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GREEN CLIMATE FUND

Climate-friendly cooking: A paradigm shift in Kenya and Senegal

How climate-friendly cooking accelerates sector growth, transforms cooking markets and contributes to climate change mitigation

Contents

Abbreviations

AQL	Access quality level
BAU	Business as usual
BMZ	German Federal Ministry for Economic Cooperation and Development
CCT	Controlled Cooking Test
CDM	Clean Development Mechanism
CO_2e	Carbon dioxide equivalent
EAMD	Energy Access Market Development
EnDev	Energising Development
FAO	Food and Agriculture Organization of the United Nations
GCF	Green Climate Fund
GHG	Greenhouse gas
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH
Gt	Gigatonne
ICS	Improved cookstove
JETP	Just Energy Transition Partnership
KEBS	Kenya Bureau of Standards
KPT	Kitchen Performance Test
LME	Last-mile entrepreneur
LPG	Liquefied petroleum gas
MFI	Microfinance institution
MRV	Monitoring, reporting and verification
MSMEs	Micro, small and medium-sized enterprises
Mt	Megatonne
MTF	Multi-Tier Framework
NDC	Nationally Determined Contribution
NGO	Non-governmental organisation
ODA	Official development assistance
SDG	Sustainable Development Goal
SIE	Energy Information System
UN	United Nations
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary carbon market
WHO	World Health Organization

Foreword

Looking back on five years of implementation, I am proud to share the story of a journey that was as **ambitious** as it was **impactful**. The project Promotion of Climate-Friendly Cooking: Kenya and Senegal was one of the first GIZ-implemented projects co-financed by both the Green Climate Fund (GCF) and the German Federal Ministry for Economic Cooperation and Development (BMZ). With its complexity, bold approach, and strong partner orientation, the project has been a pioneer in many respects.

It empowered local producers to make clean cooking more accessible and sustainable. By supporting the growth of local enterprises, we helped reduce production costs, increase productivity, and expand market reach – all while generating measurable benefits for public health, the environment, and livelihoods.

With 3 million improved cookstoves (ICSs) produced and over **3.2 million tonnes of CO_2** reduced by Dec 2024, we met our objectives, achieved all the indicators and delivered real change as well as making a major contribution to reaching Kenya's and Senegal's Nationally Determined Contribution (NDC) climate targets. Another achievement was significant social development, with **over two million households, almost a third of them headed by women**, benefitting directly from the project.

But numbers alone do not tell the full story. This was, above all, a **story of transformation**. We witnessed the evolution of a sector, with committed national partners supporting the creation of a conducive enabling environment and small-scale local artisans growing and expanding into formal, creditworthy businesses operating at scale across the country. Demand for clean cooking solutions increased exponentially, and with this came a shift: the financial sector gained trust, and commercial finance became accessible, bringing a new level of sustainability to the clean cooking market.

It has also been a **story about people**, about courageous innovators in the private sector – like Naomi Ngotho, who began as small-scale entrepreneurs and, just five years later, employs six people and sends her children to top schools. A story about outspoken and committed partners across ministries and public institutions and about our dedicated implementation teams – agile, professional and always solution-oriented.

I am deeply grateful for the collaboration, trust and persistence shown by everyone involved. What we have built together is more than a completed project; it is a foundation for lasting change and a model for others to follow. Let this knowledge product serve as both a reflection and an inspiration for what can be achieved when ambition meets partnership and when systems are truly transformed.

Alexander Haack
Project Director Climate Friendly Cooking and Head of Energising Development (EnDev)

Acknowledgements

We gratefully acknowledge the support and collaboration of all those who contributed to the successful implementation of this project. We extend our sincere thanks to our political partners: the Ministry of Energy and Petroleum Kenya, the Ministry of Petroleum, Energy and Mines of the Republic of Senegal and the Ministry of Environment and Ecological Transition of the Republic of Senegal; and to the executive entities and implementing partners: the Ministry of Energy and Petroleum Kenya, Mercy Corps, Practical Action, Strathmore University, Dedan Kimathi University of Technology, the Kenya Tea Development Agency Foundation, the Green Belt Movement and the Clean Cooking Association of Kenya in Kenya and Enda Energie, Enda Ecopop and Concept in Senegal.

This report was prepared with valuable inputs from colleagues from the Kenyan and Senegalese EnDev country teams, including Fredrick Oluleka Amariati, Jackson Mutonga, Francesca Nzuve and Andrew Raudo (EnDev Kenya) and Mireille Afoudji Ehemba, Viviane Sagna Ciss, Luca Mango and Christoph Messinger (EnDev Senegal). Their insights, ideas, suggestions and constructive feedback were essential. The report was overseen by Alexander Haack, the content edited by Verena Brinkmann and Anja Straumann, the language reviewed by Lotta Schuett (all from GIZ). It was authored by Mirco Gaul and Miriam Schroeder (both from SiNERGi Consulting). We are indebted to all those colleagues who participated in discussions and shared their knowledge throughout the process.

Executive summary

The need for a paradigm shift

Despite significant efforts over recent decades, 2.1 billion people worldwide continue to rely on traditional biomass, such as firewood and charcoal, for cooking – a trend that persists and is even increasing in sub-Saharan Africa. However, there is growing political momentum for advancing clean cooking solutions, with the transformation of the cooking sector emerging as a priority in many countries' NDCs. Scaling and modernising the cooking energy sector is crucial not only for achieving NDC targets through substantial emissions reductions, but also for ensuring universal access to clean cooking (Sustainable Development Goal (SDG) 7) and supporting broader sustainable development goals related to economic growth, health and gender equality.

The project Promotion of Climate-Friendly Cooking: Kenya and Senegal

The project Promotion of Climate-Friendly Cooking: Kenya and Senegal aims to demonstrate a paradigm shift in reducing greenhouse gas (GHG) emissions and to improve people's – and especially women's – living conditions. Co-funded by GCF and the German Federal Ministry for Economic Cooperation and Development (BMZ), it strives to bring about an ICS market transformation in the two partner countries – Kenya and Senegal. This report presents key achievements and lessons learned and critically assesses the strengths and weaknesses of the approaches taken throughout the project.

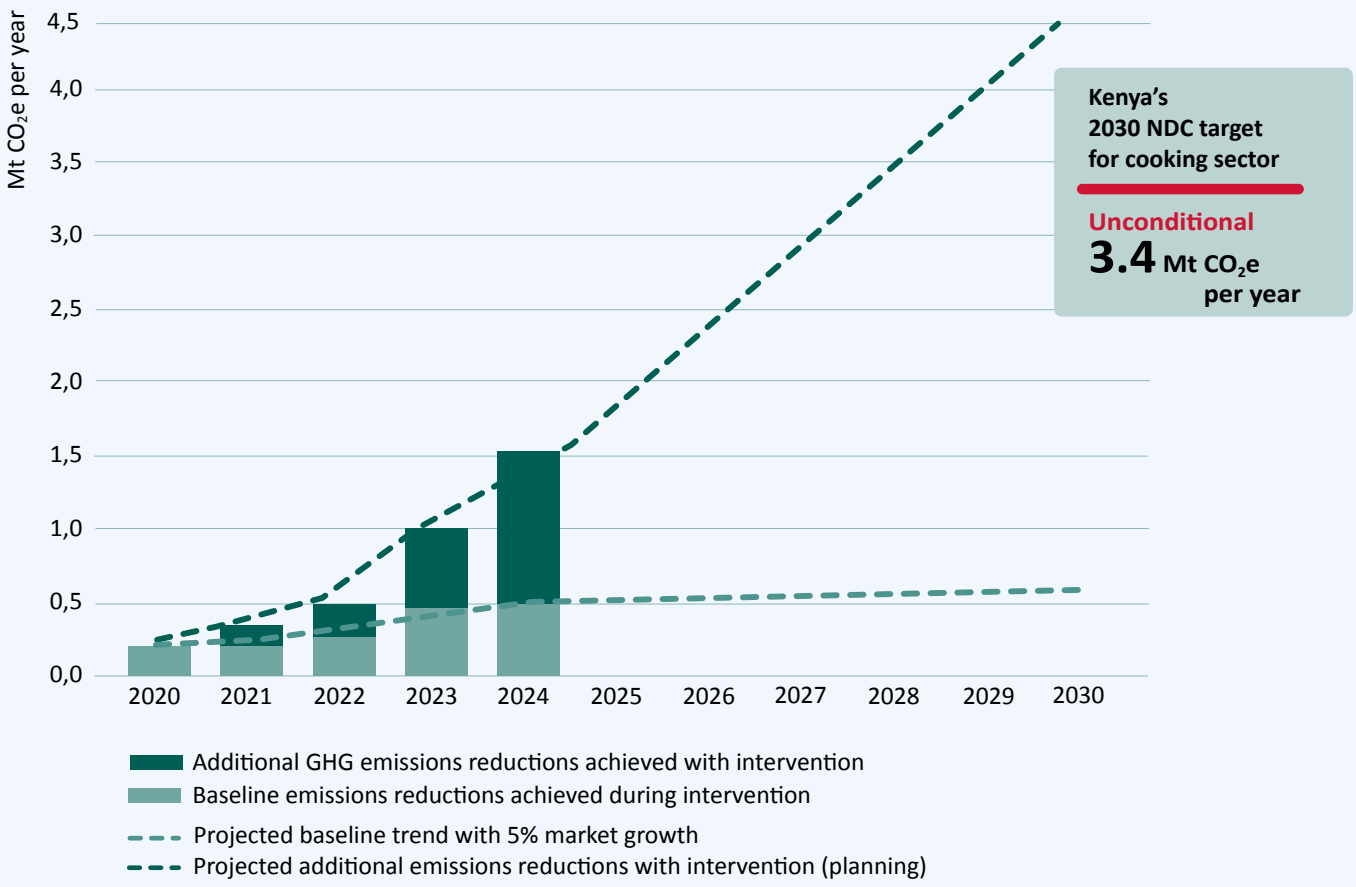
Innovative approach: market transformation through professionalisation

Through its Professionalisation Approach – a performance-based support scheme – the project focuses on building professional, fully commercial and growth-oriented ICS supply chains for household stoves. Rather than supporting stove production on a small, decentralised scale, the project targets large-scale market development by mobilising nationwide demand and strengthening the enabling environment. In parallel, it implements robust systems for the monitoring, reporting and verification (MRV) of emissions reductions at the project level while also supporting governments in establishing national MRV systems to integrate cooking sector achievements into GHG inventories and NDC reporting.

Key achievements

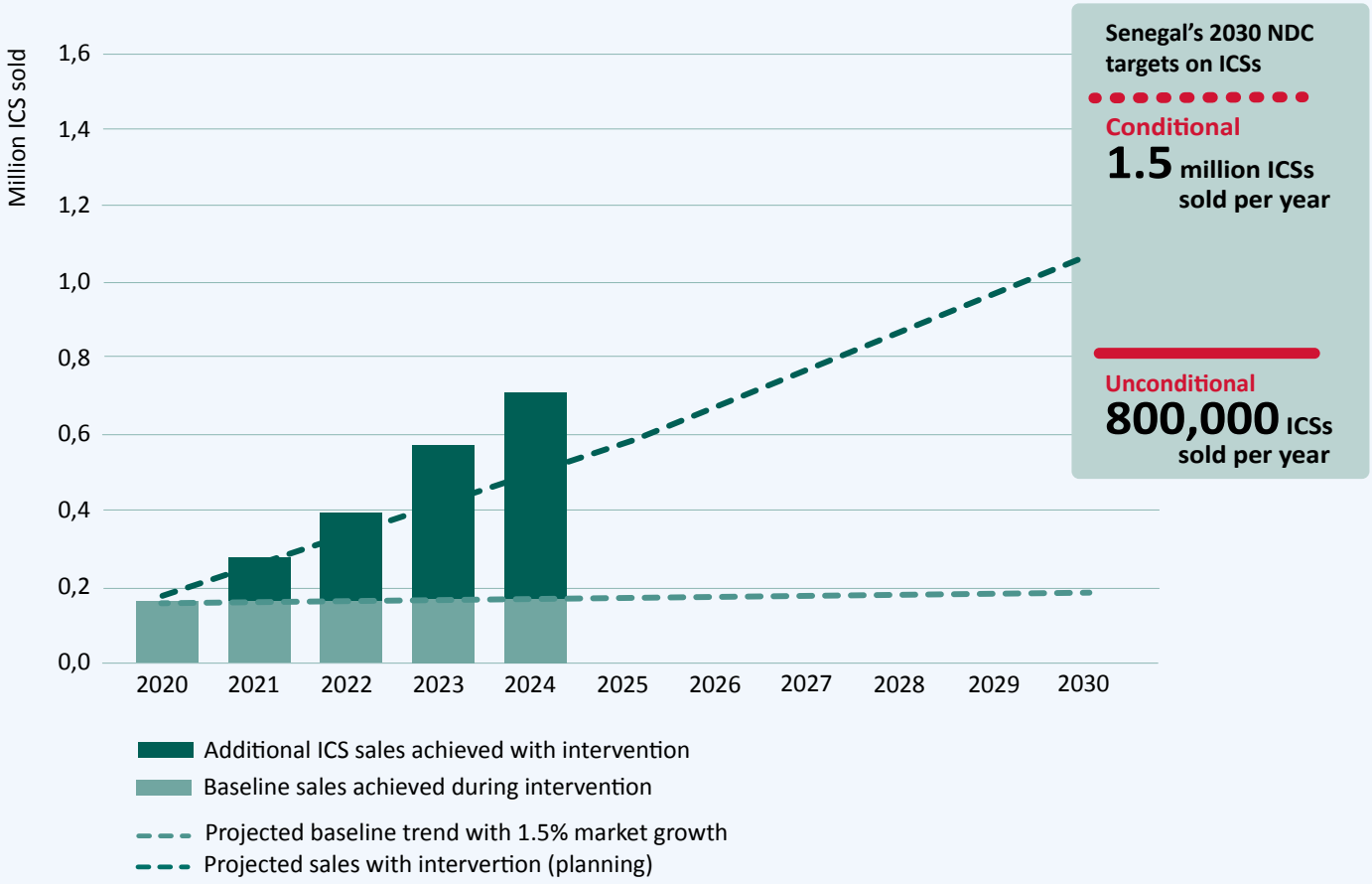
Over a five-year implementation period, the Professionalisation Approach helped almost 30 business class producers to emerge in Kenya and Senegal, and they are now showing strong growth. This has enabled the large-scale dissemination of improved biomass cookstoves and resulted in GHG emissions reductions that allow Kenya and Senegal to meet their cooking energy-related NDC targets. By the end of 2024, (approximately one year before completion), the project was able to achieve its objective of exponential growth in ICS sales and the tripling of annual sales compared to the 2020 baseline. The two figures below show the corresponding GHG emissions reductions for the two countries.

Figure: Annual GHG emissions reductions in relation to Kenya's NDC



With a sales target of about 2 million ICSs by 2030, the additional annual emissions reductions are projected to reach 3.8 megatonnes (Mt) of carbon dioxide equivalent (CO_2e), which exceeds the target set for ICSs in Kenya's NDC.

Figure: Annual ICS sales in relation to Senegal's NDC



With a sales target of about 1.1 million ICSs by 2030, the annual emissions reductions are projected to reach 0.9 Mt CO_2e, which is equal to about 35% of Senegal's unconditional NDC target and 8% of its conditional target.

Key lessons learned

Achievement of these exponential growth trajectories was driven by the effective implementation of the Professionalisation Approach. Drawing on extensive implementation experience, the following key lessons emerged, offering valuable insights for future clean cooking initiatives.

1. **Professionalising production:** Tailoring the project support scheme to the sales performance of each ICS producer category enabled the most capable ICS producers to become strong, sustainable businesses.

2. **Establishing commercial last-mile distribution:** Providing performance-based support for ICS distributors was essential for expanding access and employment, with LMEs, women's groups and savings groups playing a key role in reaching last-mile customers, despite wholesalers handling the bulk of sales.

3. **Boosting demand:** Boosting ICS demand works best if there is a concerted effort involving national media campaigns combined with grassroots events and partnerships with local groups; empowering advanced producers to lead their own marketing campaigns further accelerated market transformation.

4. **Emphasising gender transformation:** Supporting women's access to finance, challenging restrictive gender norms and promoting women as change agents led to greater gender equality, as evidenced by more women-led businesses and higher female employment in ICS production and distribution.

5. **Fostering inclusivity:** Special efforts targeting vulnerable customers (e.g. by promoting affordable stoves and tailored outreach) and enabling greater participation of vulnerable groups in the ICS workforce (e.g. by offering equal pay and making training venues and workspaces accessible for people with disabilities) contribute to greater social and economic inclusion.

6. **Facilitating access to finance:** Financial institutions are more likely to lend to ICS producers with full legal registration, strong governance, reliable business data and sound business plans.

7. **Developing ownership and sustainability:** Ensuring ICS producers take responsibility for marketing and sales supports long-term sustainability and reduces ODA reliance. This can include ICS labelling, digital marketing, building distribution structures and partnerships and employing dedicated staff responsible for marketing and sales.

8. **Implementing robust monitoring systems:** A robust project-level MRV system that is coherently structured with multi-level data validation and clear standards (for impacts such as fuel savings and stove usage) is essential. Digitalisation can boost efficiency if local companies have access to the required technologies. Providing quality sales data is crucial for GHG inventories and NDC reporting.

9. **Strengthening integrated NDC reporting capacity:** Integrating household cooking energy data into national MRV systems with nationwide monitoring of ICS sales, usage and fuel consumption enhances NDC reporting. In the medium-term, the MRV system should also cover electric and liquefied petroleum gas (LPG) cooking.

10. **Enhancing policy- and stakeholder alignment:** A successful national cooking energy market transition depends on the harmonisation of cooking and energy policies, the development of a national cooking strategy and alignment with carbon market strategies.

The way forward

The Professionalisation Approach offers strong potential for replication and scaling to unlock the full GHG reduction potential of the cooking energy sector. Success depends on tailoring the approach to the market readiness of each target country and ensuring balanced support across the three market dimensions of supply, demand and the enabling environment. Co-creative service delivery with diverse partners is key to building a sustainable sector. Likewise, scaling the MRV system requires close coordination with partner governments to integrate household cooking data into national GHG inventories and NDC reporting. With an irreversible market transformation as the means for achieving this, the ultimate goal is to enable ICS producers to operate independently of donor support and government partners to meet national and international climate commitments.

Preface

A paradigm shift in climate mitigation in the cooking energy sector

In 2024, global average temperatures exceeded the 1.5 °C threshold for the first time (Tollefson, 2025). Although nearly all United Nations (UN) member states have pledged to align their NDCs with the 1.5 °C target, existing NDCs are only projected to limit global warming to between 2.1 °C and 2.8 °C by 2030 (UNFCCC, 2024). As countries are currently revising their NDCs (UNFCCC, 2023), there is a chance to aim higher. In this context, the transformation of the cooking sector has attracted attention since improved cooking systems can significantly cut emissions while also offering other benefits.

However, the latest SDG 7 tracking data confirm the persistent gap still to be bridged to reach universal access to clean cooking. Unless rapid and decisive action is taken, 1.8 billion people will lack access to clean cooking fuels and technologies in 2030 (IEA et al., 2025). Recent calls for action also highlight the strong contribution of clean cooking to other SDGs, such as combating climate change by mitigating carbon emissions (SDG 13), reducing environmental damage by lowering fuel consumption (SDG 15), promoting empowerment and economic development (SDGs 5 and 8) and improving health by reducing smoke pollution (SDG 3). To make a dent in achieving large-scale GHG emissions reductions and meeting the SDGs, the project Promotion of Climate-Friendly Cooking: Kenya and Senegal aims to accelerate the transition to clean cooking.

The project's contribution to tackling the challenge

The project Promotion of Climate-Friendly Cooking: Kenya and Senegal (for details see GCF website) reduces GHG emissions and improves people's – and especially women's – living conditions by transforming ICS markets. Co-funded by GCF and BMZ, it strives to achieve accelerated and sustainable long-term ICS market growth. It does so by applying what it calls the Professionalisation Approach, which is a performance-based support scheme to establish a professional, fully commercial and growth-oriented national ICS supply chain for household stoves. The project also demonstrates how robust monitoring of ICS sales, usage and associated CO_2 emissions reductions can be achieved. It further shows how these data can be integrated into national NDC monitoring and reporting, thereby supporting countries in reaching their NDC targets. For details on how the Professionalisation Approach works, please refer to GIZ 2023: Climate-friendly cooking: scaling markets – A Guide on the Professionalisation Approach; for details on the project's MRV approach, please refer to GIZ 2024: Climate-friendly cooking: demonstrating CO_2 emission reductions – How biomass cookstove projects can contribute to national NDC reporting.

Purpose and outline of the report

This report takes a step back and reflects on the lessons learned from project implementation. It is aimed at funders, partner governments and implementers interested in new approaches in the cooking sector that focus on climate impacts. **Chapter 1** sets the stage and provides context in relation to climate effects caused by the cooking energy sector, development of the energy access sector and how the project addresses both GHG mitigation and the gap in access to clean cooking. **Chapter 2** introduces the project Promotion of Climate-Friendly Cooking: Kenya and Senegal, while **Chapter 3** summarises the approaches implemented, presents the achievements of the project, highlights the best practices adopted and draws lessons learned. **Chapter 4** concludes the report by outlining the potential for replicating and scaling of the project approaches, and reflects on how the project's outcomes can contribute to long-term sustainability and support partner countries in achieving their climate and development goals.

1 A paradigm shift in climate-friendly cooking

Impact potential of climate-friendly cooking

The burning of solid fuels for cooking on open fires and traditional stoves represents approximately 12% of global final energy use and 54% of bioenergy use (IRENA, 2022) and causes severe negative climate, environmental, socio-economic and health impacts. With regard to climate effects, it releases GHG emissions, such as carbon dioxide (CO_2) and methane (CH4), and short-lived climate forcers, such as black and organic carbon aerosols.

Food-related household energy use is estimated to contribute two gigatonnes (Gt) of CO_2e, which comes close to 4% of GHG emissions, of which 36% is from non-renewable biomass1 (Flammini et al., 2023)as the emissions from wood fuel combustion can be offset by the CO_2 absorbed by the growth of the forest (as a carbon sink. Decreasing the use of non-renewable biomass for cooking therefore has a significant climate mitigation potential (SDG 13.2).

At the same time, it delivers a wide range of sustainable development benefits, such as reducing the pressure on forests and biodiversity, exposure to smoke-related health hazards, the burden of collecting firewood on women and children and household expenditure on wood fuels.

Today, 2.1 billion people still use traditional biomass to meet their cooking needs. Based on historical fuel use and global trends in population growth and urbanisation, the World Health Organization (WHO) estimates that 1.8 billion people will still lack access to clean cooking by 2030, contrary to commitments made regarding universal access to affordable, reliable and modern energy services (SDG 7.1). Despite large-scale initiatives over recent decades, firewood consumption and charcoal use are still growing in sub-Saharan Africa, offsetting declines in solid fuel use in Asia and Latin America (IEA et al., 2024).

1 Estimates for 2019 with an error range of −63% to +64%. The article includes data from 1990 to 2019, showing declining emissions since 2005. At the upper error bound, the result is almost in line with the 2009 estimate of 1–1.2 Gt CO2e (Bailis et al., 2015). Data on emissions from food-related household (non-wood fuel) energy use are based on FAOSTAT (FAO, 2021). In comparison, global emissions from land use change were 3.5 Gt CO2e in 2019 (FAO, 2024).

New political momentum for clean cooking

The transformation of the cooking sector has become a priority in many NDCs. By 2023, in total 96 countries (among these 43 African states) have included clean cooking specific or broader household energy measures in their NDCs, of which 60 contain explicit clean cooking targets (CCA, 2023). Many governments joined UN energy compacts (UN-Energy, 2024) or developed national clean cooking strategies to accelerate action on clean cooking and other energy goals, and 2024 was a pivotal year for clean cooking for the African continent with the Summit on Clean Cooking in Africa and the launch of the Mission 300 initiative, under which the first 12 national energy compacts were presented at the Africa Energy Summit 2025 in Tanzania. While these actions aim to increase recognition and funding for clean cooking, scalable approaches are needed to enable a fast roll-out of sustainable improved access.

Bringing biomass ICSs to scale for fast, low-cost GHG emissions reductions

The scaling of clean cooking alternatives, such as electric, biogas, ethanol and forced draft gasifier stoves remains challenging due to the high costs of such stoves and the need to establish reliable and affordable fuel supply systems and power grids. The latest projections for 2030 therefore indicate that biomass will remain the primary fuel for 23% of households globally and for almost 70% in sub-Saharan Africa (IEA et al., 2024). Furthermore, an estimated two thirds of households with clean cookstoves also use biomass cookstoves in parallel (Shankar et al., 2020; Gill-Wiehl et al., 2024)including climate, energy, health, gender, poverty and deforestation. However, project emission reductions must be accurately or conservatively estimated to avoid undermining climate action and long-term SDG financing. Here we conduct a comprehensive, quantitative, quality assessment of offsets by comparing five cookstove methodologies with published literature and our own analysis. We find misalignment, in order of importance, with fraction of non-renewable biomass, firewood–charcoal conversion, stove adoption, stove usage, fuel consumption, stacking (using multiple stoves. This practice, known as stove stacking, significantly reduces the positive health and climate impacts of clean cooking; however, stacking with ICSs instead of traditional cookstoves can mitigate this negative impact.

The use of ICSs as a transitional cooking technology should result in biomass fuel savings of at least 30% and up to 50%, compared to the traditional forms of cooking they are replacing.[2] They are well adapted to local cooking habits and preferences and affordable for most households. Thanks to favourable supply- and demand-side characteristics, domestic ICS markets can be scaled significantly faster and at a lower cost than clean fuel solutions.

2 The project Promotion of Climate-Friendly Cooking: Kenya and Senegal requires a minimum fuel saving of 30%.

2 What is unique about the project

Drive for a paradigm shift

The project Promotion of Climate-Friendly Cooking: Kenya and Senegal aims to demonstrate a paradigm shift in reducing GHG emissions by initiating an ICS market transformation in the two partner countries – Kenya and Senegal. Instead of strengthening the capacities of stove artisans at a local, decentralised level, the project seeks to achieve scale by building professional micro, small and medium-sized enterprises (MSMEs), mobilising demand countrywide and strengthening the enabling environment. In parallel, the project demonstrates robust MRV of emissions reductions at project level. It also supports partner governments in building national MRV systems that cover the cooking sector and incorporating its climate mitigation achievements into national GHG emission inventories and NDC reporting. The project's objective is to triple annual ICS production and sales in the two countries by the end of 2025 and to achieve a six-fold increase by 2030. This is the scale required for both countries to reach their ICS-related NDC targets and to achieve ODA-independent growth. In addition, the project will improve global knowledge about the ICS sector's contribution to NDC targets (see Box 1 below).

Box 1: The project Promotion of Climate-Friendly Cooking: Kenya and Senegal

EUR **57.17** million

Total funding

BMZ, GCF; Ministry of Energy and Petroleum Kenya (MoEP), Ministry of Petroleum, Energy and Mines of the Republic of Senegal (MPEM) and Ministry of Environment and Ecological Transition of the Republic of Senegal (METE)

Funders and cofunders

Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Accredited Entity

2020 to 2025

Overall term

- **Reduce GHG emissions by 6.5 Mt CO_2e** over the project period and by an additional 24.8 Mt CO_2e by 2030
- **Triple the annual sales of ICSs** over the project period and achieve a six-fold increase by 2030
- Provide biomass ICSs to rural and vulnerable populations, directly **benefitting 11.2 million people** in 1.9 million mainly rural households, including **0.61 million female-headed households** and **5.6 million children**

Objectives

The project aims to bring about a paradigm shift which can only be achieved by accelerated growth of the ICS sector, in particular, in more remote and rural locations, and an irreversible market transformation. To do this, the project sets out to transform a sector dominated by small, undercapitalised and informal artisanal ICS producers and vendors into a much stronger economic sector. The transformed sector will have the necessary technology base and business management capacities, access to commercial capital and the ability to deliver better quality products to a bigger number of consumers, in particular, in remote rural areas.

Box 2: The Energising Development (EnDev) programme

EnDev is a global, multi-donor partnership dedicated to expanding access to modern, affordable and climate-friendly energy for people, social institutions and businesses in developing countries. Since its launch in 2005 until December 2024, EnDev has reached 33.9 million people, 35,480 social institutions and more than 110,000 MSMEs with modern energy solutions. In 2024 alone, this helped to mitigate 3.02 million tonnes of CO_2e emissions. The programme operates in 20 partner countries around the globe, with a strong focus on the most vulnerable populations and least developed countries.

EnDev's work centres on three impact areas:

- **ENERGISING LIVES**
  Improving quality of life by providing households and social institutions, such as schools and health centres, with access to clean and reliable energy

- **ENERGISING OPPORTUNITIES**
  Supporting economic development by enabling businesses to access modern energy, fostering job creation and market growth

- **ENERGISING CLIMATE**
  Promoting the transition to renewable energy and efficient technologies to mitigate climate change, in line with the Paris Agreement and the Sustainable Development Goals

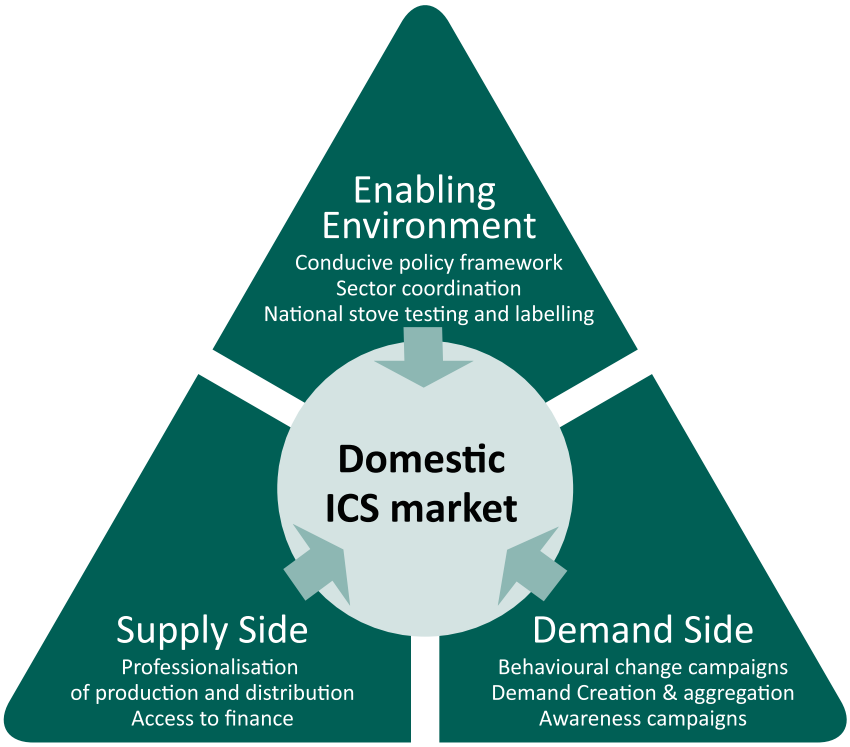
EnDev is a strategic partnership, with dedicated donors, partners and individuals working together to support social development and economic growth by providing access to modern energy.
The driving force behind EnDev is the partnership formed by Germany, the Netherlands, Norway and Switzerland, who are donors committed to accelerating energy access. GIZ and the Netherlands Enterprise Agency (RVO) coordinate the programme.

endev

A holistic market building approach

To bring about the paradigm shift, the project employs the market building approach, as used by EnDev, and adapts it to cover three key intervention strategies (see Figure 1 below): a) professionalising ICS supply businesses to become high-performing companies, expanding distribution and retail chains and facilitating access to market-based finance (supply-side activities), b) by creating demand and raising consumer awareness and c) by fostering an enabling market environment.

Figure 1: A holistic market building approach



The Professionalisation Approach for the supply side represents the linchpin of the irreversible transformation from a semi-commercial market segment into a fully commercial sector with a strong technology base and business management capacities and access to commercial finance. The approach is built on the assumption that ICS producers in the business class category (see Chapter 3 for a definition) will deliver a higher number of better-quality products to a larger number of consumers, especially in remote rural areas, and thereby drive independent market growth.

Behavioural change campaigns on the demand side are the key element for mobilising ICS demand. They increase the knowledge of potential household customers about ICS benefits and build confidence in new products and vendors. The project supports large national-scale campaigns in both countries that are synchronised with the marketing activities of ICS companies to reach a critical level of general awareness and early adopters.

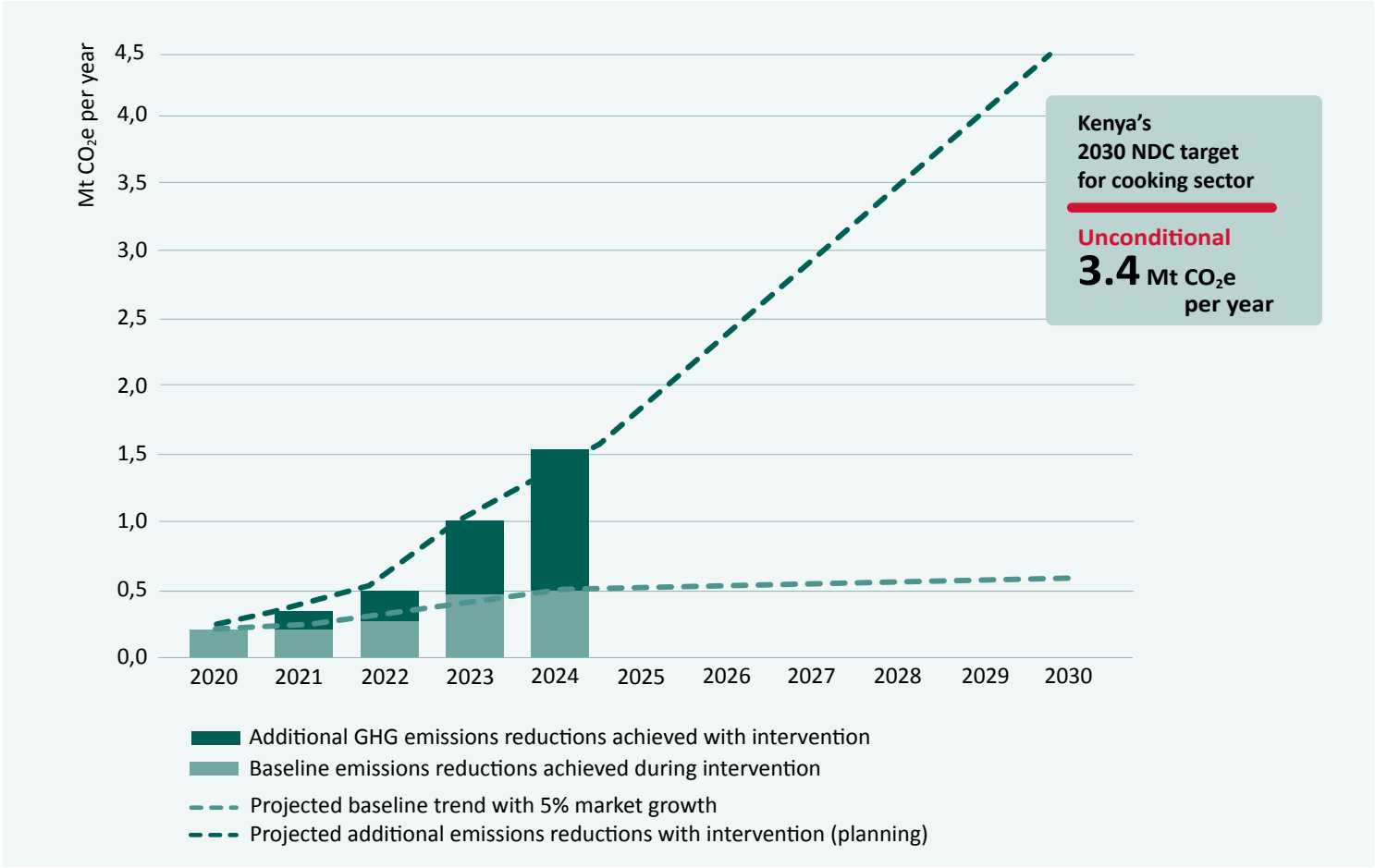
Support to partner governments in **strengthening the enabling environment** is the third pillar of the project's intervention strategy. It includes integrating clean cooking into energy and cross-sectoral planning and into NDC monitoring and reporting, supporting ICS testing and labelling schemes, involving local government in awareness campaigns and facilitating public policies supportive of small businesses. This encourages a new spirit of transformation among key stakeholders, with the aim of driving sector growth.

Ultimately, exponential market growth combined with an irreversible market transformation enables **GHG emissions reductions to be made at scale and ICS-related NDC targets to be met**.

Key achievements so far

The project aims to triple the annual sales of ICSs by the end of the five-year project period and to support a six-fold increase by 2030. By the end of 2024 (approximately one year before completion), the project was able to achieve its objective of reaching an **exponential growth trajectory of ICS sales** and tripled annual sales compared to the 2020 baseline (see Table 1). These results are all the more remarkable considering that they were achieved despite the COVID-19 crisis and the resulting collapse of ICS sales in Kenya and Senegal in 2020.

Figure 2: Annual GHG emissions reductions in relation to Kenya's NDC

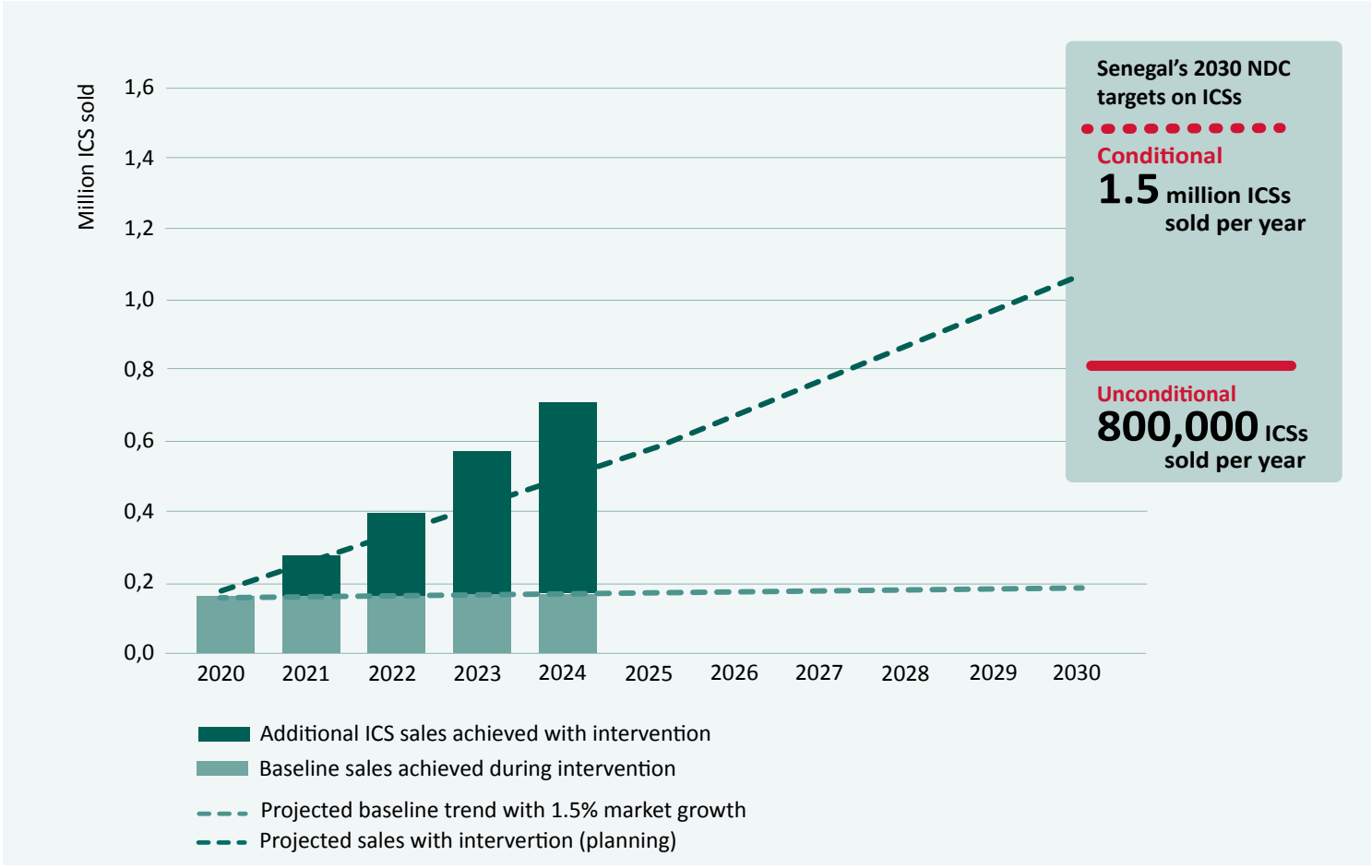


Source: EnDev and project monitoring. The pre-COVID baseline of 2019 was adapted when sales collapsed in 2020. As the project impact was delayed to 2021 onwards, the projected sales target for 2024 was shifted to 2025, while the 2030 target remained unchanged.

In **Kenya**, an annual growth rate of 5% was assumed for ICS sales and resulting emissions reductions (grey dashed line) as the baseline growth scenario against which additional sales and resulting additional emissions reductions during and after project implementation were projected (blue solid line). The ambitious sales projections have been fully reached despite the COVID-19 impact, and the sales achieved have more than tripled.

Kenya's updated NDC foresees a 32% GHG emissions reduction compared to annual business-as-usual (BAU) emissions of 143 Mt CO_2e by 2030 (Government of Kenya, 2020b). Half of the emissions reduction will be achieved by the energy sector, to which ICSs are expected to contribute 3.4 Mt CO_2e of annual emissions reductions by 2030 (Government of Kenya, 2020a). Applying the Clean Development Mechanism (CDM) Small-scale methodology: Energy efficiency measures in thermal applications of non-renewable biomass (AMS-II.G), the project achieved additional GHG emissions reductions of 1.1 Mt CO_2e in 2024. With a sales target of about 2 million ICSs by 2030, annual emissions reductions are projected to reach an additional 3.8 Mt CO_2e, which is beyond the contribution envisaged for ICSs in Kenya's NDC.

Figure 3: Annual ICS sales in relation to Senegal's NDC



Source: EnDev and project monitoring. The pre-COVID baseline of 2019 was adapted when sales collapsed in 2020. As the project impact was delayed to 2021 onwards, the projected sales target for 2024 was shifted to 2025, while the 2030 target remained unchanged.

In **Senegal**, an annual growth rate of 1.5% was assumed as the BAU growth scenario (grey dashed line) against which sales during and after project implementation were projected (blue dashed line). Initial COVID-19 delays could be fully offset by the sales achieved (grey bars), with the growth trajectory exceeding projections (blue line), surpassing Senegal's unconditional NDC target for ICS sales and possibly even reaching the conditional ICS sales target.

Senegal's NDC includes explicit clean cooking targets in both the unconditional and conditional sections (Government of Senegal, 2020). The national unconditional NDC mitigation target is a 7% reduction of annual emissions compared to BAU (37.8 Mt CO_2e) by 2030. As a means to meeting this target, the NDC includes the specific target of achieving an annual distribution of 800,000 ICSs and 27,000 biodigesters by 2030. The national conditional NDC mitigation target is a 29% reduction in emissions compared to BAU by 2030, partly enabled by annual sales of 1.5 million ICSs and 48,000 biodigesters. Applying the CDM AMS-II.G, the project achieved annual GHG emissions reductions of 0.6 Mt CO_2e in 2024. With a sales target of about 1.1 million ICSs by 2030, the annual emissions reductions are projected to reach 0.9 Mt CO_2e, which equals about 35% of Senegal's total unconditional NDC target and 8% of its conditional target.

Success in reaching these exponential growth trajectories was ensured by several key approaches, which are outlined and discussed in the next chapter.

3 Lessons learned and best practices

This chapter presents the project's achievements, the key lessons learned and many additional insights that emerged during implementation. The discussion in this chapter is structured around the project's paradigm shift goals:

1. Remove market barriers to achieve exponential ICS sales growth
2. Bring about an irreversible market transformation with ODA-independent market growth
3. Reduce domestic GHG emissions on a scale consistent with achieving ICS-related NDC targets

Each of the following sections gives a brief overview of the approaches used, discusses implementation experiences and achievements up to the time of writing (end of 2024) and sets out lessons learned and success factors.

Key lessons learned

Achievement of these exponential growth trajectories was driven by the effective implementation of the Professionalisation Approach. Drawing on extensive implementation experience, the following key lessons emerged, offering valuable insights for future clean cooking initiatives.

1. **Professionalising production:** Tailoring the project support scheme to the sales performance of each ICS producer category enabled the most capable ICS producers to become strong, sustainable businesses.

2. **Establishing commercial last-mile distribution:** Providing performance-based support for ICS distributors was essential for expanding access and employment, with LMEs, women's groups and savings groups playing a key role in reaching last-mile customers, despite wholesalers handling the bulk of sales.

3. **Boosting demand:** Boosting ICS demand works best if there is a concerted effort involving national media campaigns combined with grassroots events and partnerships with local groups; empowering advanced producers to lead their own marketing campaigns further accelerated market transformation.

4. **Emphasising gender transformation:** Supporting women's access to finance, challenging restrictive gender norms and promoting women as change agents led to greater gender equality, as evidenced by more women-led businesses and higher female employment in ICS production and distribution.

5. **Fostering inclusivity:** Special efforts targeting vulnerable customers (e.g. by promoting affordable stoves and tailored outreach) and enabling greater participation of vulnerable groups in the ICS workforce (e.g. by offering equal pay and making training venues and workspaces accessible for people with disabilities) contribute to greater social and economic inclusion.

6. **Facilitating access to finance:** Financial institutions are more likely to lend to ICS producers with full legal registration, strong governance, reliable business data and sound business plans.

7. **Developing ownership and sustainability:** Ensuring ICS producers take responsibility for marketing and sales supports long-term sustainability and reduces ODA reliance. This can include ICS labelling, digital marketing, building distribution structures and partnerships and employing dedicated staff responsible for marketing and sales.

8. **Implementing robust monitoring systems:** A robust project-level MRV system that is coherently structured with multi-level data validation and clear standards (for impacts such as fuel savings and stove usage) is essential. Digitalisation can boost efficiency if local companies have access to the required technologies. Providing quality sales data is crucial for GHG inventories and NDC reporting.

9. **Strengthening integrated NDC reporting capacity:** Integrating household cooking energy data into national MRV systems with nationwide monitoring of ICS sales, usage and fuel consumption enhances NDC reporting. In the medium-term, the MRV system should also cover electric and liquefied petroleum gas (LPG) cooking.

10. **Enhancing policy- and stakeholder alignment:** A successful national cooking energy market transition depends on the harmonisation of cooking and energy policies, the development of a national cooking strategy and alignment with carbon market strategies.

How to achieve exponential sales growth

This section addresses the question of how the project was successful in removing market barriers to achieve exponential ICS sales growth in Kenya and Senegal.

PROFESSIONALISING PRODUCTION

Graduating ICS producers to higher levels of professionalisation and productivity is a very individual process and can take considerable time and effort. To short-cut this process for a rapid scaling of the ICS supply chain, the **Professionalisation Approach** uses **three key design elements**:

- Categorisation and competitive selection of the stove producers and distributors supported
- Standardisation of support packages
- Performance-based support

The Professionalisation Approach seeks to foster the development of more centralised ICS production in national cooking energy sectors. This has clear advantages in terms of quality and cost, thanks to the mechanisation of production, the efficient procurement of materials and inputs and general economies of scale. To transform artisanal or semi-commercial ICS production and distribution channels into a fully commercial supply chain, the Professionalisation Approach offers progressively greater support to high-performing producers and distributors. This targeted support helps them to fully establish themselves as professional businesses within the sector (for details see GIZ 2023: Climate-friendly cooking: scaling markets – A Guide on the Professionalisation Approach).

A categorisation of ICS producers was introduced to facilitate performance-based support consisting of demand-oriented yet standardised support packages. The producers were categorised and supported according to the following system:

- **Artisanal** – small-scale producers are mostly informal family businesses with one to three workers, who are not formally employed, selling 30 to 100 stoves per month. They typically need technical training to improve the production process and their basic business skills.

- **Intermediate** – medium-scale producers are characterised by a certain degree of division of labour (e.g. three to seven workers) and higher sales of up to 1,000 stoves per month. Intermediate producers are supported in further professionalising and formalising their business activities and in investing in upgrading their production process.

- **Business class** – large-scale producers are characterised by formal business structures and employment and significant turnover (monthly sales over 1,000 stoves). They are supported in applying for commercial financing to further scale their production and in taking ownership of marketing and distribution chain development.

In both countries, three consecutive calls for project participation were launched, aimed at producers who qualified for one of these categories. Table 1 provides an overview of the ICS producers supported in the different categories and their share in total sales during the project implementation period in the two countries.

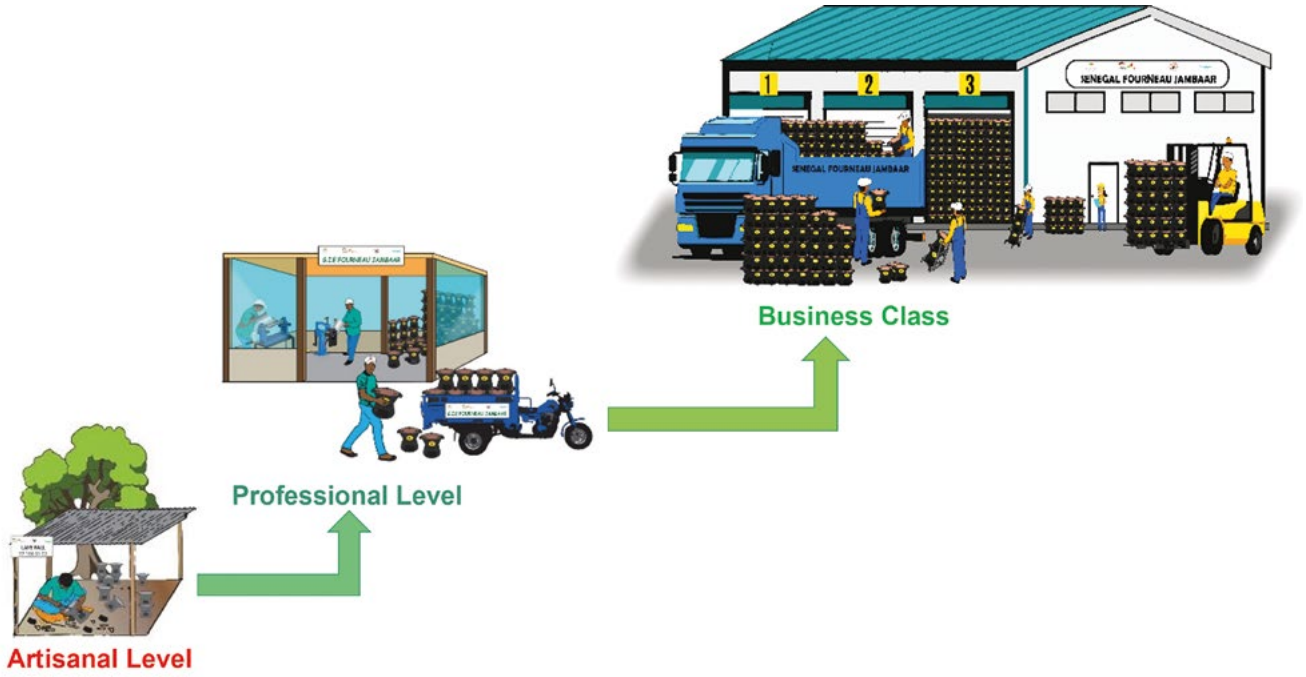


Table 1: Number and sales share of supported ICS producers by category

ICS producer	Kenya				Senegal			
	2020		2024		2020		2024	
	No	% of sales	No	% of sales	No	% of sales	No	% of sales
Artisanal	87	20%	46	2%	183	55%	213	31%
Intermediate	26	55%	78	33%	20	27%	98	49%
Business	2	25%	22	65%	2	18%	7*	20%

*For Senegal, the number of business class producers is expected to reach 20 by the end of 2025.

The number of intermediate and business class ICS producers at least tripled in each country, and their share of sales increased accordingly. In Kenya, intermediate and business class producers, who already contributed strongly to the market in 2020, increased in number and capacity, accounting for 98% of all sales by 2024 (significant impact of the Professionalisation Approach: 22 business class producers accounted for 65% of all sales). In Senegal, the market was less concentrated in 2020, and by 2024 intermediate and business class producers accounted for 69% of sales. In total, **ICS sales increased from around 260,000 stoves in 2021 to 1,560,000 in 2024** (i.e. 860,000 ICSs in Kenya and 700,000 in Senegal). Progress should be evaluated in the light of the market dip that occurred in 2020 and in the following years due to COVID-19 restrictions and the economic downturn.

Key lesson learned 1

PROFESSIONALISING PRODUCTION

Tailoring the project support scheme to the sales performance of each ICS producer category enabled the most capable ICS producers to become strong, sustainable businesses.

The **categorisation of ICS producers** into different classes helped to tailor the hardware and training support to the specific needs and capabilities of each producer group. This approach made it possible to engage with ICS producers at the most appropriate level, and the **prospect of graduating to a higher category and receiving high-value support packages motivated performance**.

The support offered was well **tailored to the producers' needs**. ICS artisans starting out on their professionalisation journey received inputs they could handle and develop according to their early-stage capacities. More advanced producers were supported with higher-value inputs that allowed for faster scaling. For example, while artisans were primarily interested in accessing tools, more advanced producers were interested in means of transportation, expanding workshop premises and receiving support in strategic business development and marketing advice. All ICS producers were required to make a contribution themselves of 10% to 20% of the cost of the hardware components received. **Implementation experience confirmed that making a financial contribution not only increases ownership but also ensures that the tools provided meet the actual needs of producers**.

The Professionalisation Approach was unique in that **it tied the level of support to the performance** of ICS manufacturers. They had to reach clearly defined milestones, such as sales per month, to be eligible for a particular support package. **This performance-based approach was crucial in ensuring that high-value support packages were allocated only to motivated and capable producers**. It enabled the project to effectively incentivise strong performance and minimise the risk of investing in non-performing partners.

SUCCESS STORIES – Climate-friendly cookstove producers as the driving force for long-term sustainable market growth

Progressing from artisanal to intermediate level: In 2020 in Murang'a County in Kenya, Naomi Ngotho started her own ICS business, producing between 150 and 200 cookstoves a month. Her skills and motivation in combination with the business development support she received as part of the project's professionalisation kit enabled her to quickly move on from artisanal to professional production. She was able to increase productivity to manufacture over 2,000 stoves a month. In doing so, she also created six new jobs for people in her community, four of whom are women. And Naomi's vision doesn't stop there. She has ambitious plans to further expand her operations, increase her production capacity and broaden her market reach.

'Before, we used to produce an average of 150 stoves a month, but currently we make more than 2,000. When I started, I had no home; now I own a home and my children go to the best school. It's all because of the hard work I put into this project.'

Naomi Ngotho

Graduating from intermediate to business class level: Mbathie Sow founded his ICS workshop in 2012 in Dakar, Senegal. Initially, he was able to produce around 600 units a month. However, thanks to a new ICS workshop in one of Dakar's industrial zones, along with the tools and machines included in the professionalisation kit, Mbathie has managed to successfully scale up his production to 1,200 ICS units a month. This expansion elevated his operation to business class level, enabling him to extend his distribution chain beyond his production region to remote and rural areas. In the process, he has taken on seven new employees, creating new jobs for young people in Dakar. He plans to continue developing his business by investing in online marketing via social media and thus further extend his distribution chain.

'Now I transport more than 400 ICSs on each trip I make to the city of Ziguinchor, as I have increased my production. So, I need to combine car hire with transportation by van, which was provided by the project.'

Mbathie Sow

ESTABLISHING COMMERCIAL LAST-MILE DISTRIBUTION

To achieve exponential market growth, the project not only needed to enhance production capacities but also ensure that the stoves produced effectively reached end-user households. This involved establishing robust distribution networks, with a particular focus on last-mile delivery. The project tackled this challenge with a capacity development approach for both existing and newly recruited regional wholesalers, retailers and LMEs. Like ICS producers, wholesalers, retailers and LMEs were differentiated according to their monthly sales performance into three categories – basic, intermediate and advanced distributors (see Table 2).

Table 2: Categorisation of ICS distributors

Distributor category	ICS wholesalers/retailers (monthly ICS sales)	ICS LMEs (installers) (monthly ICS sales)
Basic	50–200	15–30
Intermediate	200–500	30–50
Advanced	> 500	> 50

In both countries, three consecutive calls for project participation were implemented for distributors who qualified for one of these categories. Depending on their category, ICS wholesalers, retailers and LMEs could benefit from various training and material support kits. These were tailored to the needs of each distributor category and consisted of technical and entrepreneurial training on ICS installation, marketing and retail. Hardware support included generic ICS promotional materials, such as T-shirts, caps and bags, to first tranche distributors and – if certain sales milestones were reached – it was expanded to include stove models, banners, display stands and even tuk-tuk tricycles. Distributors were also supported with the branding of materials, participation in trade fairs and local media spots. Women's groups acting as ICS distributors were offered specific business training.

Table 3 provides an overview of the ICS distributors supported and their respective share in total sales by category.

Table 3: Number and sales share of supported ICS distributors by category

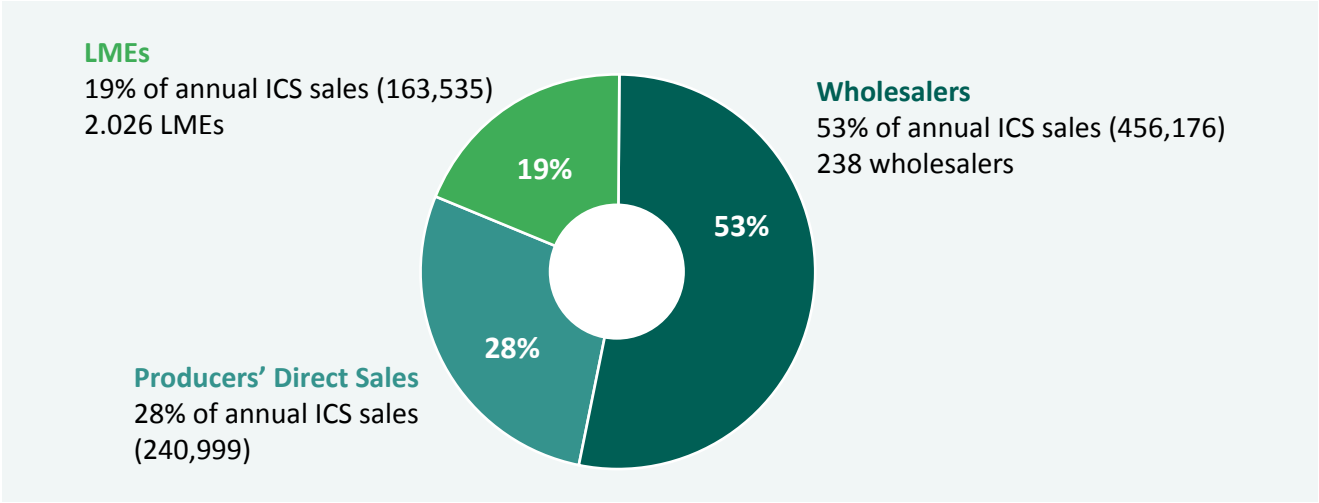
		Kenya				Senegal			
ICS distributors		**2021**		**2024**		**2021**		**2024**	
		No	% of sales	No	% of sales	No	% of sales	No	% of sales
Wholesalers	Basic	9	9	81	12	64	13	28	10
	Intermediate	16	32	130	14	19	9	18	27
	Advanced	11	59	27	74	40	78	13	63
LMEs	Basic	29	40	1,824	58	62	33	424	40
	Intermediate	4	23	104	17	3	13	36	26
	Advanced	4	37	98	25	4	54	13	34

When comparing the 2021 baseline situation with the situation in 2024, two trends become apparent: the number of wholesalers increased in Kenya as the project aimed to expand the distribution chain to

make ICSs available even in areas without ICS producers; in Senegal, wholesaler figures were consolidated because they contributed a greater number of sales each. As stove production increased in both countries, the number of LMEs to conduct door-to-door sales increased accordingly. These trends reflect a stronger link between producers and distributors, where deliberate efforts by both – for example, to identify target distribution points – helped expand ICS market reach.

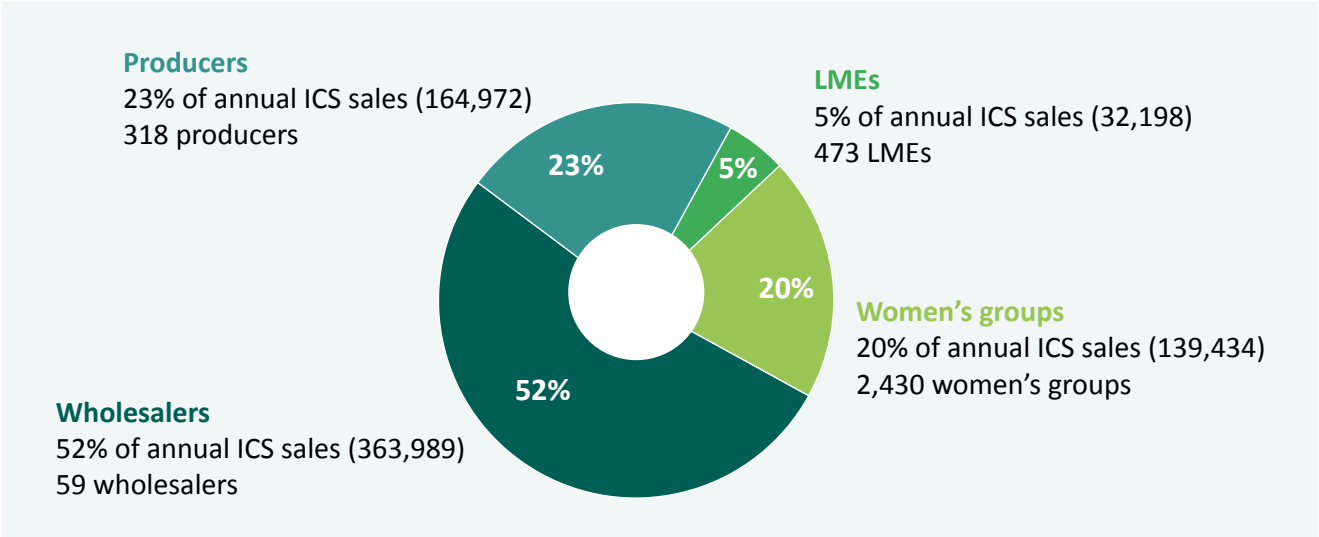
In **Kenya**, wholesalers sell more than half of all stoves (53%), followed by producers selling directly to customers and LMEs.

Figure 4: Number and sales share of supported ICS distributors in Kenya by category (2024)



In **Senegal**, sales by women's groups and LMEs are disaggregated. A performance study on stove distribution shows that, overall, wholesalers account for the largest share of sales and make the most sales per individual, ahead of women's groups and (young) LMEs. Although women's groups do not sell as much per individual, they play an important role as there are many of them and they are well integrated and respected in the community and therefore reach many households at the grassroots level. However, connecting production at the national level with local women's groups requires extra efforts.

Figure 5: Number and sales share of supported ICS distributors in Senegal by category (2024)



Key lesson learned 2

ESTABLISHING COMMERCIAL LAST-MILE DISTRIBUTION

Providing performance-based support for ICS distributors was essential for expanding access and employment, with LMEs, women's groups and savings groups playing a key role in reaching last-mile customers, despite wholesalers handling the bulk of sales.

Implementation experience confirmed the importance of offering support packages tailored to the performance and ambition of each distributor category. In both countries, the highest share in sales overall was achieved by wholesalers. LMEs, women's groups and savings groups, in particular, can facilitate access for remote communities and female customers who may struggle to afford an ICS. In Kenya, **ICS distribution via LMEs and their networks was already a proven success factor**. In Senegal, this approach was replicated, and professional LMEs turned out to be key players in accelerating sales.

The project supported individual last-mile sales agents and also women's groups. **Cooperating with women's groups acting as ICS LMEs proved successful in reaching female stove users** and in raising general awareness about the health benefits of ICSs. In addition, local savings groups can be important vehicles for making ICSs affordable for remote customers, as they usually face comparatively higher stove prices due to increased transport costs. ICSs become affordable when women's groups or savings groups enable customers to pay in instalments over time.

A positive side effect was the promotion of youth entrepreneurship. In Senegal, a number of campaigns were launched to motivate young people to enter the stove business, for example, the Meun Na Nek Campaign, which asked young LMEs to set themselves medium- and long-term sales goals, or the Jambaar Champion of the Month Award, which awarded a prize consisting of bonus ICS provisions, personalised coaching sessions and more communication support to the three top-performing LMEs.

To safeguard the sustainability of the approach, it was crucial to develop the distributor training curricula in close cooperation with the target groups, have them approved by national training authorities and deliver them through certified national trainers. Although **official recognition of training curricula can be time-consuming, it enables national training institutions to continue using the curricula beyond the project's lifetime**. In Kenya and Senegal, youth polytechnics and vocational training centres are prospective partners to continue offering these courses at affordable rates.

BOOSTING DEMAND

Apart from tackling supply chain bottlenecks, such as ICS production capacities and distribution networks, the Professionalisation Approach mobilised demand in order to achieve exponential ICS market growth. Demand-side activities included **massive awareness and ICS promotion campaigns** in both countries. In Kenya, 250 awareness-raising events were conducted at the community level, reaching about 2.6 million people (approximately 60% women), and the radio and TV spots broadcast nationally are estimated to have reached an audience in the region of 9 million people. In Senegal, 377 road shows and 1,039 animation events at rural markets were conducted, 15,113 spots were broadcast on local radio stations and 185 on national TV and, last but not least, ICSs were promoted by means of product placement in popular national TV series. At the grassroots level, demand was stimulated in close cooperation with local savings groups, microfinance institutions (MFIs), women's groups and local governments to increase awareness on ICS benefits. In addition, the more advanced ICS producers and distributors were encouraged to take ownership of demand creation and received technical assistance to develop their own marketing and promotion campaigns.

Key lesson learned 3

BOOSTING DEMAND

Boosting ICS demand works best if there is a concerted effort involving national media campaigns combined with grassroots events and partnerships with local groups; empowering advanced producers to lead their own marketing campaigns further accelerated market transformation.

National mass media campaigns (radio and TV) can be an effective way of creating demand. The evaluation of the ICS awareness campaign in Kenya concluded that 53% of respondents had heard of the ICS campaign, mainly via **mass media channels** (radio and TV). While ICS advantages that were highlighted in the campaign included fuel and time savings as well as health and environmental benefits, the most prominent message recalled by respondents was that ICSs **save money by reducing fuel consumption**.

Implementation experience from Senegal highlights the importance of ICS awareness campaigns on social media, especially with a view to reaching young people. To this end, content was produced for distribution on social networks (e.g. YouTube and Instagram), and professional **e-commerce accounts** were created (e.g. on WhatsApp Business and Tik Tok).

EMPHASISING GENDER TRANSFORMATION

The project used a gender transformative approach at various levels. In its main activities, it aimed to ensure equal benefits for women and men, for example, it strived to achieve a female participation rate of 60% in its training for ICS producers and distributors. The project also aimed for more gender equality in job creation and pay.

The project's approach towards gender equality was developed in an iterative process. First, gender assessments and environmental and social assessments were conducted for the ICS sectors in Senegal and Kenya, which informed the design of activities, especially the gender action plan. After project kick-off, local consultation processes were established that included women's consultation groups for key project components. Consequently, **special concerns voiced by women were considered throughout all phases of the ICS value chain**. Their preferences were taken into account in stove design, producers were encouraged to employ female LMEs, women's groups received special support as ICS distributors and awareness and behavioural change campaigns paid special attention to female customers. The project's transformative gender approach was further enhanced by gender training and gender knowledge exchange workshops.

The project was able to promote gender transformation across various segments of the ICS value chain. Significantly, 44% of producers supported in Kenya were women-led, while almost no women could be promoted in the production process in Senegal (see lessons learned below for the reasons). The figures for ICS distributors show that 60% were female in Kenya, and 47% in Senegal, and over 5,500 women's groups had participated in ICS marketing by 2024.

Key lesson learned 4

EMPHASISING GENDER TRANSFORMATION

Supporting women's access to finance, challenging restrictive gender norms and promoting women as change agents led to greater gender equality, as evidenced by more women-led businesses and higher female employment in ICS production and distribution.

The degree to which gender transformative impacts can be achieved depends on the baseline for women's participation in certain economic segments, which is influenced by factors deeply rooted in the cultural context of the partner countries. For example, in Senegal, metal stove production is traditionally a male-dominated business, while in Kenya, clay stove production is traditionally a female-dominated activity. Promoting women in male-dominated sectors was challenging, as was to be expected. In these areas, **the project needed to address the root of the issue, namely prevailing socio-cultural norms**.

Adhering to its gender transformative approach, the project aimed to challenge established perceptions. This proved to be time-intensive, as it was necessary to systematically address traditional myths that, for example, have it that men should not pass by areas where clay is extracted for pottery or it will disappear or that sexually active women should not participate in stove making. These norms were deconstructed through gender analysis and dialogue, which encouraged greater participation by previously excluded groups.

The project also **promoted gender equality in the ICS sector by supporting women as change agents**. For example, in Kenya, the project launched the Women in Clean Cooking (WiCC-K) chapter in 2024, thereby strengthening women's networks in the just energy transition, providing business connections and facilitating opportunities for young women in the form of fellowships, scholarships and internships and in the labour market.

The project put a special emphasis on **supporting access to finance for women**. For example, in Senegal, the Jambaar Saving Fund was established to empower women's groups that previously lacked start-up capital for ICS commercialisation. Likewise, support was provided for savings groups, in which women always lead the savings funds (only around 10% of participants are men). After two saving cycles, some groups were able to finance their planned income-generating activities, which mainly involved selling ICSs alongside other small-scale trading activities.

SUCCESS STORY – Supporting women's ICS businesses

Lydiah Wanjiku Gichere, located in Kiambu County, Kenya, started her production centre in 2018. She was only producing one type of stove, the Kenya Ceramic Jiko (KCJ), which is not promoted by the project. She participated in the call for expression of interest in 2021 and met the eligibility criteria. She received technical training on ICS production and a starter kit, which enabled her to start producing and selling climate-friendly ICSs. By leveraging her existing customer base, she was selling an average of 200 ICSs a month within five months. She also took part in the next round of support, and the professionalisation kits and business training enabled her to upscale her production volume and open up new distribution channels, leading to an increase in sales to between 1,500 and 2,000 a month to date.

'The EnDev/GCF project provided me with both manual and electric machines, which has led to an increase in output. This has enabled me to hire three full-time workers (one of whom is a woman) and eight temporary employees. I am planning to buy a piece of land to expand my production centre to be able to produce and sell more.'

Lydiah Wanjiku Gichere

Ndeye Soukeyna Sene, from the city of Mbour in Senegal, has been engaged in the sale of improved stoves since 2015. Thanks to the project's support in the form of training in marketing, coaching sessions in business management and personal development and a 10-stove starter kit, she has been able to invest heavily in sales events and to employ three additional women as sales agents. As a result, she has increased her monthly sales from five stoves a month to over 120. She plans to expand her distribution network with her own resources in the sub-region, particularly in the Gambia. This visionary and determined woman has reinvested part of her profits in training and in launching a complementary business making and selling soaps.

FOSTERING INCLUSIVITY

The project also aimed to achieve greater social and economic inclusion for vulnerable groups who, for social, economic, religious, ethnic, legal or other reasons, are not yet able to access or benefit fully from energy service markets. In two areas, the project strived to adhere to the 'leave no one behind' principle, targeting vulnerable households as ICS customers and supporting vulnerable groups within the ICS supply chain. For example, it encouraged ICS producers to employ individuals from vulnerable groups or recruit them as LMEs and also made an effort to ensure that training venues and workspaces are accessible.

Key lesson learned 5

FOSTERING INCLUSIVITY

Special efforts targeting vulnerable customers (e.g. by promoting affordable stoves and ta ilored outreach) and enabling greater participation of vulnerable groups in the ICS workforce (e.g. by offering equal pay and making training venues and workspaces accessible for people with disabilities) contribute to greater social and economic inclusion.

Generally, the ICSs promoted have a relatively low purchase price (EUR 5 in Kenya and EUR 12 in Senegal), which means that lower-income households can afford them. Given their fuel saving potential, they pay for themselves in just two to three months, which has a positive effect on household budgets.

Households belonging to vulnerable groups were approached with tailored ICS outreach strategies for low-income communities. This included cooperating with women's savings groups, known as *merry-go-round chamas* in Kenya and tontines in Senegal, thereby strengthening existing groups and structures in the community.

To foster the inclusion of individuals from vulnerable groups in the ICS supply chain, the project ensured that ICS-producing companies adhered to the labour laws in force in Senegal and Kenya, which require equal pay for employees performing the same work, regardless of their origin, sex, age or status, and with equal working conditions, professional qualifications and performance. The introduction of environmental and social management plans at ICS production workshops also supports inclusion. For example, they promote employment formalisation with written job contracts that specify roles, wages and safety provisions. There were also people with disabilities who were trained and equipped and became ICS producers. Many became ICS distributors either as individual LMEs or as wholesalers. In Senegal, 129 people living with a physical disability were encouraged to work as LMEs.

In addition, the venues for cooking demonstrations and other meetings were selected for their **accessibility**. They were equipped with ramps, widened doors and adapted toilets to facilitate access for people with disabilities. Trainers received guidance on how to accommodate participants with disabilities, including the provision of specialist translators for LMEs with visual or hearing impairments, ensuring equitable participation and understanding of training content. In addition, the project promoted workplaces (e.g. when supporting new workshops) adapted to the needs of people with disabilities.

SUCCESS STORIES – Fostering the inclusion of people with disabilities

In Dakar, Senegal, business class producer **Mbathie Sow** is fully committed to producing improved stoves, despite having lost an arm. In 2024, he sustained an average production of 1,300 ICSs a month. His courage and determination are a perfect example of resilience and the ability to overcome obstacles.

In Kenya, **Peter Obel**, a producer who is disabled, was trained in ICS production, fabrication and gender mainstreaming. The venues selected for training were easily accessible (in terms of distance) and had the required facilities to accommodate him. In addition to professionalisation kits, the project provided support in the form of ergonomic workplace design to ensure efficiency and comfort in the working environment. To ensure inclusivity, the project facilitated transportation (taxi services) to enable disabled distributors to attend training events.

In another encouraging example from Senegal, an albino association fosters economic and social development in the local community in the Tambacounda region, empowering its members. The association's president, Fatoumata Soumaré, has received training in business management and women's leadership, enabling her to better guide and motivate the members. She also encourages her group to become actively involved in the ICS distribution network. At present, six members, including three women, are involved in selling ICSs, with an average of 30 sold each month.

How to make market transformation irreversible

This section examines whether the project was successful in reaching an irreversible market transformation with ODA-independent market growth in the two countries.

FACILITATING ACCESS TO FINANCE

Access to commercial finance is a challenge for many ICS companies as they often lack assets such as land or real estate to meet commercial banks' collateral requirements and may not even be fully legalised. The project helped to overcome this barrier, as the Professionalisation Approach offers customised mentorship and coaching for growth-oriented companies. This included supporting producers and distributors in fully legalising their business, securing ownership or long-term lease of premises and building or expanding their production facilities. Companies were also advised on how to improve business management and prepare business plans for loan applications.

Of the 71 intermediate and business class ICS producers supported, 39 successfully obtained commercial bank loans to further scale up their business activities. In Kenya, 38 ICS producers (18 of them female-led) were trained in business management and received support to develop investment plans. Additionally, 24 ICS producers (nine of them female-led) were able to secure loans for their businesses totalling EUR 30,202 (with loan sizes between EUR 35 and EUR 10,350). In Senegal, 27 ICS producers were trained in loan application requirements, and 15 received bank loans totalling EUR 51,500 (with loan sizes between EUR 610 and EUR 16,769). Most loans were used to acquire machinery to boost productivity. In addition to commercial loans, the project helped 18 producers benefit from a Senegalese business programme organised by the Senegalese Upgrading Office (BMN), which provided them with a 40% subsidy for their investments totalling EUR 300,000.

In addition, the project informed 41 MFIs about ICS sector characteristics and growth dynamics, sharing first-hand market intelligence with them. On-site visits were organised to ICS producers to give MFI representatives a first-hand impression of the business.

Key lesson learned 6

FACILITATING ACCESS TO FINANCE

Financial institutions are more likely to lend to ICS producers with full legal registration, strong governance, reliable business data and sound business plans.

Implementation experience has confirmed that access to finance is facilitated if ICS producers formalise their business by establishing it as a legal entity and prepare investment plans that are based on historical sales figures, evidence-based future sales projections and turnover. General improvements in internal governance, management practices, operations and bookkeeping can also increase the credibility and reliability of ICS producers in the eyes of financial institutions. This, in turn, can lead banks and MFIs to offer more favourable loan terms to well-structured and trustworthy clients.

DEVELOPING OWNERSHIP AND SUSTAINABILITY

A key element of the project's strategy for transformational change in ICS markets is to empower stove-producing companies to take ownership of ICS marketing and distribution, enabling them to become independent of ODA support. This is a significant move for producers who, in the past, were primarily focused on manufacturing at their production sites and had minimal engagement in distribution, typically depending on non-governmental organisations (NGOs) to place large orders and handle the distribution of stoves to end users. The project motivated producers to assume responsibility for distributing the stoves themselves and to embrace a commercial sales mindset. This involved employing sales agents either directly or indirectly (paying LMEs on a commission basis) and facilitating the creation and growth of retail networks made up of wholesalers and LMEs, such as market traders and women's groups. In addition, producers were supported in establishing their own branding and commercial marketing for ICSs.

Key lesson learned 7

DEVELOPING OWNERSHIP AND SUSTAINABILITY

Ensuring ICS producers take responsibility for marketing and sales supports long-term sustainability and reduces ODA reliance. This can include ICS labelling, digital marketing, building distribution structures and partnerships and employing dedicated staff responsible for marketing and sales.

As it is increasingly important to use **digital communication** in ICS marketing, the project trained ICS producers to develop digital marketing activities. Digital communication experts assisted them in content production, for example, creating product images and video clips that they broadcast on social networks to promote their stoves. One success factor in marketing is the introduction of **own brands and labels**, as it promotes customer recognition of quality products. For example, in Kenya, at least 15 ICS producers participated in the pilot to establish voluntary labelling standards across the country.

In Senegal, some professional and business class producers have begun **investing in awareness-raising and promotional efforts** on their own initiative. They have produced radio spots to boost ICS sales and regularly organise promotional tours. In addition, they are active on social media – including Tik Tok, Instagram, Facebook and WhatsApp – with a view to reaching a broader audience. They are also developing a variety of promotional materials, such as branded T-shirts, caps, polo shirts, plastic display supports, flyers and business cards, which help strengthen their brand visibility and recognition.

It also proved important to establish a strong connection between ICS producers and wholesalers. The project facilitated this cooperation by **organising networking events** at which producers and wholesalers were introduced to each other, especially in areas with low ICS penetration. These contacts made it possible to gradually establish a supply chain (business class producers – wholesalers – retailers – LMEs) to improve ICS distribution in the most remote areas.

Job creation in an ICS market indicates market transformation, as it shows that businesses are expanding to meet demand and operating independently of external support and that they consider business prospects good enough to put more people on the payroll. Over the project period, 5,983 jobs were created in cumulative terms in the ICS market, specifically 4,026 jobs in Kenya and 1,957 in Senegal.

How to contribute to NDC targets

This section reviews the project's success in building linkages between the GHG emissions reductions achieved at scale and the MRV systems of the partner countries and NDC target achievement.

IMPLEMENTING ROBUST MONITORING SYSTEMS

Robust MRV systems are essential for GHG mitigation projects to ensure the transparency, accuracy and comparability of emissions data. Reliable data are crucial for informed policy decisions and enables effective tracking of progress towards climate targets. A robust MRV system is accurate, reliable, resistant to manipulation or error and ensures that claimed emissions reductions are real and verifiable. At the same time, data protection needs to be ensured at company and project level in compliance with national regulations.

The MRV system for quantitative results for the **Promotion of Climate-Friendly Cooking: Kenya and Senegal** project tracks the sales made by the participating companies and calculates the corresponding emissions reductions. This is carried out according to the following steps (see the project's MRV guide for details: GIZ, 2024):

1. All supported ICS producers are required to keep records of their sales, which are shared with the sub-national MRV teams monthly.
2. The sub-national MRV teams check and analyse the submitted data and, once verified, send the datasets to the national MRV team.
3. The national MRV team undertakes its own independent data verification and reporting. The sales data collected is uploaded to a digital monitoring platform, and an annual external verification is conducted by an independent body.
4. The consolidated final data are aggregated by country and by stove type, thereby providing the basis for calculating GHG emissions reductions applying the CDM Small-scale methodology: Energy efficiency measures in thermal applications of non-renewable biomass – AMS-II.G (UNFCCC, 2022).
5. Monitored sales trends over time are compared to pre-intervention BAU growth scenarios. These were identified in baseline market studies of past growth trajectories. The BAU scenario for Senegal is 1.5% growth, and for Kenya 5% growth (see Figures 2 and 3). Sales up to these thresholds are attributed as long-term impacts to previous EnDev projects. Sales above the BAU growth scenarios are attributed to this project.

The project adheres to the following standards and benchmarks concerning ICS fuel savings, stove usage and access quality:

- Definition and method used for counting ICSs. A **minimum fuel saving** of 30% must be achieved by ICSs supported by the project. Fuel savings are measured using either the Controlled Cooking Test (CCT) or the Kitchen Performance Test (KPT). A household study is analysing actual reductions in wood fuel use.
- The rate of ICS adoption and use and the resulting **access quality level** (AQL) for baseline and improved access is documented with EnDev's project-level application of the Multi-Tier Framework (MTF) methodology. It covers parameters such as stacking practices and usage rates.

Additional qualitative data, for example, on access quality, including fuel availability and affordability, exposure to household air pollution, safety and convenience, are assessed against the AQL, and impacts on market development are analysed with the help of the Energy Access Market Development (EAMD) Scorecard methodology developed by EnDev. For these qualitative assessments, a baseline survey and an endline survey were carried out to compare the results and understand progress. In field studies, households and special stakeholder groups were interviewed to analyse the situation before and after project implementation. Additional impact studies were conducted to assess gender and socio-economic impacts and increased knowledge on ICSs.

Key lesson learned 8

IMPLEMENTING ROBUST MONITORING SYSTEMS

A robust project-level MRV system that is coherently structured with multi-level data validation and clear standards (for impacts such as fuel savings and stove usage) is essential. Digitalisation can boost efficiency if local companies have access to the required technologies. Providing quality sales data is crucial for GHG inventories and NDC reporting.

The project's MRV system benefited from the implementation experience of EnDev's established MRV and impact monitoring procedures (e.g. AQL, MTF application, EAMD Scorecard). While the upstream MRV procedures are fully digitalised, integrating downstream data collection at the grassroots level requires digital tools and training. The introduction of QR codes and digital data entry apps for production and sales documentation requires access to and the use of at least a smartphone. Full digitalisation of data entry and management requires a longer transition period until all producers and LMEs have reached a level of professionalisation that allows them to participate in such a system. However, private sector participation will depend on what direct benefits or incentives there are to make additional sales data entry efforts worthwhile. This is particularly relevant if such data collection and MRV systems are to continue beyond project implementation in order to inform national GHG inventories and NDC reporting (see also the section below). Government partners in both countries have taken on this commitment: in Senegal, the Ministry of Petroleum, Energy and Mines continues to run the stove sales monitoring platform and QR code system, while the Chamber of Commerce oversees data collection; in Kenya, responsibility for ICS sales monitoring will be taken over by the Ministry of Energy and Petroleum, while the Rural Electrification and Renewable Energy Corporation (REREC) will manage data collection.

STRENGTHENING INTEGRATED NDC REPORTING CAPACITY

Many governments are currently in the process of updating their NDCs with targets for 2035 to establish and improve their NDC reporting systems, national GHG inventories and long-term low-emission development strategies. The project's political partners and the respective National Designated Authorities were relatively advanced in this process when the project kicked off in 2020 but benefited from its support both in terms of achieving quantitative NDC targets and improving reporting processes.

Key lesson learned 9

STRENGTHENING INTEGRATED NDC REPORTING CAPACITY

Integrating household cooking energy data into national MRV systems with nationwide monitoring of ICS sales, usage and fuel consumption enhances NDC reporting. In the medium-term, the MRV system should also cover electric and liquefied petroleum gas (LPG) cooking.

In collaboration with the Ministry of Energy and Petroleum of Kenya, the project supported the development of a harmonised reporting environment for the cooking sub-sector. Based on the existing United Nations Framework Convention on Climate Change (UNFCCC) reporting requirements, a robust tool for monitoring and reporting on energy consumption from the household cooking sector was established to enable the Ministry to collect and analyse energy consumption data for reporting to the Climate Change Directorate of the Kenyan Ministry of Environment, Climate Change and Forestry.

The Government of Senegal is in the process of developing a national MRV system for NDC reporting to be implemented by sectoral technical services under the supervision of the Ministry of Environment and Ecological Transition of the Republic of Senegal, with the support of the National Climate Change Committee. For the energy sector, technical services are provided by the Energy Information System (SIE) of the Ministry of Petroleum, Energy and Mines. In collaboration with the Ministry, the project has established a domestic cooking monitoring platform which will be integrated into the SIE. The digital monitoring and evaluation platform integrates stove sales data with data from surveys and studies on stove stacking and firewood and charcoal consumption to facilitate the calculation of emissions reductions in terms of CO_2e avoided. It is planned to expand the platform to cover the entire domestic cooking sub-sector, including electric and LPG cooking.

In sum, the integration of project monitoring data into national NDC reporting has been successful in both countries. However, the continuation of such a national ICS market monitoring mechanism for NDC reporting will depend not only on the operational capacity of the government agencies responsible, but also on the continued motivation of ICS market stakeholders to comply with data submission requirements and the maintenance of an effective verification mechanism.

Regarding the ongoing update of NDC targets for 2035, governments will need to consider the best balance between mobilising additional carbon finance under Article 6 of the Paris Agreement and the voluntary carbon market (VCM) for conditional ICS targets and setting unconditional ICS promotion targets relying on nationally financed action as a relatively easily achievable means of mitigating GHG emissions.

ENHANCING POLICY- AND STAKEHOLDER ALIGNMENT

Transforming the cooking sector has become a priority in the NDCs of 98 nations, including sub-Saharan countries (CCA, 2023), but strategies and targets are often not yet aligned with energy policies and planning, resulting in missed opportunities to increase access to clean cooking (CFI, 2022). The strong cross-sectoral linkages as well as the coordination of national and sub-national implementation pose additional challenges. The project therefore interacted with national governments and key stakeholders intensively to improve national policy development and stakeholder coordination.

Key lesson learned 10

ENHANCING POLICY- AND STAKEHOLDER ALIGNMENT

A successful national cooking energy market transition depends on the harmonisation of cooking and energy policies, the development of a national cooking strategy and alignment with carbon market strategies.

It has proved helpful to **develop a national cooking transition strategy including key performance indicators, national ICS quality standards and cooking sector knowledge management strategies**. In Kenya, the project contributed to the adoption of clean cooking as a crucial thematic area in the Revised National Energy Policy 2025–2034, a framework for spearheading Kenya's vision of an equitable energy transition, focusing on innovation, resilience and sustainability.

The project also supported the development of the new National Cooking Transition Strategy 2024–2028 (Ministry of Energy and Petroleum of Kenya, 2024), which points the way to universal access to clean cooking by 2030. At the sub-national level, the project supported the development of 10 county energy plans, which include clean cooking measures and guide resource allocation at the county level.

The Kenya Bureau of Standards (KEBS) has established performance requirements for biomass stoves (KS 1814:2019). Given the advanced requirements, application of the KEBS standard by ICS producers would have taken additional time and investment. Therefore, a transitionary voluntary label was developed and introduced to facilitate a stepwise graduation of ICS producers to comply with the KEBS standard.

In view of the increased share of cookstove projects in carbon markets, it is paramount to **align and regulate the reporting of GHG emissions reductions to avoid double counting**. Kenya has a very active carbon market. With 210 CDM activities, it is actively preparing to participate in Article 6 activities with the amendment of the Climate Change Act in 2023 and the adoption of the Climate Change (Carbon Markets) Regulations in 2024 (Kamau et al., 2024). It is also one of the largest issuers of VCM credits in Africa. ICSs represent a significant share of CDM and voluntary carbon activities. In 2024, 13.4% of sales by ICS producers participating in the project were reported to voluntary carbon projects and are therefore excluded from the project's calculations of emissions reductions.

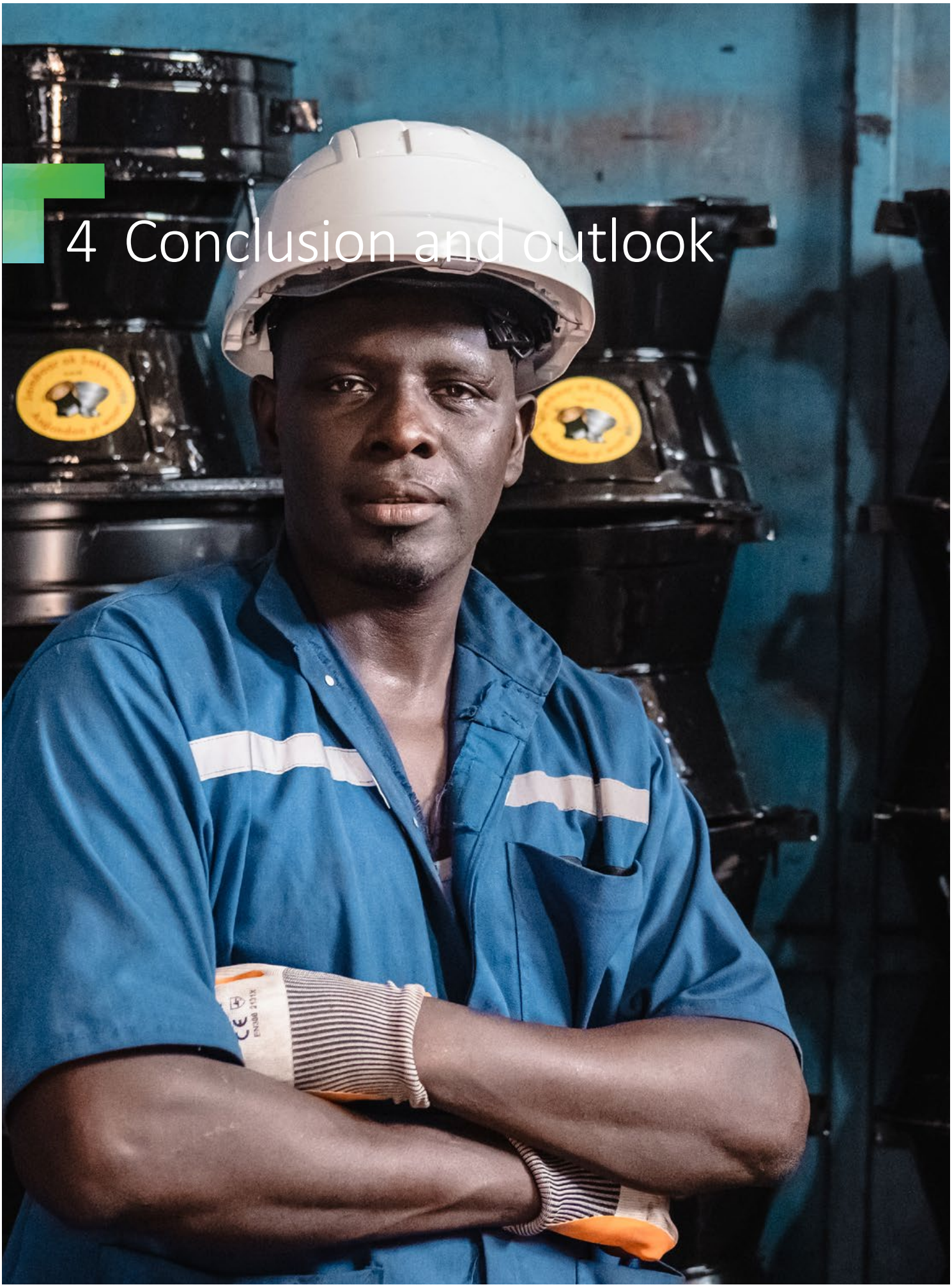
In Senegal, the project supported the National Strategy for Clean Cooking Fuels and Biofuels 2025–2035 (Government of Senegal, 2025a) which was launched in April 2025 and provides an updated roadmap for reaching universal access to clean, sustainable and affordable cooking energy by 2035. In preparation, a fuel consumption study was conducted on the Senegalese household cooking sector in 2024. All supported ICS models comply with production standards certified by the Senegalese Standardisation Agency and are laboratory-tested at the Centre for Study and Research on Renewable Energies (CERER).

The project also supports the Senegalese Ministry of Petroleum, Energy and Mines in setting up national and regional consultation frameworks for the ICS sector. For example, ICS producers have formed a national association and regional associations to give their members a voice.

The VCM does not yet play a significant role for the ICS sector in Senegal, but the government is actively preparing for the Article 6 mechanism, and several projects are being developed under this framework.

The significance of an ICS market transformation is even greater if it is also **well aligned with the partner country's contributions to international initiatives**. The project advised on the strategy for JETP with Senegal, emphasising the importance of creating attractive market conditions and a conducive political framework for the cooking energy sector. These two key aspects are now part of Senegal's JETP strategy, namely the creation of attractive market conditions for biomass ICS companies and the promotion of a conducive political framework for the cooking energy sector. Likewise, the project was able to contribute to Senegal's Energy Compact, which now includes clean cooking targets among its main objectives and supports market building efforts and private sector delivery (Government of Senegal, 2025b). The project's achievements in terms of households receiving support on improved cooking solutions also contributed significantly to meeting the energy access targets of Mission 300, a joint initiative by the World Bank Group and the African Development Bank to provide energy access to 300 million people by 2030.

4 Conclusion and outlook



The Promotion of Climate-Friendly Cooking project demonstrated how the Professionalisation Approach successfully transformed a domestic artisanal ICS sector into a professional, fully commercial one in Kenya and Senegal. Over the implementation period, almost 30 business class producers emerged with a strong entrepreneurial spirit and growth orientation. This has enabled the large-scale dissemination of improved biomass cookstoves and resulted in GHG emissions reductions that allow ICS-related NDC targets to be met.

Replicating the Professionalisation Approach

The project followed a market transformation strategy consisting of a) professionalising ICS supply businesses to enable them to become high-performing companies, b) raising awareness and creating demand for ICS and c) advising on the development of an enabling environment that provides integrated cooking policies and supports private sector engagement.

A prerequisite for replicating the Professionalisation Approach is the readiness of the target ICS market. Based on an assessment of the target market's potential, current market development phase (as defined by EnDev's EAMD Scorecard – EnDev, 2019),[3] market barriers and available funds, four cases can be identified in which the Professionalisation Approach can be applied, albeit in a modified form (for details, see GIZ 2023: Climate-friendly cooking: scaling markets – A Guide on the Professionalisation Approach):

1. **Pioneering ICS markets** on the verge of entering their expansion phase are best suited for the Professionalisation Approach because it seeks to kick-start exponential market growth by scaling production, boosting demand and enhancing the enabling environment.

2. **Pre-commercial ICS markets** need more support for longer, ideally with a pilot phase in order to prepare local ICS companies for the Professionalisation Approach.

3. For **ICS markets largely dominated by imports**, the purpose and target of the Professionalisation Approach needs to be redefined. In such markets, the approach could target local companies involved in assembly, distribution and after-sales service. If the development of domestic production capacity is considered valuable and viable, this could be an argument for pursuing the Professionalisation Approach, and if greater ICS distribution capacity is needed, local distribution companies could be supported to help them grow and invest in their retail networks.

4. **When the funding required for massive market scaling is not available**, activities could focus on the main market barriers and/or be limited to pilot areas to provide lighthouse examples that facilitate access to additional funding for scaling up.

Any intervention strategy going for scale needs to streamline support for the three distinct market dimensions: supply side, demand side and enabling environment. To this end, the project has developed scalable, integrated solutions for its core activities and services. These include standardised materials and training support packages tailored to the sales and administrative performance of different categories of companies.

3 The EAMD Scorecard Tool distinguishes between six market development phases for energy access products and services, ranging from 'pre-commercial' to 'degeneration'.

The massive scaling of ICS project activities may require an even larger number of implementing partners. Although dealing with multiple partners can pose management and administrative challenges, the project's experience of working with a diverse range of partners was fruitful. Actors such as energy entrepreneurs, opinion leaders, institutional and technical partners as well as other projects and NGOs have contributed to raising awareness, providing training and supporting the spread of these energy solutions. Working together, they have increased access to ICSs, improved product quality and boosted user confidence. This synergy between different players is a powerful driving force for the sustainable development of the sector. Such a co-creative service delivery approach increases ownership by national stakeholders and implementers and intensifies reflection and innovation on service implementation.

When thinking about replicating the approach, it may be decided to limit support to intermediate producers only, at least in the second or third call, in order to avoid allocating resources to artisanal producers who may struggle to compete in a more mature and competitive market. This idea is supported by data from 2024, where intermediate producers achieved nearly double the sales of their artisanal counterparts, and more than 10 of them showed clear progress towards reaching the business level. However, many of these producers started at the artisanal level and only grew with project support. To sustain market growth and foster upward mobility, continued support to promising artisanal producers remains essential.

Replicating the MRV approach

The project aims to demonstrate a paradigm shift in reducing GHG emissions by initiating an irreversible ICS market transformation. This requires, on the one hand, accelerated ICS sector growth enabled by the Professionalisation Approach and, on the other, support for partner governments in building national MRV systems that integrate GHG emissions data from the household cooking sector and in harmonising their GHG inventories and NDC reporting accordingly.

The project initiated this transformation by using a robust project-level MRV system for supported ICS sales and by helping its partners to integrate the biomass cooking sector into national GHG inventories and NDC reporting, harmonise their national cooking policies and enhance sector coordination.

When replicating or scaling the project-level MRV system, it should be kept in mind that a good balance must be struck between cost efficiency and reliability for data verification and validation systems. It must incorporate measurement protocols for fuel savings and stove usage, for instance, which must be clearly defined and rigorously implemented.

Digitalisation of MRV systems, both at the project level and the national/local level, can increase efficiency. The project included some digitalisation measures, such as the use of QR codes to track ICS sales, but encountered limitations, as not all LMEs owned smartphones to scan products. While digitalisation usually lessens administration and monitoring efforts, when going for scale, national governments, implementers and/or private sector partners need to tackle these challenges and ensure compliance with data protection regulations. In addition, producers and distributors will only continue to invest time and money in providing sales data for national GHG inventories and NDC reporting if they see some value in it for their business.

How to achieve scale and ensure sustainability

The project's main objective – to achieve an irreversible transformation of the ICS market – is directly tied to ensuring long-term sustainability. The exit strategy is based on the premise that, once ICS producers reach the level of professionalism that allows them to scale up production, achieve commercial sales volumes and access the necessary financing, they will be able to thrive independently of further ODA support. As a critical mass of producers transition from artisanal operations to professional, business-oriented enterprises, the market will enter the expansion stage. At this point, the sector is expected to generate sufficient returns to support high production volumes and sustain ongoing growth. As the project had already achieved this market transformation after five years of implementation, market expansion can be expected to continue and annual GHG emissions reductions to increase.

Achieving a transformative and lasting reduction in GHG emissions requires the shift towards an irreversible ICS market transformation to be closely aligned with partner governments' core development strategies at the local, national and international level. To this end, the project interacted with national governments and key stakeholders intensively to improve national policy development and stakeholder coordination. This included developing national cooking transition strategies, national ICS quality standards and cooking sector knowledge management strategies. In addition, it supported the development of 10 regional energy plans.

It is equally important that this market transformation enables partner countries to meet their international commitments, e.g. their NDCs. At least 43 African countries have included clean cooking targets or broader household energy measures in their Nationally Determined Contributions (NDCs), underscoring the sector's growing importance in achieving national climate goals. This alignment with climate commitments creates opportunities to attract and channel climate finance towards accelerating the transition to modern, sustainable cooking solutions. The EnDev-GCF approach, which integrates public investment, results-based financing, and market-shaping interventions, offers a practical blueprint that can be adapted and replicated across countries to support the delivery of these NDC targets while generating co-benefits for health, gender equality, and environmental protection.

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