (7) buildings and appliances. There are also four “enabling” Action Areas: (1) energy planning and policies; (2) business model and technology innovation; (3) finance and risk management; and (4) capacity building and knowledge sharing.</li> </ul>	<ul style="list-style-type: none"> <li>- Potentially useful inputs for future clean cooking policies and strategies:</li> <li>- Introducing the value chain development approach for clean cooking (SNV is well placed to engage in this area because of its rich experience in the agriculture and other sectors)</li> <li>- Building infrastructure and supply chains for advanced biofuels such as ethanol; increasing production of ethanol from state sugar factories, support for distribution including in developing appropriate technical regulations for supply (storage, transport, distribution), pricing incentives</li> <li>- Understanding consumer requirements better through social research and using this as feedback for technical development of clean cook stoves</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- <b>Modern cooking appliances and fuels:</b> Providing access to modern energy services for those lacking clean and efficient equipment such as stoves and fuels.</li> <li>- <b>High-impact opportunities:</b> Building <b>sustainable local value chains</b> for clean and efficient cooking solutions; <b>building market demand by raising awareness</b> of their health, economic, environmental, and gender benefits; <b>investing in the infrastructure and local distribution supply chains</b> required for cleaner fuels (e.g., ethanol and LPG); <b>developing tiered standards</b> for efficiency, emissions and safety; and <b>designing cooking appliances that meet consumer needs</b> and price points.</li> </ul>	
GTP II & related policy matrix (2015-2020)	<p>Electricity</p> <ul style="list-style-type: none"> <li>- Customers: 2.31 million (2007 EFY) to 6.95 million (2012 EFY)</li> <li>- Transmission: 16,018km (2007) to 21,728 (2012)</li> <li>- Distribution:</li> <li>- Per capital consumption: 86kWh (2007) to 1269kWh (2012)</li> <li>- Losses: 23% (2007) to 11% (2012)</li> </ul> <p>Alternatives</p> <ul style="list-style-type: none"> <li>- Improved cook stoves: 8.88 million (2007), additional 11.45 million (2012)</li> <li>- Domestic biogas: 31,400 (2012)</li> <li>- Bio oil stoves: 20,000 (2012)</li> <li>- Solar cookers: 5,000 (2012)</li> <li>-</li> <li>- Solar home systems: 400,000 (2012)</li> <li>- Solar lanterns: 3.6 million (2012)</li> <li>- Solar systems for institutions: 3600 (2012)</li> <li>- Solar water heaters: 5000 (2012)</li> <li>-</li> <li>- Micro hydro power plants: 135 units (2012)</li> <li>- Wind powered pumps: 300 (2012)</li> <li>- Land cultivated to biodiesel feedstock crops: 500,327ha (2012)</li> <li>- Biodiesel fuel production: 450 million liter (2012)</li> <li>- Ethanol fuel production: 1375 million liter (2012)</li> </ul> <p>Main strategies</p>	<ul style="list-style-type: none"> <li>- The second Growth and Transformation Plan (GPT 2) sets out baselines and targets for the energy sector during 2008 to 2012 EFY.</li> <li>- The plan for the improved and clean cooking stove distribution is as follows (for 2012EFY):</li> <li>- Improved cook stoves: 11.45 million</li> <li>- Domestic biogas: 31,400</li> <li>- Household biofuel stoves: 20,000</li> <li>- Solar cookers: 5,000</li> <li>- Institutional gasifier stoves: 60</li> <li>- Institutional briquette stoves: 60</li> <li>- Improved charcoal production kilns: 250</li> <li>- Biomass briquetting systems: 250</li> <li>- Production of ethanol fuel: 1375 million liters (using 412 million liters for cooking, lighting, agro processing)</li> <li>- Distribution of 4.1 million ethanol stoves</li> <li>- Production of biodiesel: 450 million liters (using 270 million liters for cooking, agricultural processing)</li> <li>- Distribution of 1.8 million biodiesel stoves</li> <li>-</li> <li>- The budget requested for the biomass component of the GTP 2 energy sector plan was ETB 443 million over five years, 90% of sought as grant (ETB 429 million excluding biogas systems).</li> <li>- The rationale for the biomass component of the plan is stated as reducing demand for fuelwood to reduce pressure on forest, reduce indoor air pollution in homes thus reducing health problems for women and children, reducing the time and effort spent by women and girls for fuel collection</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Create institutional/organization, human capacity for implementation for power generation, transmission and distribution</li> <li>- Enhance capacity of domestic contractors for power sector activities</li> <li>- Increase local manufacturing capacity</li> <li>- Attract international finance to the power sector</li> <li>- Capacity building , technical support and monitoring, incentives, market development, promotion for alternative energy</li> </ul>	<ul style="list-style-type: none"> <li>- Main strategies for achieving targets include capacity building of the lead ministry (MOWIE but later moved to MEFCC), Bureaus of Energy in the regional states, MSEs; development of new technologies; improved monitoring of the alternative energy program; market development through public awareness of the benefits of technologies promoted; engagement to increase resource flow to the alternative energy program (through forums)</li> <li>- The lead institutions provide technical support including training for stakeholders engaged in promotion (regional energy bureaus), technical and business training for stove manufacturers and distributors</li> <li>- Research on biofuel technologies in academic institutions; research collaboration with universities in other countries (particularly countries which have managed to produce and use biofuels in large volumes); creating and sustaining a network of concerned government institutions and research institutions for continued technological development and program roll out; support for biofuel feedstock development working together with MOANR extension program; strengthening the biofuel forum</li> <li>- Issues</li> <li>- Baseline was 8 to 9 million ICS distributed at beginning of GTP period and the GTP 2 proposed additional 11.4 million ICS. The GTP 2 plan states that there would be a total of 16 million ICS by the end of the GTP 2 period (appears to have disregarded the need for replacements)</li> <li>- The plans for distribution of household stoves is very ambitious; the plan for distribution of improved technologies and systems on the supply side is too small (or pilot level) with for example plan to distribute 250 improved charcoal kilns</li> <li>- Unrealistic assumptions and targets (physical targets and budgets) as illustrated by targets for biofuel production and biofuel stove distribution targets (6 million biofuel stoves). Budget request for biomass component of the program (excluding biofuels) was ETB 429 million over five years.</li> <li>- Inconsistent plans within the same sector: consider fuel and stove distribution for biomass, biofuels, electricity</li> <li>- Inconsistent plans made for the same sector in different strategies and programs: consider plans for electric, LPG, other stoves in the CRGE for the energy sector</li> <li>- Inconsistent plans across sectors: consider targets for sugar production (therefore potential ethanol production from sugar waste) – industry sector vs. energy sector</li> <li>- Questions about current and future relevance for some actions: this is the case, for example, for biodiesel production. The GTP 2 plan for biofuels points to the “absence of incentives for deteriorating engagement of private companies in biofuel feedstock production, biofuel production and processing”</li> <li>-</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
		<ul style="list-style-type: none"> <li>- Consistency with targets for electricity – e.g. plan to add 6.9 million new customers on the grid by 2012EFY (2020) which would be higher than that projected by the power system master plan or the national electrification program</li> <li>- Need for integrated sector planning frame</li> </ul>
Ethiopia CRGE, Climate Resilience Strategy: Water and Energy (?)	<ul style="list-style-type: none"> <li>- The climate resilience (CR) strategy for water and energy puts biomass energy efficiency as one of four key strategies for resilience for the energy sector (along with energy efficiency and diversifying energy mix, and off-grid electrification for electricity).</li> <li>- The goal of the NICSP is stated as distributing 30 million stoves by 2031. But it has been able to get only 2% of the funds required.</li> <li>- Strategies are costed – access to energy (biomass energy and off-grid energy) was costed at USD 246 million to 2030 (USD 245 million for the NICSP program alone).</li> </ul> <div style="display: flex; justify-content: space-around; margin-top: 20px;"> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p style="text-align: center;"><b>Energy</b></p> <p style="text-align: center;"><u>Electric power</u></p> <p>2.1 Diverse energy mix 2.2 Energy efficiency</p> <hr/> <p style="text-align: center;">5.1 Data for decisions</p> <p style="text-align: center;"><u>Access to energy</u></p> <p>2.1 Biomass efficiency 2.2 Off-grid energy</p> </div> <div style="border: 1px solid black; padding: 5px; width: 45%;"> <p style="text-align: center;"><b>Water</b></p> <p style="text-align: center;"><u>Irrigated agriculture</u></p> <p>3.1 Accelerate irrigation plans 3.2 Strengthen rainfed agriculture 3.3 Balance water demands</p> <hr/> <p style="text-align: center;">5.2 Accelerate delivery</p> <p style="text-align: center;"><u>Access to WASH</u></p> <p>4.1 Accelerate access 4.2 Enhance self-supply</p> </div> </div>	<ul style="list-style-type: none"> <li>- The CR strategy reinforces the role of biomass energy use efficiency measures proposed under the green economy (GE) strategy as described in the CRGE document (and later GOE made commitments in the (I)NDC.</li> <li>- Energy efficiency for electricity is another CR strategy where increasing efficiency of electric cooking can be considered (but was not mentioned in the strategy which identified only efficient lighting and motors were mentioned).</li> <li>- Very high level of funding required (USD 245 million to 2031 or USD 8/stove). This must be compared with funding estimated in the NICS investment plan.</li> </ul>
Intended nationally determined contribution (INDC) of the FDRE (2015)	<ul style="list-style-type: none"> <li>- GHG mitigation goal: limit GHG emissions to 145MtCO<sub>2</sub>e in 2030 (reduction of 255MtCO<sub>2</sub>e from BAU)</li> <li>- Pillars: (1) crop and livestock productivity, (2) protect, re-establish forests for economic, eco-system services, CO<sub>2</sub> sequestration, (3) electricity from RE, (4) leapfrog to modern energy efficient technologies</li> <li>- Plan to reduce 255MtCO<sub>2</sub>e in 2030: 130MtCO<sub>2</sub>e from forestry and <b>reducing deforestation and forest degradation (half of total); about 30% of it from improved and modern stoves (21% from bioenergy, 9% from electricity)</b></li> </ul>	<ul style="list-style-type: none"> <li>- Clean cooking is given a major role in the CRGE and the INDC where it is envisaged to contribute 15% of emission reduction from Ethiopia (and 30% of emission reduction from the forestry sector) in 2030.</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Climate change adaptation goal: to fully mainstream climate change action into development activities to reduce vulnerability and contribute to resilient economic growth</li> <li>- Mid and long term actions: droughts: increase agricultural productivity, reduce food insecurity, protect human and animal life from droughts, diversify economic opportunities from agro-forestry and afforestation of degraded areas, enhance irrigation systems through water harvesting, ensure water services in urban areas, improve food and feed storage, biodiversity movement corridors, ecological farming, power generation from geothermal, wind and solar to minimize effects of droughts on hydropower; flood control through rehabilitation of degraded highland areas, building dams for power generation, CC and flood compatible construction/building codes</li> </ul>	
<p>National electrification strategy, NES (2016)</p> <p>National electrification program, NEP (2017)</p>	<p>Goal:</p> <ul style="list-style-type: none"> <li>- provide roadmap for scaling up electrification in a more effective, sustainable manner, ultimately raise overall performance of the electricity sector</li> </ul> <p>Objectives:</p> <ul style="list-style-type: none"> <li>- establish institutional framework through which financial, technical and institutional resources can be allocated to accelerate electrification</li> <li>- strengthen policy formulation, program coordination and performance monitoring</li> <li>- increase connection rates</li> <li>- institutionalize more effective and automated planning, design, construction and program management</li> <li>- rationalize bulk supply and retail tariffs to improve cost recovery</li> <li>- facilitate increase in off-grid electrification</li> </ul> <p>Strategy elements:</p> <ul style="list-style-type: none"> <li>- 1. Institutional: develop national electrification policy; establish electrification directorate; accelerate consumer connection; support sustainable and affordable off-grid services</li> <li>- 2. Planning and technical: develop master planning framework; create densification program; evaluate willingness to pay and affordability; promote low-cost designs and construction standards</li> <li>- 3. Financial: ensure financial sustainability of program; create electrification fund; promote productive uses of electricity</li> </ul>	<ul style="list-style-type: none"> <li>- The NEP foresees universal electrification in 2025 (65% on grid, 35% off-grid). The program envisions connection of 97% of households to the national grid by 2030 (7 years earlier than forecasted by the power system expansion master plan in 2014).</li> <li>- Increased urbanization, rising incomes in both urban and rural areas, and universal electrification through the grid will result in significant shift from biomass to electricity (this is already the case in urban areas where electricity has become an important, in most cases the cheapest source of cooking).</li> </ul>

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	<ul style="list-style-type: none"> <li>- The national electrification program (NEP) does not address electricity use by customer or by end use (such as cooking by households). The NEP foresees universal electrification (connection of all households) by 2025 – 65% of connections through the national grid, 35% of households through off-grid technologies. It further envisions connecting nearly all households (97%) to the national grid by 2030.</li> </ul>	
Ethiopian power system expansion master plan study, Draft Final Report, Volume 2: Load forecast report & distributed load forecast report (Feb 2014)	<ul style="list-style-type: none"> <li>- The master plan foresaw electrification of 95% of households through the grid by 2037</li> <li>- The plan assumes that a large segment of households will use electricity for cooking in the long run (the following is for newly connected households): <ul style="list-style-type: none"> <li>- <i>“As time passes the newly connected households would purchase more electrical equipment, and it is assumed that an average household would have 8 x 10 W lights operating for 3 hours per day, a 50 W radio operating for 6 hours (less usage due to TV set), a 200 W TV operating for 3 hours per day and a 1000 W electrical cooker operating for 1.2 hours per day for 365 days which gives 854 kWh.”</i></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- High rate of electric stove penetration assumed for both newly connected and existing electricity consumers</li> <li>- This is different from estimates of other policies, strategies and studies that foresee limited role for electricity for cooking in the future</li> </ul>
<b>Environment, forestry and climate change</b>		
Environmental policy (1997)	<ul style="list-style-type: none"> <li>- Background: Natural resources are the bases of the economy; renewable natural resources are deteriorating; burning of dung as fuel instead of as soil conditioner causes reduction in grain production by 0.55 million tons annually, soil erosion reduces production by 40,000 tons; land degradation results in loss of livestock production equivalent to 1.1 million tropical units</li> <li>- Overall policy goal: to improve and enhance health and quality of life of all Ethiopians and to promote sustainable social and economic development through sound management and use of natural, human-made and cultural resources and the environment as a whole</li> <li>- Guiding principles: every person has right to live in health environment; communities to make their own decisions; development, use and management of renewable resources shall be based on sustainability; appropriate and affordable technologies which use renewable and non-renewable resources efficiently shall be adopted; women shall be treated equally with men and empowered to be involved in policy, program and project design</li> <li>- Energy resource policies: inter-sectoral planning process integrating conservation, sustainable utilization and environmental protection;</li> </ul>	<ul style="list-style-type: none"> <li>- Made energy resource specific policies in areas</li> <li>- Improved sector planning (recommended inter-sectoral planning, meaning integrated planning)</li> <li>- Sustainability considerations in sector development</li> <li>- Recommended that large industries and enterprises consuming large volumes of wood to grow their own wood</li> <li>- Farm and homestead planting of trees to meet wood fuel requirements of households</li> <li>- Lessons for policy making in other sectors:</li> <li>- Considered sectoral links more broadly than in the energy policy</li> <li>- Highlighted the impact of wood and agricultural residue use for fuel, detailing its impact on soil quality degradation, reduction in crop production and livestock production</li> <li>- Considered GHG in the policy – very early in the GHG debate; it also pointed the role of biomass energy in GHG emission</li> <li>- Monitoring, evaluation and policy review is part of the policy document (this is not so for the energy policy of 1994 or the draft energy policy of 2013)</li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<p>institutions and industries consuming large volumes of wood to establish their own plantations; focus extension program on farm and homestead tree planting to satisfy wood requirements</p> <ul style="list-style-type: none"> <li>- Atmospheric pollution and climate change: firm and visible commitment for GHG reduction; Ethiopia's environmental and long term economic interest and its energy prospect coincide with need to minimize GHGs; recognize continued use of biomass for energy production makes no net contribution to GHG as long as at least equal amounts of biomass are produced to compensate uses</li> <li>- Environmental research:</li> <li>- Environmental information system:</li> <li>- Environmental impact assessment:</li> <li>- Environmental education and awareness:</li> <li>- <b>Institutional framework: legally established coordination and management bodies from federal to community levels,</b></li> <li>- <b>Legislative framework: participation, motivation of people for restoring, protecting and managing resources, framework for incentive measures</b></li> <li>- <b>Monitoring, evaluation and policy review</b></li> </ul>	
Ethiopia's Programme of Adaptation on Climate Change (EPACC)	<ul style="list-style-type: none"> <li>- Reviewed the climate resilience strategy for the water and energy sectors instead..</li> </ul>	
National REDD+ strategy (final draft, 2016)	<ul style="list-style-type: none"> <li>- The strategy points out that Ethiopia is losing 92,000 ha of forest annually and that current and current afforestation rates are only 19,000ha annually, i.e. less than a quarter of the loss.</li> <li>- Forests are important sources of economic and ecological service in the context of Ethiopia meeting critical development needs of the country and livelihoods of millions of citizens, particularly in rural areas. The strategy points out that Ethiopia's forest resources are threatened by agricultural expansion and non-sustainable harvesting of trees for fuel. Adequate legal and institutional frameworks are not in place or have not been implemented effectively to arrest or reverse this threat.</li> <li>- The strategy identifies extraction of wood for fuel (wood for charcoal making and wood consumed directly) as the main causes of forest degradation in Ethiopia. Charcoal production is deemed a particularly severe contributor to forest degradation.</li> </ul>	<ul style="list-style-type: none"> <li>- The REDD+ strategy addresses the causes of deforestation and forest degradation, one of which is harvesting of trees for fuel. The strategy, while addressing the causes, also recommends actions for restoration of degraded areas, reforestation and afforestation.</li> <li>- The strategy points out that harvesting of forests for fuel is a major contributor to forest degradation.</li> <li>- Targets for improved and clean cook stoves in this strategy are lower than those proposed in other documents including the GTP 2 plans for the energy sector and in the cook stove investment plan.</li> <li>-</li> </ul>



Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- The strategy proposed dissemination of fuel efficient stoves and alternative fuels to reduce demand for wood fuels (alternative fuels proposed include electricity, solar, LPG, biogas). Targets for 2030 include dissemination of fuel efficient stoves to 3 million households, promotion of biogas systems to 0.8 million households, and use of other alternative fuels (electricity, LPG, solar) by 1 million households.</li> <li>- The national REDD+ strategy seeks to reduce GHG emissions from and increase CO2 sequestration into forests. The strategy recommends a set of policies, laws and investment to conserve and restore forest resources. The strategy also recommends improving national and regional state level institutional reform to achieve the goal.</li> <li>- The goal of the REDD+ strategy is to reduced deforestation and forest degradation, and at the same time improve sustainable management of forests to increase carbon stocks</li> <li>- The REDD+ program seeks to reduce deforestation and forest degradation by addressing the drivers for this (e.g. reducing the demand for wood products) and restore degraded areas under forest cover (including through afforestation, reforestation, and forest restoration). The program will also strengthen the institutional and governance issues in the sector for improved sector management and development.</li> <li>- The strategy recommended measures in the following areas: <ul style="list-style-type: none"> <li>- Addressing policy, legal and institutional issues related to land use and forest governance for forest conservation (addressing drivers of forest loss) and forest restoration</li> <li>- Establishment of strong institutional mechanisms for an effective cross-sectoral coordination;</li> <li>- Developing a robust and transparent methodologies for setting baseline emissions and removals, and designing an effective MRV system;</li> <li>- Mobilizing resources and intensifying investments in forestry for increased emission reductions and carbon removals;</li> <li>- Establishing transparent REDD+ financial management mechanism and a fair benefit sharing scheme;</li> <li>- Taking measures for building national and sub-national capacity to support REDD+ activities at all levels;</li> </ul> </li> </ul>	

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Strengthening public awareness, communication and information sharing on REDD+ issues;</li> <li>- Establishing mechanisms for active participation and engagement of stakeholders including communities and the private sector</li> </ul>	
Climate Resilient Green Economy (CRGE) strategy (2010)	<ul style="list-style-type: none"> <li>- The vision of the CRGE is to achieve middle income status b 2025 in a climate-resilient and green economy</li> <li>- The plan is to follow green growth path that fosters development and sustainability</li> <li>- The CRGE has identified more than 60 initiatives to reduce greenhouse gas emissions by 250MtCO<sub>2</sub>e by 2030 (reducing business as usual emission of 400MtCO<sub>2</sub>e to 150MtCO<sub>2</sub>e)</li> <li>- The CRGE has four pillars: improve crop and livestock practices, protecting and re-establishing forests for economic, ecosystem services and carbon stocks, electricity generation from renewable sources for domestic and regional markets, transition to modern ad energy—efficient technologies in transport, industry, and buildings</li> <li>- The strategy has prioritized four initiatives; development of hydropower capacity, <b>large-scale dissemination of rural cook stoves</b>, efficiency improvement in livestock production, and <b>reducing emissions from deforestation and forest degradation</b></li> <li>- The forestry sector accounts to nearly a quarter of total emission from Ethiopia in 2030 – half of this due to deforestation from expansion of agriculture into forests, and the remaining half mainly forest degradation mainly due to wood fuel consumption</li> </ul>	
Ethiopia CRGE, Climate Resilience Strategy: Agriculture and forestry (?)	<ul style="list-style-type: none"> <li>- CR actions were shortlisted in the agriculture (crop, livestock) and forest sectors</li> <li>- Actions proposed under “natural resources conservation and management” include <ul style="list-style-type: none"> <li>- Using forests for adaptation, resilience measures for forests, conservation and rehabilitation, promoting biodiversity in agriculture, and payment for ecosystem services</li> <li>- Reducing deforestation (with improved stoves, fuel substitution) is not considered as specific measures under “conservation and rehabilitation” but should have been.</li> </ul> </li> </ul>	-
Forest Development, Conservation and Utilisation	3 Rationale: development, conservation and sustainable use of forests plays a decisive role in satisfying the needs of society for forest products and contributes to economic enhancement	

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
Proclamation (No. 542/2007)	<ul style="list-style-type: none"> <li>- Sustainable use for forests is possible through participation of concerned communities, by harmonizing forest policies and programs with those of other sectors (in particular with agricultural and rural development policy)</li> <li>- Development and conservation of forests contributes to preventing soil erosion, desertification, loss of biodiversity and reduction of agricultural production</li> </ul> <p>4 Types of forests: private forest, state forest</p> <p>5 Promotion of forest development: developers have right to obtain rural land for forest development (private, associations, govt, and non-govt organs); management plans shall be developed with participation of local community for forests that are designated as protected or productive state forests; promote farm forestry through support to plant seeds; assurance to persons developing forests on their land including transfer of holding rights</p> <p>6 Promotion of forest technology:</p> <p>7 Promotion of market for forest products:</p> <p>8 Designation, demarcation and registration of state forest</p> <p>9 Conservation, development and administration of state forest</p> <p>10 Utilization of state forests</p> <p>11 Administration of protected forests</p> <p>12 Prevention of forest fire</p> <p>13 <b>Production and movement of forest products:</b> people may not harvest forest products, cut trees, settle, graze domestic animals, hunt in and from state forest without permit; forest products seized from illegal transporters and harvesters shall be sold at market price; licenses for large scale development activities (farming, mining, road construction, other) shall not be given before undertaking consultation and approval of relevant bodies</p> <p>14 Powers and duties of regional states: regional states have the power to administer state forests in their regions</p>	
GTP II Plan (2015-2020)	<p>The main targets for the forestry sector during the GTP 2 period are</p> <ul style="list-style-type: none"> <li>- Increase forest cover from 15.5% in 2007 EFY to 20% in 2020</li> </ul>	
<b>Agriculture</b>		
GTP II & related policy matrix (2015-2020)	<p>The main targets for natural resource protection and management</p> <ul style="list-style-type: none"> <li>- Increase area closure and rehabilitation from 10.8 million ha in 2007EFY to 22.5 million ha in 2012 EFY</li> </ul>	

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Sustainable Land Management Project II (SLMP-2)	<ul style="list-style-type: none"> <li>- The Ministry of Agricultural and Natural Resources (MoANR) has been implementing sustainable land management (SLM) projects, with support from partners, for the past ten years in two phases (called SLMP-1, SLMP-2). The program is continuing with a third phase, now called the Landscapes and Livelihoods Project (RLLP). The SLMP-2 program built resources on 1.3 million hectares of degraded smallholder and communal land through integrated land management interventions including               <ul style="list-style-type: none"> <li>- natural resource management through water and soil conservation, agro-forestry and forest management, controlled grazing, small-scale irrigation, and climate smart agriculture;</li> <li>- ascertaining land rights by issuing certificates for legal landholding;</li> <li>- livelihood support activities including by supporting adoption of clean and efficient biomass cookstoves that reduce the burden of fuel collection for women and reduce their exposure to indoor air pollution</li> </ul> </li> </ul>	
<b>Health and gender</b>		
Health Policy of the Transitional Government of Ethiopia (1993)	<ul style="list-style-type: none"> <li>- Policy principles: democratic and decentralized health service; focus on health care and prevention; equitable distribution of limited resources; support multi-sector activities; develop domestic capacity for health service and develop actions and approaches to attract international support; regional and international cooperation in health sector activities and for control of health hazards; build sector capacity; increase participation of the non-government sector in health service delivery</li> <li>- Policy priorities: health care (prevention) awareness, priority to prevention of epidemics, health problems from mal nutrition and poverty; occupational health, environmental health, health infrastructure, health service management; curative and rehabilitative health care; traditional medicine; health research in focused on main health issues; improve supply of health service inputs; build human capacity; special focus on health service to: families and particularly to women and children, for productive population, marginalized regions and communities, those afflicted by human and non-human induced disasters</li> <li>- Strategies: related to clean cooking – public education and awareness on health living, personal hygiene, healthy environment and</li> </ul>	

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
GTP II & related policy matrix (2015-2020) for the health sector	<ul style="list-style-type: none"> <li>- Goal: increase quality and reach of health services; enable population to protect itself from health hazards</li> <li>- Main targets: reduce maternal mortality – 420/100,000 (2007) to 199/100,000 (2012); reduce under 5 mortality – 64/1000 (2007) to 30/1000 (2012); reduce under 1 year mortality – 44/1000 (20047) to 20/1000 (2012); basic health service coverage – 98%to 100%, life expectancy from 64 years to 69 years</li> </ul>	
National Policy on Women (1993)	<ul style="list-style-type: none"> <li>- The transitional government of Ethiopia issued the National Policy for Women in 1993. The policy seeks to enhance the social and economic role of women in society. It provides a range of actions to improve the social and economic participation and benefits to women.</li> <li>- The policy promotes giving women equal rights to men, equal economic opportunities as men, and increasing women’s economic opportunities through better employment opportunities</li> <li>- The policy recommends integrating gender aspects into sector development plans and increasing effective service delivery to women</li> <li>- National priorities</li> <li>- Increase women’s access to health care, education and employment (ensure that economic, social and political policies and programs give women equal access to country’s resources as men)</li> <li>- Eliminate discrimination against women including in the labour market, customary practices (through public awareness, laws, policies, regulations)</li> <li>- Support women to receive financial assistance for the formation of women’s associations and groups (the policy created the Women’s Affairs Office within the Prime Minister’s office to promote the interests of women)</li> </ul>	
GTP II plans for women (2015-2020)	<ul style="list-style-type: none"> <li>- Goal: to build capacity of women and youth for effective engagement in political, economic and social sectors; create conducive environment for them for effective engagement</li> <li>- Targets: increase capacity of women to participate in govt, economic, social and climate spheres; ensure equitable benefit to women from their participation in economic and other engagements; finance for women (coops, associations); create better environment for girls in education; support creation of MSEs employing 4.13 million women, 1.79 million women in self-employment, 5 million women in service coops</li> </ul>	

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
National science, technology and innovation policy: Building competitiveness through innovation (2010)	<ul style="list-style-type: none"> <li>- The national science, technology and innovation policy recognizes environment issues, in particular desertification, deforestation and forest degradation as critical problems</li> <li>- The policy indicates that solutions to these environmental problems are possible through the adoption, adaptation and generation of green technologies in agriculture, energy and water resources and management. Proposed strategies include: <ul style="list-style-type: none"> <li>- Introduction of fast growing trees for afforestation/reforestation and as sources of wood products including biomass energy, soil conservation</li> <li>- Local production of wind and solar energy hardware to make them affordable</li> <li>- Adopt waste management technologies together with energy generation</li> <li>- Build local technological capacity (including building a center for research on energy)</li> </ul> </li> </ul>	
Global Strategy for Safe Access to Fuel and Energy (SAFE): A UNHCR Strategy 2014-2018, UNHCR, 2014	<ul style="list-style-type: none"> <li>- Vision</li> <li>- All refugees are able to satisfy their energy needs for cooking and lighting in a safe and sustainable manner, without fear or risk to their health, well-being and personal security.</li> <li>- Strategic objectives – UNHCR and partners will: <ol style="list-style-type: none"> <li>1. Integrate energy into emergency preparedness and response</li> <li>2. Develop and implement country level energy strategies</li> <li>3. Improve access to household fuel and lighting using appropriate technologies and renewable energy</li> <li>4. Increase access to energy for schools, health centres and other institutions.</li> <li>5. Establish and manage woodlots for fuel provision and environmental protection.</li> </ol> </li> <li>- Strategic approaches <ul style="list-style-type: none"> <li>- Partnerships and coordination</li> <li>- Capacity building</li> <li>- Communication and advocacy</li> <li>- Integrated approaches</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- Ethiopia hosts a large refugee population (0.9 million as of beginning of March 2018). It has been hosting large refugee populations since the 1990s. <a href="https://reliefweb.int/report/ethiopia/unhcr-ethiopia-factsheet-february-2018">https://reliefweb.int/report/ethiopia/unhcr-ethiopia-factsheet-february-2018</a></li> <li>- Main refugee sources are South Sudan (48% of refugees), Somalia (28%) and Eritrea (18%). Three-quarter of the refugee population is therefore from South Sudan and Somalia, and these reside mainly in two refugee camps located in the Gambella Regional State and the Somali Regional State.</li> <li>- <a href="https://impakter.com/integrating-refugees-national-systems-ethiopia-2/">https://impakter.com/integrating-refugees-national-systems-ethiopia-2/</a></li> </ul>

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	<ul style="list-style-type: none"> <li>- Measurement</li> <li>- Innovation</li> </ul> <p>How to reach results</p> <ul style="list-style-type: none"> <li>- Develop methodologies to collect data, and use data to make decisions</li> <li>- Forge new partnerships, including with national entities</li> <li>- Harness the talent and resourcefulness of the refugee community</li> <li>- Create synergies with other sectors from onset</li> <li>- Translate innovative energy approaches and technologies into humanitarian settings</li> <li>- Identify appropriate combination of fuels and stoves to match needs</li> <li>- Provide lighting at household and community levels</li> <li>- Increase UNHCR and partner expertise</li> <li>- Capitalise on new and innovative funding opportunities to address needs</li> <li>- Document good practices in camps and apply beyond camps</li> </ul>	<p><b>ETHIOPIA: REFUGEES AND ASYLUM-SEEKERS</b> (as of 30 November 2017)</p> <p>893,938 Registered Refugees and Asylum-seekers 246,794 Households</p> <p>73,078 8.6% 73,078 Eritrean refugees previously registered as living in camps have settled in urban areas. This confirmed figure represents a reduction of 8,000 refugees, following the conclusion of a comprehensive verification exercise.</p> <p>SHIRE 43,003 4.8% AFAR 36,634 4.1% ASSOSA 61,379 6.9% ADDIS ABABA 20,632 2.3% JUJIGA 37,130 4.2% GAMBELLA 400,002 44.7% SNNP 2,787 0.3% BORENA 3,924 0.4% MELKADIDA 215,369 24.1%</p> <p>LEGEND      Refugee Camp      Refugee Transit Center      Refugee Location      UNHCR Country Office      UNHCR Representation to AU &amp; ECA      UNHCR Sub-Office      UNHCR Field Unit      South Sudanese      Somalis      Eritreans      Sudanese      Yemenis      Other Nationalities</p> <p>The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations.</p> <ul style="list-style-type: none"> <li>- Energy access is a major issue in refugee camps. UNHCR and partners have annual plans to address energy access in the refugee camps in Ethiopia. The plan for 2018 includes the following: installation of 500 solar street lights, the distribution of 6,900 solar home systems and 8,500 solar lanterns, the solarisation of 37 schools, 3 health centres, 20 business centres and 3 water pumping systems. Ethanol and briquette fuel will be provided to 13,300 and 7,500 refugee households respectively, while 16 biogas plants will be constructed and 5 refugee camps connected to the national electric grid.</li> <li>- Importance of clean cooking in the refugee context:             <ul style="list-style-type: none"> <li>- Cooking is the largest demand for energy in refugee camps</li> <li>- Solid biomass fuels are the principal sources of cooking in refugee camps</li> <li>- Extraction of fuelwood for cooking by a large group (hundreds of thousands) of refugees result in deforestation and forest degradation</li> <li>- There are potential for conflicts with host communities (sharing of resources)</li> <li>- Access to cooking fuel can be a major economic, social and security problem for women and girls in refugee camps</li> </ul> </li> </ul>

Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
		<ul style="list-style-type: none"> <li>- Some of the strategies adopted in the past to address clean cooking access in the refugee context have not worked well. Some of the issues include: <ul style="list-style-type: none"> <li>- Inadequate needs assessment – results in inappropriate measures, technology distribution</li> <li>- Inappropriate stoves disseminated – for example, distributing stoves that are locally available but which may not fit refugee diets or cooking habits</li> <li>- Non-sustainable supply chain for stoves provided – sometimes stoves are bought and distributed without much thought as to how they may be replaced or maintained if they fail</li> <li>- Short vs. long term view – refugee camps are established in the expectation of refugees returning to their home countries in the short term and the strategies and measures taken are short term. However, some refugee populations stay for decades (e.g. refugees from Somalia) and a long-term perspective may need to be considered for some.</li> <li>- Lesson learning and redirection of strategies</li> </ul> </li> </ul>
<p>Strategic Plan: Safe Access to Fuel and Energy – Ethiopia Country Strategy (2015-2018), UNHCR Ethiopia, 2015</p>	<p><b>Mission</b> Our mission is to responsibly enable all refugees and other peoples of concern satisfy their energy needs for domestic, community services and productive use by placing renewable energy, energy efficiency and sustainable environmental &amp; natural resource management squarely in the center of our Strategy.</p> <p><b>Vision</b> All household and community energy needs are met in a safe and sustainable manner. ONE refugee without access to safe and sustainable energy is TOO MANY.</p> <p><b>Core Values</b> To achieve our mission and vision, we share the following core corporate values. RESPIRE drives our energy and environment operations:</p> <ul style="list-style-type: none"> <li>- <b>Result-oriented</b> – All our actions will be directed to delivering results.</li> <li>- <b>Excellence</b> – We consistently perform at the highest standard.</li> <li>- <b>Synergy</b> – We develop and strengthen cooperation and collaborative relationships with a wide range of stakeholders to fulfill our mission and vision.</li> <li>- <b>Preparedness</b> – We integrate energy into emergency planning and response.</li> </ul>	<p>The SAFE strategy for Ethiopia provides the strategy direction for the years 2015-2018. The strategy sets the context of refugee camps in Ethiopia including distribution of refugees, their energy demands, availability of energy resources, and the cost of energy. The strategy then sets objectives and targets for in six areas: (a) scale-up energy access, (b) expand the use of renewable energy, (c) attain efficient use of energy, (d) achieve sustainable management of environmental and natural resources, (e) unlock the potential of the private sector in energy service delivery, and (f) strengthen the capacity of the UNHCR and partners to effectively manage energy and environment-related operations.</p> <p>The strategy has the following limitations:</p> <ul style="list-style-type: none"> <li>- Disregarded host communities</li> <li>- Disregarded integration with national energy and other relevant sector policies and strategies (including key national strategies such as the CRGE)</li> <li>- Overlooked the resilience context in the design of the strategy which is critical in Ethiopia (and particularly for refugee/host community areas in the geographic and economic periphery)</li> <li>- Lessons from existing interventions have not been evaluated (many have failed)</li> <li>- The strategy would have benefited from a more in depth analysis of problems/issues, then evaluating strategic alternatives before selecting strategies</li> <li>- Strategy formulation appears purely technical – setting the context in terms of energy demand (types, quantities), resources (types, quantities), then costs. The institutional and socio-economic and cultural context have been overlooked</li> </ul>



Key policy/strategy documents	Key features	Issues (inc. Gaps) and opportunities related to clean cooking - analysis and comments
	<ul style="list-style-type: none"> <li>- Innovation – We promote a culture of innovation and continual learning.</li> <li>- Resource utilization – We strive to use our scarce resources optimally.</li> <li>- Empowerment – We are committed to empowering community, private sector, and partners.</li> </ul> <p>The strategy objectives are to (a) scale-up energy access, (b) expand the use of renewable energy, (c) attain efficient use of energy, (d) achieve sustainable management of environmental and natural resources, (e) unlock the potential of the private sector in energy service delivery, and (f) strengthen the capacity of the UNHCR and partners to effectively manage energy and environment-related operations.</p>	<ul style="list-style-type: none"> <li>- Considering the scale of demand and impact on biomass resources a more studied and refugee/host community specific resource mapping would have been useful</li> <li>- The issue of supply-chains (service delivery models) have not been addressed (but lessons from past interventions show this to be critical). For example, several approaches for service/product distribution have been attempted – import and free give away of ICS, central purchase and distribution of stoves and solar lanterns, local/host community assembly and distribution of stoves</li> <li>- The strategy has also not given attention to the needs of disadvantaged groups (how it will address their special circumstances) including women and girls, persons with disability, and the elderly</li> </ul> <p>The SAFE strategy for Ethiopia is for the 2015-2018 period, which means it will be reviewed for the next planning period of 2019-2022 (review may already be in progress). It is recommended that such a review of the strategy consider the following to make it more relevant and actionable:</p> <ul style="list-style-type: none"> <li>- A broader assessment of the context including the institutional set up and distribution models for energy services</li> <li>- Broader assessment of needs that include host communities and their institutions</li> <li>- Consideration of policies and strategies at the national and regional state level (Somalia, Oromia, Tigray)</li> <li>- Generation of strategy alternatives, then rating and selection of options (selection could be by strategy formulation team and/or key stakeholders)</li> <li>- Consider climate change as key</li> <li>- Consider specific needs and capabilities of disadvantage groups (women, girls, persons with disabilities, elderly)</li> <li>- Incorporate lessons from past energy service interventions in the refugee context in Ethiopia</li> </ul>

### Annex 3. Analysis of institutions and their programs

Institutions	Mandates	Programs, projects	Human and other resources (existing, desired)	Issues Gaps and opportunities related to clean cooking
MEFCC	<p style="text-align: center;"><b><u>MEFCC: Powers and Duties as Stated in establishment Proclamation No. 916/2015</u></b></p> <ul style="list-style-type: none"> <li>○ Coordinate activities to ensure that the environmental objectives provided under the Constitution and the basic principles set out in the Environmental Policy of the Country are realized;</li> <li>○ Establish a system and follow up implementation for undertaking environmental impact assessment or strategic environmental assessment on social and economic development policies, strategies, laws, programs and project set by the government or Privet;</li> <li>○ <b>Prepare a mechanism that promotes social, economic and environmental justice and channel the major part of benefit derived thereof to the affected communities to reduce emissions of greenhouse gases that would otherwise have resulted from deforestation and forest degradation;</b></li> <li>○ Coordinate actions on soliciting the resources required for building a climate resilient green economy in all sectors and at all Regional levels; as well as provide capacity building support and advisory services;</li> <li>○ Establish a system for evaluating and decision making, in accordance with the Environmental Impact Assessment Proclamation, the impacts of implementation of investment programs and projects on environment prior to approvals of their implementation by the concerned sectoral licensing organ or the concerned regional organ;</li> <li>○ Prepare programmes and directives for the synergistic implementation and follow up of environmental agreements ratified by Ethiopia pertaining to the natural resources base, desertification, forests, hazardous chemicals, industrial wastes and anthropogenic environmental hazards with the objective of avoiding overlaps, wastage of resources and gaps during their implementation in all sectors and at all governance levels;</li> <li>○ Take part in the negotiations of international environmental and climate change agreements and, as appropriate, initiate a process of their ratification; play key role in coordinating the nationwide responses to the agreements;</li> <li>○ <b>coordinate, and as may be appropriate, carry out research and technology transfer activities that promotes the sustainability of the environment and the conservation and use of forest as well as the equitable sharing of benefits accruing from them while creating opportunities for green jobs;</b></li> <li>○ Establish a system for development and utilization of small and large scale forest including bamboo on private, communal and watershed areas, and ensure implementation of same;</li> <li>○ Establish a system to rehabilitate degraded forest lands and ensure its implementation to enhance their environmental and economic benefits.</li> </ul>			

Institutions	Mandates	Programs, projects	Human and other resources (existing, desired)	Issues Gaps and opportunities related to clean cooking
	<p align="center"><b>A) FORESTRY SECTOR</b></p> <p><b>Forestry lever 5 – Large- and small-scale afforestation/ reforestation and area closure</b>  Afforestation, reforestation, and area closure measures provide additional sequestration opportunities. The total abatement potential for the year 2030 comes to around 32.3 Mt CO<sub>2</sub>e, with afforestation contributing 21.5 Mt CO<sub>2</sub>e and reforestation 10.8 Mt CO<sub>2</sub>e.</p> <ul style="list-style-type: none"> <li>• Afforestation/reforestation area. Based on consultations with forestry experts, existing afforestation/reforestation projects, and discussions in the STC, it was assumed that 2 million hectares of pastureland will be afforested up to 2030. At the same time, Ethiopia will reforest 1 million hectares of degraded areas.</li> <li>• Sequestration rate. The sequestration rate for both afforestation and reforestation was set at 10.75 t CO<sub>2</sub>e/ha/year, a number directly taken from the afforestation/reforestation CDM project in Humbo.</li> </ul> <p><b>Forestry lever 6 – Forest management</b>  Forest management boasts an abatement potential of nearly 10 Mt CO<sub>2</sub>e in 2030, with management of forests contributing 6.5 Mt CO<sub>2</sub>e and management of woodlands 3.2 Mt CO<sub>2</sub>e. The abatement potential of these two levers was calculated in a very similar way, albeit using different assumptions on the following parameters:</p> <ul style="list-style-type: none"> <li>• Projected area coverage. Based on interviews with experts, experience from existing forest management projects, and discussions in the STC, the area for the management of forests and for the management of woodlands was set at 2 million hectares each.</li> </ul> <p>Sequestration rate. Management of forests has a sequestration potential of 3.24 t CO<sub>2</sub>e/ha/year as international benchmarks indicate. Assuming that the management of woodlands has about 50% of that impact, the potential for this activity is around 1.62 t CO<sub>2</sub>e/ha/year.</p> <p>According to CRGE (2011), Projects being implemented in the Forest Sector include the following:</p> <ul style="list-style-type: none"> <li>• Rehabilitation opportunity Mapping with WRI</li> <li>• The UN-REDD Program</li> <li>• Institutional Strengthening for the Forest Sector Program</li> <li>• Biodiversity Conservation Program- GIZ and kfW</li> <li>• Restoration with WRI</li> <li>• Bonga Biosphere reserve</li> <li>• Fast Track Investments in the Forest Sector</li> <li>• Great Green Wall of the Sahel &amp;Sahara Initiative</li> <li>• Bamboo sector</li> <li>• Global Green growth Initiative (GGGI)</li> <li>• Forest Sector Growth Program- EU (all regions)</li> <li>• Forest Sector Investment Portfolio- Norway (all regions)</li> <li>• Support from the GCF fund (all regions)</li> <li>• Charcoal production from Bagasse- sugar factories.</li> </ul>			

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	<p><b>B) COOKSTOVES SUB SECTOR:</b></p> <p><u>Levers reducing deforestation</u> (Source: CRGE, November 2011)</p> <p><b>Forestry levers 1-4 – Reduced forest degradation from improved cooking/baking technologies</b>  Fuelwood consumption is the main source of GHG emissions in Ethiopia. The wood is mainly used for residential baking and cooking purposes. As most of the households, particularly in rural areas, use highly energy-inefficient technologies (e.g., open fire or</p>	<p><b>Programme:</b> National Improved Cookstoves Programme (NICSP)</p> <p><b>Linkages to the CRGE:</b> One of the four initiatives for fast-tracking under the CRGE is 'large-scale promotion of advanced rural cooking technologies'.</p> <p><b>Goal (Vision):</b> To contribute to realization of the CRGE vision of reducing emissions from deforestation and forest degradation and ensuring access to clean energy.</p> <p><b>Objective (Mission):</b> To support the dissemination of 9 million ICS in Ethiopia up to January 2018 through building sustainable and vibrant market for ICS and institutional capacity.</p> <p><b>Intended Outcomes:</b></p>	<p><b>MEFCC – NICSP:</b></p> <ul style="list-style-type: none"> <li>The NICSP programme was transferred to the MFCC in 2015. The programme management team consists of seven staff. The team is fairly well organized, experienced and capable.</li> <li>The programme, is scheduled to wound up towards the end of 2018 (unless extended). If and when the programme phases out, it is hoped that a Directorate dedicated to</li> </ul>	<p><b>Issues:</b></p> <ul style="list-style-type: none"> <li>One of the key issues that continued to plague the cookstoves sub sector is weak <b>INSTITUTIONAL COORDINATION</b>.</li> <li>Institutional coordination appears to have gone from bad to worse when the NICSP was transferred to MFCC. This is not because the NICSP was transferred to a new Ministry (MFCC), rather it is because the transfer was</li> </ul>																																								

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	<p>three-stone technology), the improvement potential here is huge.</p> <p>The dissemination of technologies leading to a reduction in fuelwood consumption, either by making more efficient use of it or by shifting to other, less carbon intense fuels, can be a major lever for GHG abatement. The STC analysed different technologies:</p> <ul style="list-style-type: none"> <li>Fuel-efficient stoves (baking and cooking) Fuel-shift stoves (LPG, biogas, electric)</li> </ul>	<ul style="list-style-type: none"> <li>A carbon sink or savings effect of woody biomass amounting to 2.1 t/year per household</li> <li>A total abatement potential of 14 Mt of CO<sub>2</sub>e due to the effect of reduced degradation</li> <li>Avoidance of 1,000 - 2,000 deaths per year due to indoor pollution</li> <li>Creating 5,000 private sector jobs largely in rural areas</li> </ul> <p><b>Major Activities:</b></p> <ol style="list-style-type: none"> <li>Development of regulators and technical procedures and standards;</li> <li>Institutional and technical capacity building of government institutions and personnel at federal, regional and woreda levels;</li> <li>Capacity building of private ICS producers and entrepreneurs;</li> <li>Provision of loans to producers, distributors and retailers;</li> <li>Introduce customer support mechanism;</li> <li>Market promotion, support and development;</li> <li>Establishment of testing laboratories;</li> <li>Introduction of carbon financing;</li> <li>Establishment of baselines, and M&amp;E frameworks, manuals and standards</li> </ol> <p><b>Implementing Partner:</b> MoWE, (MoWIE) but now transferred to MoEFCC</p> <p><b>Development Partners:</b> NORAD, UNDP, BARR Foundation, Global Alliance for Clean Cookstoves (GACCS), DFID, World Bank, private improved cookstove producers, distributors, etc</p> <p><b>Other Partners:</b> MoA, MoH, MoE, EPA, MoFEC, MSED Agency, GIZ, NGOs, Academia, WVE, Gaia, SNV, HoAREC, MoWCA, WFP, UNHCR, EQSA, and ECAE</p> <p><b>Coordinating Body:</b> MoFEC</p> <p><b>Target Groups:</b> Federal and regional governments, private businesses and relevant stakeholders engaged in the energy sector, and poor urban and rural households of Ethiopia.</p>	<p>ICS activities will take over the responsibilities pertaining to the NICSP.</p> <p><b>MEFCC – ICS Directorate:</b></p> <ul style="list-style-type: none"> <li>A new Directorate – ICS Directorate – is established within the Forestry sector of the MFCC.</li> </ul> <p>Obviously, as a new Directorate recruited new staff with no or very limited experience in cookstoves, technical and managerial capacities remain significant issue for the programme implementation</p>	<p>INCOMPLETE. The entire Directorate (AETDPD) along with its workshop and laboratory facilities and, above all, staff of over 40 highly skilled and experienced was left behind with the MoWIE. This has led to setting up a REPLICA Directorate (ICS Directorate) within MFCC. It is not only the duplication of efforts that is an issue with this sort of arrangements, but also it adds another layer of barrier to the already serious issue of institutional coordination. With its institutional arrangements, the NICSP can no longer directly access the workshop, the laboratory and draw on expertise (all of which were under its discretion when the programme was under the MoWIE) that are left behind with the MoWIE.</p> <p><b>Gaps:</b></p> <ul style="list-style-type: none"> <li><b>Institutional Gap:</b> As it stands now, there is no mandated government institution to oversee and guide activities, mobilize resources and coordinate initiatives in the cookstoves sub sector and the wider RE sector for that matter.</li> <li><b>Capacity Gaps:</b> There is a contradiction here: On the one hand, there is a team of over forty skilled and experienced staff</li> </ul>

Institutions	Mandates	Programs, projects	Human and other resources (existing, desired)	Issues Gaps and opportunities related to clean cooking
		<p><b>Main Beneficiaries:</b> Energy institutes of governments at the all levels; private ICS producers, distributors and retailers; women and children.</p> <p><b>Location(s):</b> Ethiopia: urban and rural areas all over the 11 regions of Ethiopia</p> <p><b>Period:</b> January 2013 – January 2018</p> <p><b>Total Budget:</b> 33.56 Million USD (Yet to be sourced)</p>		<p>equipped with a workshop and laboratory facilities inside MoWIE (AETDPD) and there is considerable capacity gap within the newly established ICS Directorate under MFCC. This contradiction needs to be resolved one way or another.</p> <p><b>Opportunities:</b></p> <p>If and when further institutional reforms are considered (reforms to re-establish a mandated institution with all RE-inclusive portfolios including cookstoves under single umbrella) in the future, resource at AETDPD’s disposal (40+ skilled staff, workshop, laboratory) are all opportunities themselves waiting for an opportunity.</p>
<p><b>MOWIE – AETDPD</b></p>	<p><b><u>Powers and Duties of the MoWIE as Stated in Establishment Proclamation No. 916/2015</u></b></p> <p>1/The Ministry of Water, Irrigation and Electricity shall have the powers and duties to:</p> <p>a) promote the development of water resources and electricity;</p> <p>b) undertake basin studies and verify the country’s ground and surface water resource potential in terms of volume and</p>	<p><b>A) <u>UNDP/GEF RETs Project:</u></b></p> <ul style="list-style-type: none"> <li>• Project: Promoting Sustainable Rural Energy Technologies for Households and Productive Uses</li> <li>• Implementing Agency: AETDPD (MoWIE)</li> <li>• Financiers: UNDP, GEF, UNCDF</li> <li>• Total Budget: ~US \$ 6 million</li> <li>• Period: 5 years</li> <li>• Objectives: to promote and encourage significantly greater use of energy efficient and renewable energy technologies for households and productive use in rural communities in Ethiopia</li> <li>• Major Project Components: (i) Improved Cookstoves, and (ii) Off-grid Solar</li> </ul>	<p><b><u>A1. UNDP/GEF RETs Project</u></b></p> <ul style="list-style-type: none"> <li>• With a UNDP expert embedded within AETDPD to steer and oversee project implementation; and four senior staff of AETDPD working on the project, capacity (both in terms of skills and number of project staff) is not a serious issue for the RETs project.</li> </ul> <p><b><u>A2. EU/SNV Biogas Programme</u></b></p>	<p><b><u>A1. UNDP/GEF RETs Project</u></b></p> <p><b><u>A1.1 Issues:</u></b></p> <ul style="list-style-type: none"> <li>• There are no serious issues except the fact that the project is operating within MoWIE/AETDPD, which is not legally mandated to oversee and guide cookstoves initiatives with a clear purpose, vision and mission.</li> </ul> <p><b><u>A1.2 Gaps:</u></b></p>

Institutions	Mandates	Programs, projects	Human and other resources (existing, desired)	Issues Gaps and opportunities related to clean cooking
	<p>quality, and facilitate the utilization of same;</p> <p>c) determine conditions and methods required for the optimum and equitable allocation and utilization of water bodies that flow across or lie between more than one Regional States among various uses and the Regional States;</p> <p>d) undertake studies and negotiations of treaties pertaining to the utilization of boundary and trans-boundary water bodies, and follow up the implementation of same;</p> <p>e) cause the carrying out of study, design and construction works to promote the expansion of medium and large irrigation dams;</p> <p>f) administer dams and water structures constructed by Federal budget unless they are entrusted to the authority of other relevant bodies;</p> <p>g) in cooperation with the appropriate organs, prescribe quality standards for waters to be used for various purposes;</p> <p>h) support the expansion of potable water supply coverage; follow up and coordinate the implementation of projects financed by foreign assistance and loans;</p> <p>i) promote the growth and expansion of the country's supply of electric energy;</p> <p>j) issue permits and regulate the construction and operation of water works relating to water bodies referred to in paragraphs (c) and (d) of this sub-article;</p>	<ul style="list-style-type: none"> <li>Core Activities of the Project: (i) Strengthening Regulatory and Legal Frameworks Based on National Standards, (ii) Rural Public Awareness Campaign on RETs, (iii) Sustainable Financial Mechanism for RETs for households, and (iv) Business Incubator to Promote Greater Entrepreneurship for Investment in RETs.</li> </ul> <p><b>B) <u>EU/SNV Biogas Programme:</u></b></p> <p><b>Programme:</b> Biogas Dissemination Scale-Up Programme (NBPE+)</p> <p><b>Donors:</b> EU</p> <p><b>Fund Manager &amp; Implementation Assistance:</b> SNV</p> <p><b>Implementing Partner:</b> AETDPD of MoWIE</p> <p>Implementation Modality: Public-Private Partnership</p> <p><b>Location:</b> All nine regional states of Ethiopia</p> <p><b>Period:</b> Five years</p> <p><b>Objectives:</b></p> <ul style="list-style-type: none"> <li>To provide 180,000 people with biogas as clean energy (mainly used for cooking) and bio-slurry as high value fertiliser (in total, 36,000 bio-digesters);</li> <li>To improve the affordability of bio-digesters and provide a pro-poor orientation towards female headed and disadvantaged families;</li> <li>To expedite sector capacity development for a sustainable domestic bio-digester sector and engage of partners to fill the capacity gap;</li> <li>To further develop existing and create new types of bio-digesters, appliances and accessories for both domestic and productive purposes;</li> <li>To further develop the institutional and policy framework for the biogas sector in the country.</li> </ul> <p><b>Main activities:</b></p> <ul style="list-style-type: none"> <li>❖ Provision of <i>investment incentives</i> to the farmers.</li> </ul>	<ul style="list-style-type: none"> <li>SNV, working closely with the MoWIE/AETDPD. is responsible for the overall management and TA for this programme. As such, the programme has a capable and well-staffed, resourced programme management team both at federal and regional levels. The team, reporting directly to SNV, is embedded within MoWIE (federal) and respective WME Bureaus of all regional states where the programme is active. Though embedded within MoWIE (for implementation arrangements), it is more or less independent programme fully managed by SNV through its National and Regional Coordination Offices.</li> <li>While the National Coordination Office has 12 staff, four larger regions (where Phase I programme was active) have 15 staff each and four new (emerging) regions have 10 staff each.</li> </ul>	<ul style="list-style-type: none"> <li>At least, at federal level, capacity is not a serious issue for the project.</li> </ul> <p><b><u>A1.3 Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>The cookstoves component of the RETs project could serve as a nucleus for the AETDPD to regain its cookstoves portfolio with clear mandates, vision and mission</li> </ul> <p><b><u>A2. EU/SNV Biogas Programme</u></b></p> <p><b><u>A2.1 Issues</u></b></p> <ul style="list-style-type: none"> <li>Thanks to its coordination offices and embedded operations from within the respective government institutions at national and regional levels, currently the programme is running smoothly. However, implementation is likely to be adversely affected at lower levels (Zones and woredas) mainly due to lack of incentive mechanisms at lower levels.</li> <li>The other key issue for the programme is fraudulent activities by some treacherous BCEs (Biogas Construction Enterprises) who take the 'short-cut' route to benefit from subsidized financing scheme.</li> </ul> <p><b><u>A2.2 Gaps</u></b></p>

Institutions	Mandates	Programs, projects	Human and other resources (existing, desired)	Issues Gaps and opportunities related to clean cooking
	<p>k) ensure the proper execution of functions relating to meteorological services.</p> <p>2/ The powers and duties given to the Ministry of Water, Irrigation and <u>Energy</u> by the provisions of other laws, currently in force, with respect to water resource and electricity, are hereby given to the Ministry of Water, Irrigation and Electricity</p>	<ul style="list-style-type: none"> <li>❖ Provision of <i>programme support activities</i> aimed at achieving the actual installation (i.e. awareness raising, technical support for biogas credit finance, construction and 10 use) implemented by SNV and other partners and including national and regional coordination by the Government.</li> <li>❖ <i>Technical assistance</i> by SNV through a staff team of long term Technical Assistance providers and through alternative Implementing Partners. The technical assistance is aimed at the Implementing Partners, the private sector, credit providers and institutional structures within and related to the Government.</li> <li>❖ <i>Overall programme management and Monitoring &amp; Evaluation activities</i> to ensure the efficient and effective implementation of the entire programme, according to plan and expectations.</li> </ul>		<ul style="list-style-type: none"> <li>• There are no capacity gaps (technical or managerial) for this programme.</li> </ul> <p><b><u>A2.3 Opportunities:</u></b></p> <ul style="list-style-type: none"> <li>• Carefully designed, well-organized and centrally managed by SNV, the programme offers a huge and unique opportunity for scaling up and wide-spread distribution of biogas digesters in rural Ethiopia.</li> </ul>



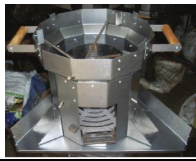




## Annex 4. Clean cook stove classification

### A) Improved biomass *injera* baking stove with their ranking according to IWA-12

No.	Type of stove	Picture	Performance Indicators								Safety	IWA Category
			Emissions				Efficiency/Fueluse		Indoor Emissions			
			High Power		Low Power		High Power	Lower Power	CO	PM		
			CO (g/MJ <sub>d</sub> )	PM (mg/MJ <sub>d</sub> )	CO (g/min/L)	PM (mg/min/L)	Thermal Efficiency (%)	Specific Consumption (MJ/min/L)	(g/min)	(mg/min)		
1	Three-stone open-fire		-	-	-	-	10 % [Reference]	-	-	-	-	<b>Tier 0</b> [Efficiency/Fuel use]
2	Mirt		-	-	-	-	-	-	-	-	-	
3	Gonzie		-	-	-	-	-	-	-	-	-	
4	Awaramba		-	-	-	-	-	-	-	-	-	
5	<i>Injera</i> baking Natural Draft Gasifier		-	-	-	-	-	-	-	-	-	

**B) Improved biomass non-injera baking stove with their ranking according to IWA-12**

No.	Type of stove	Picture	Performance Indicators								Safety	IWA Category	
			Emissions				Efficiency/Fuel use		Indoor Emissions				
			High Power		Low Power		High Power	Lower Power	CO	PM			
			CO (g/MJ <sub>d</sub> )	PM (mg/MJ <sub>d</sub> )	CO (g/min/L)	PM (mg/min/L)	Thermal Efficiency (%)	Specific Consumption (MJ/min/L)	(g/min)	(mg/min)			
1	Tikikil		-	-	-	-	26% [Reference]	-	-	-	-	-	<b>Tier 2</b> [Efficiency/Fuel use]
2	Laketch		-	-	-	-	-	-	-	-	-	-	-
3	Berkeley-Ethiopia		-	-	-	-	-	-	-	-	-	-	-
4	Ezye Stove		-	-	-	-	-	-	-	-	-	-	-
5	Ethanol		-	-	-	-	-	-	-	-	-	-	-