Universal Access to Clean Cooking in Africa

Progress update and roadmap for implementation

International Energy Agency

World Energy Outlook Special Report

INTERNATIONAL ENERGY AGENCY

The IEA examines the full spectrum of energy issues including oil, gas and coal supply and demand, renewable energy technologies, electricity markets, energy efficiency, access to energy, demand side management and much more. Through its work, the IEA advocates policies that will enhance the reliability, affordability and sustainability of energy in its 32 Member countries, 13 Association countries and beyond.

IEA Member countries:

Australia
Austria
Belgium
Canada
Czech Republic
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Japan
Korea
Latvia
Lithuania
Luxembourg
Mexico
Netherlands
New Zealand
Norway
Poland
Portugal
Slovak Republic
Spain
Sweden
Switzerland
Republic of Türkiye
United Kingdom
United States

The European Commission also participates in the work of the IEA

IEA Association countries:

Argentina
Brazil
China
Egypt
India
Indonesia
Kenya
Morocco
Senegal
Singapore
South Africa
Thailand
Ukraine

Revised version, July 2025
Information notice found at: www.iea.org/corrections

Source: IEA.
International Energy Agency
Website: www.iea.org

In my view, lack of access to clean cooking remains one of the great injustices in the world today and a clear example of a cause all countries agree must be addressed.

Today, around 2 billion people worldwide still live without access to clean cooking solutions, relying on polluting fuels that take lives, limit opportunity and restrict progress. It is an energy access and development crisis that affects the health, gender equity and economic security of the most vulnerable. What's more, it is solvable with existing technologies and modest investment. Yet across Africa, nearly four in five households still rely on traditional cooking fuels. Women and girls pay the highest price, spending hours each day collecting firewood or other biomass, and breathing in harmful smoke that leads to serious long-term health impacts. These burdens take them out of school, away from paid work, and away from a future of autonomy and choice.

The IEA has been at the forefront on this issue closely for more than two decades. Our role has always been to offer clear, rigorous data and analysis – and to serve as a convener of governments, industry and development actors to advance cooperation. In 2023, we laid out a vision for achieving universal access. The following year, together with the governments of Norway and Tanzania and the African Development Bank Group, we hosted in Paris the first ever Summit on Clean Cooking in Africa, securing USD 2.2 billion in public and private sector commitments. These were vital steps at a pivotal time.

This special report marks a new phase in our efforts. It is the first comprehensive assessment of how clean cooking access is progressing in Africa, tracking the delivery of finance, infrastructure, and policy reform in the wake of the Summit. It also introduces our new ACCESS scenario: a practical, data-driven roadmap that shows how all countries in Africa can achieve universal access by 2040. It is grounded in real-world constraints and solutions, examining not only fuels and technologies – such as LPG, ethanol, biogas, electricity and improved biomass – but also the infrastructure needed to scale them up including fuel supply chains, distribution networks and upgraded electricity networks. It draws from country-level analysis to show that with the right policies and leadership, many African countries can reach access rates comparable to other global success stories such as Brazil, India and Indonesia.

The report also underscores that clean cooking progress cannot succeed through top-down measures alone. The programmes that deliver results are often rooted in partnerships that can include governments, the energy industry and development stakeholders to build up supply chains and support innovative business models that work in Africa. It depends on local leadership, peer-to-peer advocacy, and especially women-led initiatives that connect with households directly. Building sustainable value chains, through local manufacturing, targeted financial support and better regulation will be critical. Equally important will be to align international finance with country-led programs and infrastructure investment.

At the IEA, we consider improving clean cooking access in Africa and beyond as a crucial part of our energy security mandate. Access to affordable and reliable energy underpins economic prosperity and human well-being. Based on the IEA's tracking of this issue, we can see that 2025 is shaping up to be a turning point as policies begin to shift and implementation accelerates in many countries across Africa – and as the international community continues to strengthen its resolve on making this a priority energy issue, building on the momentum generated by our 2024 Summit.

We will continue to monitor this issue closely, track commitments with rigour, and work with partners around the world to turn data and pledges into delivery. Clean cooking is a solvable challenge, and the benefits – for health, human dignity, economic development and the environment – are too great to ignore.

Dr Fatih Birol
Executive Director
International Energy Agency

This study was prepared by the Energy Modelling Office team in the Directorate of Sustainability, Technology and Outlooks (STO) in co-operation with other directorates and offices of the International Energy Agency (IEA).

The study was designed and directed by **Laura Cozzi**, Director of Sustainability, Technology and Outlooks (IEA). **Daniel Wetzel** was the lead author.

Isabella Notarpietro coordinated the analysis and report drafting. **Arthur Rogé** led on modelling and scenario analysis. **Oliver Joy** carried drafting and editorial responsibility.

Other principal authors of the report include: **Lucia de la Cuerda** (policies), **Nouhoun Diarra** (energy access data), **Darlain Edeme** (lead on GIS and investment), **Emma Gordon** (financing), **Bruno Idini** (Summit tracking and employment), **Arthur Jongejans** (affordability and modelling), **Sander Maebe** (enabling policies), **Marina Petrelli** (GIS and affordability) and **John Rennie** (Summit tracking).

Other contributors were Lorenzo Albertini, Cerstin Berner, Mona Boufraine, Ethan Burkley, Eleonora Chiarati, Daniel Crow, Michael Drtil, Syrine El Abed, Sangitha Harmsen, Claire Lesieur, Luca Lo Re, Rita Madeira, Michael McGovern, Rebecca Ruff, Gabriel Saive, Adam Ward and David Wilkinson.

Marina Dos Santos, Reka Koczka and **Dylan Marecak** provided essential support.

Andrea Pronzati led on graphic design. **Liv Gaunt** was the copy editor.

Valuable comments and feedback were provided by members of senior management and numerous other colleagues within the IEA. In particular, Alessandro Blasi, Olivia Chen, Joel Couse, Zuzana Dobrotkova, Tim Gould, Dennis Hessling, Brian Motherway and Cecilia Tam.

Essential support was provided by the IEA's Communications and Digital Office, notably Jethro Mullen, Lee Bailey, Isabella Batten, Poeli Bojorquez, Curtis Brainard, Gaëlle Bruneau, Jon Custer, Astrid Dumond, Merve Erdil, Grace Gordon, Julia Horowitz, Isabelle Nonain-Semelin, Pau Requena Rubau, Clara Vallois, Lucile Wall and Wonjik Yang. IEA's Office of the Legal Counsel, Office of Management and Administration and Energy Data Centre provided assistance throughout the preparation of the report, notably Elena Mitrovski.

Support for GIS modelling was provided by Francesco Fuso-Nerini, Camilo Ramirez Gomez and Manuel Enrique Salas Salazar from the KTH Royal Institute of Technology. Support for the modelling of air pollution and associated health impacts was provided by Gregor Kiesewetter and Shaohui Zhang from the International Institute for Applied Systems Analysis.

The work could not have been achieved without the support provided by the Norwegian Development Agency (NORAD) and IEA's Clean Energy Transition Programme.

Contributors and reviewers

This report benefited greatly from extensive stakeholder consultations. We are also grateful for the valuable contributions, data, analysis, and feedback provided by key senior government officials and international experts. They include:

Abdel Agadazi	Koko Networks
Tijjani Ahmad	Energy Commission of Nigeria
Justine Akumu	Ministry of Energy and Mineral Development, Uganda
David Appleton	Argus
Morten Balle	Makeen Energy
Simon Batchelor	Modern Energy Cooking Services (MECS)
Jillene Belopolsky	Clean Cooking Alliance
Daniel Benefoh	Environmental Protection Agency, Ghana
Iwona Bisaga	United Nations Institute for Training and Research (UNITAR)
Morten Houmann Blomquist	Ministry of Foreign Affairs, Denmark
Molly Brown	BURN Manufacturing
James Bullen	Independent consultant
Alicia Butterfield	Global Electric Cooking Coalition (GeCCo)
Andrea Cattini	Ministry of Foreign Affairs, Italy
Elizabeth Cecelski	ENERGIA – International Network on Gender and Sustainable Energy
Nancy Dariella Balbin Chavez	Energising Development (EnDev)
Kimball Chen	Global LPG Partnership
Laura Clough	SNV
Emanuela Colombo	Politecnico di Milano
Fernando de Cuadra	Universidad Pontificia Comillas
Bineta Diop	Ministry of Energy, Petroleum and Mines, Senegal
Doudou Diouf	Ministry of Energy, Petroleum and Mines, Senegal
Tamsin Donaldson	Petredec
Christina Espinosa	GenteGas S.A. and World Food Kitchen
Kenny Fidiarison	Ministry of Energy and Hydrocarbons (MEH), Madagascar
June Flood	Department of Climate, Energy and the Environment, Ireland
Malick Gaye	National Biogas Programme, Senegal
Peter George	Spark+ Africa Fund

C Sridhar Goud	Hindustan Petroleum Corporation Limited
Daniele Guidi	GET.Invest Finance Catalyst
Michelle Hallack	The World Bank – Energy Sector Management Assistance Program (ESMAP)
James Haselip	United Nations Environment Programme – Copenhagen Climate Centre (UNEP-CCC)
Nathan Hernandez	Department of Energy, United States
Phillippe Hoeblich	PayGas Africa
Anne Hyre	Bettering Human Lives Foundation
Hans Olav Ibrekk	Ministry of Foreign Affairs, Norway
Sunday Ihueze	Ministry of Mines and Energy Resources, Togo
Ben Jeffreys	ATEC
Agnelli Kafuwe	Ministry of Energy, Zambia
Anthony Kamara	PI-CREF, Office of the President, Sierra Leone
Michael Kelly	World Liquid Gas Authority (WLGA)
Matt King	EcoSafi
Arnold Kipchumba	Office of the First Lady, Kenya
Angelo Kleftakis	Circle Gas
Pauline Larat	Agence Française de Développement
Thoko Malunga	Ministry of Energy, Malawi
Haanan Marwah	Lightrock
James McCullagh	CITAC
Gosaye Mengistie	Ministry of Water, Irrigation and Energy (MoWIE), Ethiopia
Damião Namuera	Ministry of Mineral Resources and Energy, Mozambique
Caroline Ochieng	International Renewable Energy Agency (IRENA)
Anne Osinga	Mimi Moto
Monojeet Pal	African Development Bank (AfDB)
Tiziana Pirelli	Food and Agriculture Organization (FAO)
Christian Rakos	World Bioenergy Association
Anita Rinigia	Ministry of Energy, Tanzania
Hugh Salway	Gold Standard
Linda Schmid	U.S. Grains Council
Heli Sinkko	Modern Cooking Facility for Africa (MCFA) / Nordic Environment Finance Corporation (NEFCO)
Robert Stoner	Massachusetts Institute of Technology (MIT)

Jossy Thomas	United Nations Industrial Development Organization (UNIDO)
Gianluca Tonolo	Haki Energy Solutions
Yagouba Traoré	African Energy Commission (AFREC)
Ogbugo Ukoha	Nigerian Midstream and Downstream Petroleum Regulatory Authority (NMDPRA)
Anne Wambui	Officer of the President, Kenya
Faith Wandera	Ministry of Energy and Petroleum, Kenya
Philippe-Tanguy K. Yao	Ministry of Mines, Petroleum and Energy, Côte d'Ivoire

Comments and questions are welcome and should be addressed to:

Laura Cozzi

Directorate of Sustainability, Technology and Outlooks
International Energy Agency
9, rue de la Fédération
75739 Paris Cedex 15
France

E-mail: weo@iea.org

Annexes

Clean cooking access is a defining challenge for Africa's prosperity and social development

The world has made immense progress in improving access to clean cooking facilities, but to date momentum has been slower in Africa. Today, 2 billion people worldwide – a quarter of the global population – still cook over open fires or on basic stoves, inhaling harmful smoke and spending hours in search of fuels such as firewood or animal waste. Since 2010, almost 1.5 billion people in Asia and Latin America gained access to modern cooking stoves and fuels, halving the number of people without clean cooking in the span of fifteen years. These efforts relied largely on major government initiatives to provide clean cooking, with around three quarters of those gaining access doing so through liquefied petroleum gas (LPG), 17% from electricity, and 5% from other clean cooking solutions. In sub-Saharan Africa, however, the number of people without access has continued to grow, reaching around 1 billion today and affecting roughly four in every five households.

The lack of clean cooking harms health, economic development, education and the environment. It contributes to 815 000 premature deaths annually in Africa alone due to the health impacts of household air pollution. Across the continent, women and girls spend on average four hours a day gathering fuel and cooking, often foregoing education or remunerated activities as a result. The lack of clean cooking is also linked to the loss of 1.3 million hectares of forest each year – diminishing a key resource for the continent. The combined impact of this and direct emissions from a lack of clean cooking access is equivalent to a quarter of Africa's energy-related CO_2 emissions today.

Recent momentum creates a pivotal moment for clean cooking in Africa

Policy and financing commitments made at the 2024 Summit on Clean Cooking in Africa are being delivered. The International Energy Agency's (IEA) Summit secured USD 2.2 billion in commitments from public and private sectors and policy pledges from twelve African governments. Since then, USD 470 million has been disbursed, well above the annual average required to ensure the Summit's financing commitments are fully delivered by 2030.

Most people in sub-Saharan Africa live in countries that have accelerated their clean cooking efforts since 2024. Based on the latest tracking, more than 70% of Africans without access live in countries that have strengthened their clean cooking policy frameworks since 2024, with 40 new policies now in place. Ten of the twelve African countries represented at the Summit announced or implemented new policies highlighted in their pledges, with the United Republic of Tanzania and Kenya delivering the greatest improvement in coverage.

Progress is set to build on existing success stories throughout Africa. Over the past five years, key countries in sub-Saharan Africa accelerated their efforts to address the clean cooking gap, with countries like Kenya and Nigeria extending access to 2.7% of their population annually – a rate comparable to other success stories around the world. LPG accounted for three quarters of all people in sub-Saharan Africa who switched to cleaner cooking over that same period.

Investment in clean cooking infrastructure in Africa has also been on the rise, led by the private sector. Based on a first-ever comprehensive tracking of investment into Africa's cooking sector, the IEA estimates around USD 675 million of direct investments in infrastructure, stoves, and fuel distribution hardware occurred in 2023, a year-on-year increase of around 10%, led by growth in LPG distribution infrastructure. Based on the pipeline of announced projects and expected market growth, investment in Africa's cooking sector is set to reach new highs in 2024 and 2025.

By matching best historical performance, Africa could reach universal clean cooking access around 2040

Our new country-by-country analysis shows that, by matching the best rates of progress seen elsewhere, Africa could reach full access to clean cooking in around fifteen years. For this report, the IEA developed a new scenario, the Accelerating Clean Cooking and Electricity Services Scenario (ACCESS), which charts a pathway where all African countries replicate best historical rates of progress seen in other leading countries that share similar characteristics in terms of demography, affordability, resource availability and institutional governance. The scenario sees around 80 million people gaining clean cooking access each year in Africa – seven times the current pace. Cities achieve full access to clean cooking first, with almost 95% of Africa's urban population gaining access by 2035. Southern Africa is projected to reach universal access first, followed by West, East and Central Africa.

Achieving full access relies on expanding the availability of a host of fuels and technologies, with LPG providing access for over 60% of those currently without. The ACCESS analysis employs new geospatial tools based on a first-ever mapping of all existing clean cooking-related infrastructure across sub-Saharan Africa**.** It assesses the cost and availability of clean cooking options down to each square kilometre and determines what options are most feasible and affordable. Based on this analysis, the ACCESS pathway finds that over 60% of people gaining access in Africa through to 2040 do so via LPG. But many fuels and technologies play a role including electricity (17%) bioethanol and biogas (11%) and advanced biomass cookstoves (10%).

Demand for all modern cooking fuels, infrastructure and equipment rises substantially across Africa, requiring a scale-up of related supply chains. Modern energy use for cooking in Africa increases six-fold by 2040 in the ACCESS, adding the equivalent energy demand of Qatar. In absolute terms, by 2040 demand for LPG is just shy of 1 mbd or 8% of today's global LPG market. This requires an expansion in port, primary storage and distribution infrastructure across the continent. Electricity use for cooking grows by 65 TWh over the same period – equivalent to 15% of Africa's electricity generation today – aided by efforts to improve grid reliability and further extend electricity distribution. Bioethanol demand also rises to 6.4 billion litres annually, around 6% of current global market. When adding biogas and modern solid biomass, modern bioenergy consumption for clean cooking grows almost ten-fold from current levels, albeit from a low starting point.

More investment depends on affordable solutions and accessible finance

Reaching universal clean cooking access requires USD 37 billion in total investment through to 2040, more than USD 2 billion per year. One quarter goes toward infrastructure such as primary fuel storage, bottling facilities and upgrading distribution networks, with the remainder covering household equipment such as cylinders and stoves.

Affordability remains a major constraint, nearly two thirds of sub-Saharan Africans would need to spend more than 10% of their income to adopt clean cooking solutions. Wider distribution networks can reduce costs, but encouraging supply chains to expand into underserved regions requires derisking operations and helping consumers to make payments. Effective measures could include adjusting taxes and import tariffs, and introducing targeted affordability mechanisms such as subsidies, carbon credits and results-based finance to offer clean cooking solutions at lower costs to consumers. New business models that allow consumers to pay as they go or purchase fuels in smaller quantities have helped close the gap in many affordability-constrained communities in recent years.

Scaling up clean cooking depends on improving access to finance, at lower cost. In the ACCESS, the share of debt financing in the clean cooking sector increases from 35% today to more than 50%, as companies successfully leverage future revenue to finance infrastructure and distribution networks. This requires banks to gain experience and confidence in assessing clean cooking businesses and properly pricing risks. Access to equity is a particular hindrance for smaller distributors, who historically play the largest role in expanding distribution networks into areas financially unattractive for larger commercial players. Concessional finance can help attract more commercial lending to the sector at lower costs of capital. Concessional finance flows to sub-Saharan Africa's clean cooking sector have risen to new highs recently, reaching USD 155 million in 2023.

The benefits of clean cooking are immense, but require concerted policy effort

Clean cooking access delivers far-reaching improvements across health, development, and environment. By 2040, the cumulative premature deaths averted in sub-Saharan Africa by pursuing the ACCESS pathway instead of today's trajectory reaches 4.7 million. The average household halves the amount of time they spend gathering fuels, making and tending to fires and cooking each day. In aggregate, these time-savings are equivalent to the total annual working hours of Brazil each year. Widespread deforestation, through the felling of trees for firewood and charcoal, is reduced, saving forest area roughly the size of Ecuador by 2040.

Sub-Saharan Africa stands to benefit from the development of local clean cooking supply chains, the extent of which depends on creating a sustainable local market environment. Sub-Saharan Africa already has a foothold in several manufacturing segments of clean cooking value chains that could support a broader scaling up of manufacturing capacity. There are at least 74 facilities operating today in sub-Saharan Africa which manufacture clean cooking equipment and fuels, with an additional 16 facilities in the pipeline. Locally produced equipment and fuels help reduce import burdens and are often lower cost. Developing local supply chains for clean cooking should go hand-in-hand with implementing and enforcing globally accepted safety and performance standards to maintain consumer confidence.

New jobs in the clean cooking value chain require vocational training and transition support policies. In the ACCESS, sub-Saharan Africa requires more than 460 000 permanent new workers in the clean cooking sector by 2040 – comparable to the number of electric utility workers in sub-Saharan Africa today. Most of these jobs are connected to the distribution of clean cooking equipment and fuels, the manufacture of stoves and fuels, and operation and maintenance. Providing sufficient training is crucial to operational safety, especially in transporting and handling flammable fuels. Most roles require fewer than four weeks of training, with industry playing a large role in vocational education for the sector today. The switch to cleaner cooking solutions displaces a large network of fuelwood and charcoal distribution workers, however these vendors could, with the right transition support, play a role in emerging clean cooking distribution networks.

Reaching universal clean cooking access also lowers emissions. The switch to clean cooking solutions, notably LPG and electric cooking, drives up emissions in the ACCESS by 70 million tonnes of carbon dioxide-equivalent (Mt CO_2-eq) in 2040. However, it also reduces greenhouse gases emitted during the incomplete burning of fuelwood and charcoal in basic stoves by 280 Mt CO_2-eq and curbs deforestation, saving 330 Mt of CO_2-eq. In aggregate, the ACCESS reduces net annual greenhouse emissions by around 540 Mt CO_2-eq in 2040 against a baseline in which no action is taken.

Managing import exposure remains an energy security and fiscal concern for many African governments. Today, half of LPG and a fifth of bioethanol consumed in sub-Saharan Africa is imported. Production of LPG from natural gas processing and crude oil refining is set to rise slightly to 2030 in the region, and bioethanol production capacity is expanding from the 25 facilities active today. Global markets for both fuels have sufficient buffering capacity to absorb demand increases in the near-term. Building local storage and taking measures to diversify suppliers and the mix of cooking fuels can also help manage price shocks and supply disruptions. In parallel, governments are looking to better utilise domestic resources for cooking, including electricity and agricultural waste. Today, at least 20 biomass pellet facilities are operating or under development in the region and biogas projects operate in 17 countries.

Achieving full access in Africa to clean cooking by 2040 will require efforts across governments, industry, civil society, and the international community. Keeping this issue high on the regional and international agenda helps sustain momentum. In 2024, clean cooking was featured in both Italy's G7 and Brazil's G20 Leaders' statements, – a first – and South Africa's G20 is making clean cooking a priority. All stakeholders have a role to play in advancing practical solutions, mobilising investment, and implementing policies that deliver lasting impact. The IEA has led efforts on clean cooking since the early 2000s and will continue to monitor progress, including tracking policies, financing, and on-the-ground outcomes – to ensure clean cooking becomes a reality for all.

Clean Cooking: State of Play and Recent Progress

Nearing a turning point?

SUMMARY

- A lack of clean cooking continues to have profound impacts on public health, women's equality, economic development, and the environment. Globally, a lack of clean cooking contributes to around 3 million premature deaths each year, with women and children facing the greatest exposure, and accounts for annual emissions equivalent to 1.2 Gt CO_2-eq, roughly equivalent to the global CO_2 emissions from international aviation and shipping. The challenge is most severe in sub-Saharan Africa, where four out of five households lack clean cooking access today.
- To spur global action on the issue, the International Energy Agency (IEA) convened the Summit on Clean Cooking in Africa with the objective of making 2024 a turning point. The Summit resulted in USD 2.2 billion in public and private sector commitments, alongside pledges by twelve African governments to implement new clean cooking policies. Based on tracking by the IEA, USD 470 million has been disbursed against the commitments as of the end of June 2025. This exceeds the annualised disbursements needed to fulfil these commitments by 2030.
- Eight of the twelve countries that made pledges at the IEA Summit implemented new clean cooking policies since 2024, with Tanzania and Kenya demonstrating the largest increase in policy coverage since 2024. Amongst the African population that does not have access to clean cooking, three-quarters today live in countries that have improved their clean cooking policies since the start of 2024. Today, Ghana, Kenya, Nigeria, Malawi, Mozambique, Tanzania, Uganda, and Zimbabwe are the sub-Saharan Africa countries that have the widest coverage of key clean cooking policies.
- Over the past five years, around 13 million people gained clean cooking access in sub-Saharan Africa each year, 20% more than the average in the past decade, led by progress in West Africa and East Africa. On average around 12 million Africans per year gained access through liquefied petroleum gas (LPG), another 1 million gained access via other clean cooking solutions. In addition, 4 million gained transitional cooking solutions through Tier 3 improved biomass cookstoves each year over the same period.
- Clean cooking investment in Africa rose to its highest year on record in 2023, reaching USD 675 million – a growth of around 10% year-on-year. Over the past five years, around 80% of investment went toward LPG cooking and related infrastructure, with a notable uptick in 2023. International development was responsible for roughly 15% of total financial flows to the sector in 2023, totalling around USD 150 million – the largest single year since 2019. Carbon credits revenues also grew in 2023 and now represent roughly 10% of financial flows to the sector.

1.1 Introduction

Access to clean cooking remains among the most urgent, and often overlooked, issues in global energy systems, with dire implications for health, development, education, and the environment. In 2023, over 2 billion people worldwide – nearly one in four people – still rely on traditional stoves and open fires, exposing themselves daily to harmful smoke and exhaust that contribute to around 3 million premature deaths each year from indoor air pollution. These households rely on inefficient fuels like wood, charcoal, animal waste, kerosene, and coal. The daily task of gathering fuel and cooking over traditional stoves and fires prevents many women and girls from pursuing education, earning a livelihood, and participating in other community activities. This burden comes at an estimated cost of USD 1.4 trillion a year in negative health impacts, in addition to lost productivity, environmental and climate costs (World Bank, 2020). Globally, the traditional use of biomass emits 1.2 Gt CO_2-eq each year, similar in scale to CO_2 emissions from international aviation and shipping, when counting both direct emissions and its contribution to forest loss.

Developing Asia and Latin America have demonstrated that rapid progress is possible. These regions have collectively reduced the number of people without clean cooking access by over one billion since 2010, led by efforts in India, Indonesia, and the People's Republic of China (hereafter "China"). These efforts relied largely on major government initiatives to provide subsidised stoves and fuels to households. Three-quarters of the gains were from liquefied petroleum gas (LPG), 17% from electricity, and 5% from other clean cooking solutions.

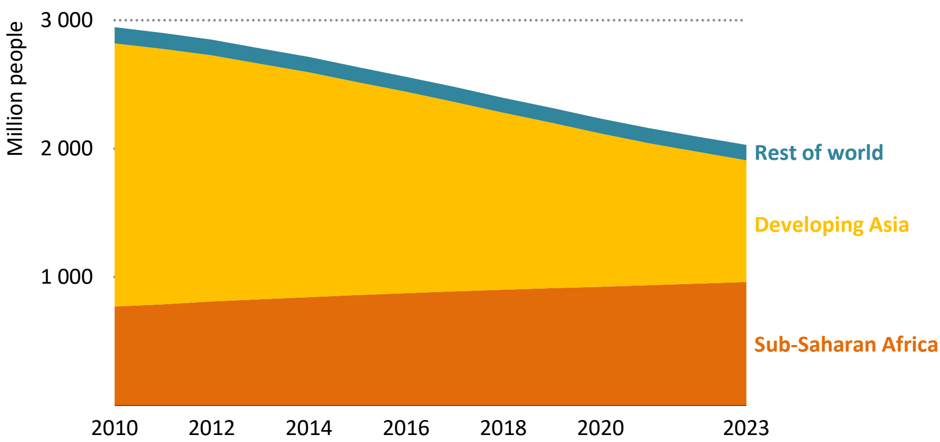
In sub-Saharan Africa, the number of people without access has continued to grow (Figure 1.1), reaching around 1 billion today, and affecting roughly four in every five households in Africa. In 2023, a lack of access to clean cooking contributed to 815 000 premature deaths, the majority of which are women and children, due to the impacts of indoor air pollution. The respiratory and cardiovascular diseases caused by the inhalation of particulate matter from traditional cooking is the second leading cause of premature death when considered against other individual causes (WHO, 2019 and 2025a).

The solutions to the clean cooking challenge are widely available and can be life changing, but addressing it requires implementation of the financial and policy pledges made at the Summit and efforts to scale up the sector in Africa. In 2023, the International Energy Agency (IEA) and the African Development Bank Group published *A Vision for Clean Cooking Access for All*, to take stock of the issue, highlight the cost of inaction and what would be required to reach the target of universal access to clean cooking by 2030 in line with the United Nations' Sustainable Development Goal 7. The report estimated that USD 4 billion would be required each year for the seven years to 2030 to close the gap to universal access to clean cooking in Africa.

To mobilise greater support around clean cooking in Africa, the IEA along with the Government of the United Republic of Tanzania (hereafter "Tanzania"), the Government of Norway, and the African Development Bank Group hosted the first-ever *Summit on Clean Cooking in Africa*. The Summit brought together leaders and decision-makers from almost

60 countries and attracted wide attention from policymakers, industry, civil society, and media. It successfully mobilised over USD 2.2 billion in public and private commitments to expand clean cooking access across Africa and beyond, tackling one of the world's most entrenched inequalities. At the Summit, more than 100 countries, international institutions, companies and civil society organisations also endorsed *The Clean Cooking Declaration*, pledging to make the issue a priority and enhancing efforts toward achieving universal access for all. Twelve African governments signed the declaration and committed to making clean cooking a policy priority.

Figure 1.1 ▷ Population without access to clean cooking by region, 2010-2023



Globally, the number of people without access to clean cooking is declining, however in sub-Saharan Africa the number is rising

Source: IEA analysis based on WHO (2025b).

Momentum from the IEA Summit has continued. Under Italy's G7 Presidency in 2024, clean cooking featured in the Leaders' Statement for the first time. Brazil's G20 Presidency launched the *Roadmap for the Brazil G20 Presidency's Clean Cooking Strategy* to guide investment, financing, market development and data strategies toward universal access. At the Africa Energy Summit (Mission 300) in January 2025, which laid out an ambitious agenda for expanding electricity access, twelve countries developed Energy Compacts with key energy targets. Eleven of those included explicit clean cooking targets, highlighting governments' growing commitment to clean cooking. The issue remains a priority for both South Africa's G20 Presidency and Brazil's COP30 in November 2025.

The IEA's new report assesses how Africa's clean cooking sector has progressed since the 2024 Summit and provides an outlook for clean cooking access, investments and infrastructure needs. For 25 years, the IEA has been at the forefront of tracking progress on energy access. It serves as one of the co-custodians for tracking progress against Sustainable Development Goal 7, to ensure access to affordable, reliable, sustainable and modern energy for all. The report includes four chapters:

- **Chapter 1: State of Play and Recent Progress**, which provides an assessment of the latest progress in Africa on access rates, investments and policy developments, and includes tracking of progress since the Summit on Clean Cooking in Africa.
- **Chapter 2: Outlook for Clean Cooking in Africa**, which looks at how Africa could reach universal clean cooking access by around 2040 as explored in the IEA's new Accelerating Clean Cooking and Electricity Services Scenario (ACCESS), and the investments needed.
- **Chapter 3: Clean Cooking Infrastructure**, which maps existing associated infrastructure and supply chains that support the clean cooking sector. It also outlines future infrastructure requirements to achieve universal access.
- **Chapter 4: Implications and Policy Considerations**, which highlights key considerations of enabling policies and regulatory frameworks, financing, workforce and skills needs to maximise economic and social benefits.

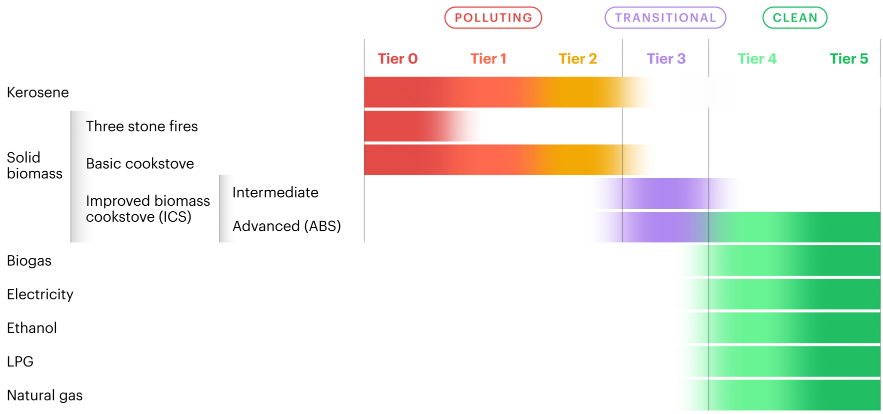
1.2 Clean cooking access rates and fuel use

While efforts to extend clean cooking access in sub-Saharan Africa improved modestly in 2023, the number of people without access continues to rise. As of 2023, 960 million people in sub-Saharan Africa lacked access, up 14 million from 2022, driven primarily by population growth. Between 2020 and 2023, sub-Saharan Africa's population increased by over 30 million people each year (a 2.6% annual growth rate) and progress on clean cooking remained below this growth rate, resulting in a net increase in the number of people without access. In 2023, an estimated 11 million people – or 1% of the population of sub-Saharan Africa – benefited from newly provided clean cooking access, up slightly from 2022. The rate of new households adopting clean cooking has been on the rise since 2015, with the exception of the 2020-2022 period, where the coronavirus (Covid-19) pandemic and the spike in liquefied petroleum gas (LPG) prices, following the Russian Federation's full-scale invasion of Ukraine, led to setbacks and some households reverting to cooking with biomass temporarily.

Box 1.1 ▷ Defining clean cooking fuels and technologies

In this report, the definition of clean cooking follows the World Health Organization (WHO) definition of clean, transitional and polluting fuels and technologies which is based on the ISO-tier framework (Figure 1.2). In this definition, a stove-fuel combination is counted as clean only if it achieves at least Tier 4 for $PM_{2.5}$ emissions and Tier 5 for carbon monoxide (CO) emissions. Tier 3 devices are treated as transitional, while those in Tiers 0-2 are classified as polluting and fall outside the scope of clean cooking access.

Figure 1.2 ▷ Classification of stove types by Tier and access levels



The improvements of ICS and ABS cookstoves over the last decade, have pushed several biomass models into higher tiers of access

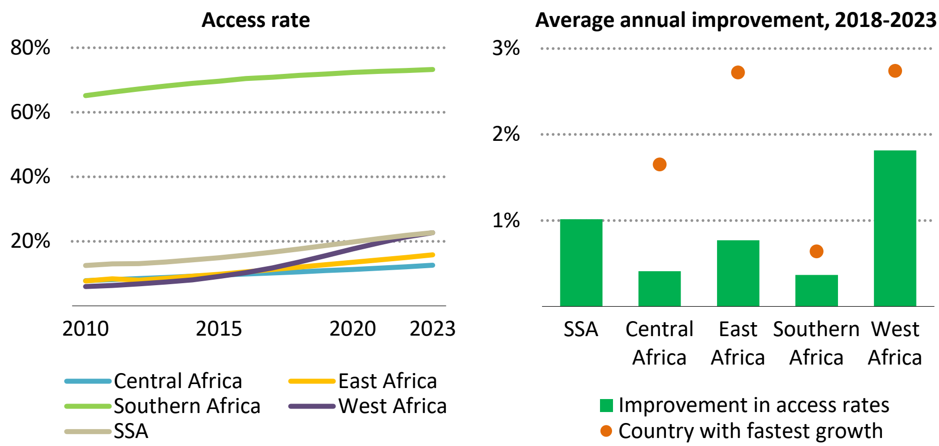
Notes: LPG = Liquefied petroleum gas. Tiers follow the WHO-ISO clean cooking framework, which rates stoves by thermal efficiency, black-carbon emissions, and $PM_{2.5}$ emissions (WHO, 2014).

Most fuel and stove combinations are relatively straightforward, however there are nuances within solid biomass cooking. For the purposes of this report, there are three broad types of solid biomass cooking commonly referred to. First is the three stone fire, which is an open fire cooking setup where three stones or similar supports are arranged to hold a cooking pot above the flames. Second is basic biomass stoves (Tier 0-2), which are usually made of clay or metal and produced in the home or in artisanal workshops and offer only slight improvements over open fires in terms of efficiency and indoor air quality. Together, three stone fires and basic cookstoves, make up the combined category of traditional use of biomass (up to and including stoves of ISO Tier 2).

Improved biomass cookstoves is the next tier up and is further delineated between intermediate improved biomass cookstoves (ICS) and advanced biomass cookstoves (ABS), the latter being a subset of ICS. ICS encompass stoves that use engineered enhancements and standardised manufacturing to improve thermal efficiency and reduce emissions. ICS include both intermediate designs (typically ISO Tier 3, considered transitional solutions) and advanced biomass cookstoves (ABS), which integrate technologies such as fans or gasifiers to achieve higher efficiency and lower emissions (ISO Tier 3-5, with the highest tiers classified as clean cooking solutions under WHO guidelines). The use of solid biomass fuels in biomass stoves of Tier 3 and above is classified as modern solid bioenergy.

Recent progress in clean cooking is highly concentrated among a few countries. The top five countries in terms of fastest rates of progress – Côte d'Ivoire, Kenya, Lesotho, Nigeria and Republic of the Congo – accounted for two-thirds of all new clean cooking access in sub-Saharan Africa between 2018 and 2023. These countries achieved annual increases in access ranging from 1.7% to 2.7%. All of them witnessed policy improvements in 2023, based on IEA tracking, and all have an active clean cooking programme that provides some form of financial support for clean cooking adoption. Conversely, there are 30 countries that witnessed annual improvement rates of less than 0.5% between 2018 and 2023 that are home to around 60% of the people without access today. The vast majority of these countries have access rates below the average of 23% across sub-Saharan Africa. On a regional basis, West Africa has seen the fastest rate of progress in the last five years, followed by East Africa (Figure 1.3).

Figure 1.3 ▹ Clean cooking access rates and annual improvements in sub-Saharan Africa by region



IEA. CC BY 4.0.

West and East Africa led improvements in clean cooking access across sub-Saharan Africa, but overall access rates in these regions remain below that of Southern Africa

Notes: SSA = sub-Saharan Africa. The average annual improvements in access rates are measured in percentage points, not as percentage growth.

Source: IEA analysis based on WHO (2025b).

The rise in clean cooking access in 2023 was driven largely by urban areas, which accounted for over two-thirds of all new connections. This reflects both ongoing urban migration and the expansion of services in underserved cities. Today, urban clean cooking access in sub-Saharan Africa stands at 41%, compared to just 9% in rural areas.

Table 1.1 ▹ Access rates and population without access to clean cooking in Africa, 2018-2023

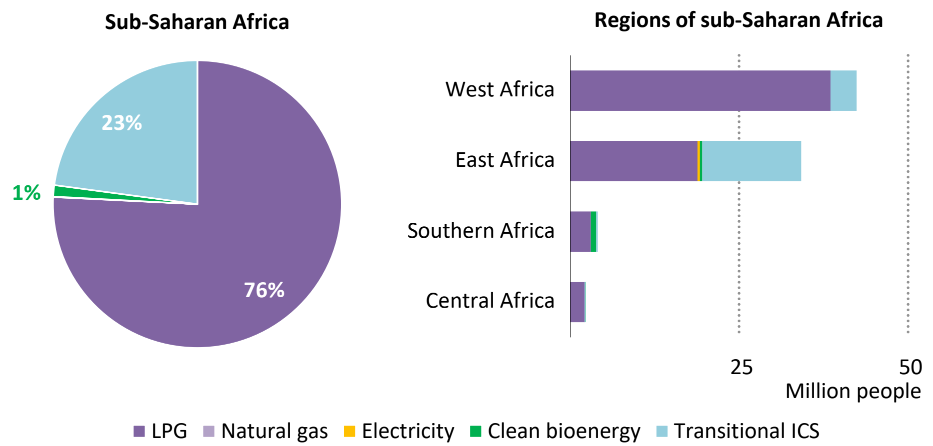
	Access rate	Population without access (million)	Annual increase in access rate	Population gaining access annually* (million)
	2023	2023	2018-2023	2018-2023
Africa	**34%**	**963**	**0.8%**	**12.3**
North Africa	>95%	<1	0.0%	<0.1
Sub-Saharan Africa	23%	962	1.0%	12.3
Central Africa	**13%**	**145**	**0.4%**	**0.6**
Cameroon	31%	20	1.1%	0.3
Chad	10%	17	0.8%	0.1
Congo	40%	4	1.7%	<0.1
DR Congo	5%	97	0.2%	0.1
Gabon	91%	<1	0.5%	<0.1
East Africa	**16%**	**448**	**0.8%**	**3.8**
Burundi	<5%	14	0.0%	<0.1
Ethiopia	7%	118	0.3%	0.4
Kenya	32%	38	2.7%	1.4
Madagascar	<5%	30	0.1%	<0.1
Mozambique	7%	31	0.4%	0.1
Rwanda	9%	13	1.4%	0.2
Somalia	5%	17	0.4%	<0.1
Tanzania	10%	61	0.9%	0.5
Uganda	6%	46	0.2%	0.1
Zimbabwe	31%	12	0.1%	<0.1
West Africa	**23%**	**340**	**1.8%**	**7.5**
Benin	6%	13	0.1%	<0.1
Côte d'Ivoire	44%	16	2.4%	0.6
Ghana	33%	23	1.5%	0.5
Mali	<5%	23	0.1%	<0.1
Mauritania	49%	3	0.7%	<0.1
Niger	5%	26	0.4%	0.1
Nigeria	26%	165	2.7%	5.8
Senegal	35%	12	1.2%	0.2
Southern Africa	**73%**	**28**	**0.4%**	**0.4**
Angola	50%	18	0.3%	0.1
Botswana	66%	<1	0.5%	<0.1
Namibia	48%	1	0.5%	<0.1
South Africa	90%	6	0.6%	0.4

Notes: *The population gaining access annually is not the same as the change in people with clean cooking access, but rather an estimate of the number of people gaining clean cooking access due to new connections, excluding those born into households already with clean cooking access. Congo = Republic of the Congo; DR Congo = Democratic Republic of the Congo; Tanzania = United Republic of Tanzania.

Source: IEA analysis based on WHO(2025b).

LPG played the leading role in extending new access in sub-Saharan Africa in the last five years. Of the nearly 17 million people who gained access to transitional and clean cooking solutions each year since 2018, three-quarters did so through LPG. The largest access gains through LPG in terms of the number of people were in Kenya, Nigeria, and Sudan, with Nigeria also benefiting from being a large producer economy. New LPG import facilities in East Africa have allowed for sharp progress in Kenya, Tanzania, Rwanda, and Uganda. In South Africa, the Richard's Bay LPG terminal has contributed to some improvements in clean cooking access rates, but loadshedding also led households to switch away from electric cooking, an important source of clean cooking in the country.

Figure 1.4 ▷ Share of people gaining access to clean and transitional cooking solutions and number of people per region, 2019-2023



LPG adoption drove access to clean cooking numbers with more than three-quarters gaining access to clean and transitional cooking solutions in the last five years

Note: LPG = liquefied petroleum gas; ICS = improved biomass cookstoves.

Source: IEA analysis based on WHO (2025b).

The picture for electric cooking in sub-Saharan Africa is more complex given low electricity access rates and unreliable service, particularly in rural and remote areas. East Africa saw a slight increase in the population gaining access through electricity. Meanwhile, in other regions, there has been a decrease in the share of people reporting electricity use as their primary cooking device. Bioethanol, a new emerging player on the clean cooking markets, saw installations continue to rise in 2023, with notable gains in East Africa – and Kenya in particular.

Demand for clean cooking fuels increased by 1.3% in 2023, based on IEA data. This reflects both growing access rates and higher consumption per capita from households that are already cooking with these fuels. Clean cooking fuel consumption per capita in sub-Saharan Africa remains about half that of other developing regions and is expected to continue to rise with incomes and as households reduce fuel stacking – the practice of a household simultaneously relying on two or more different cooking fuels or stove types to meet its cooking needs.

Preliminary indicators for 2024 suggest that the number of people gaining access will be comparable to 2023. New government programmes in Ghana, Senegal and Tanzania have contributed to positive progress, as have expansions of new LPG infrastructure in countries such as Côte d'Ivoire, Kenya and Nigeria. However, the market for solid biomass cookstoves, including improved and advanced, has been affected by a decline in carbon credit prices and a continuing increase of surplus credits available on the market.

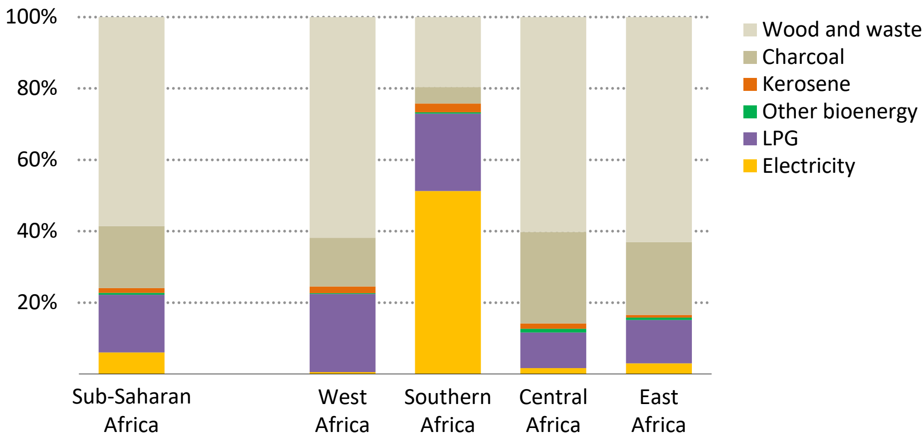
While not officially included in the WHO's tracking of clean cooking access, improved biomass cookstoves classified as Tier 3 under the ISO performance tiers (Box 1.1) remain a widely used transitional cooking solution in Africa today. Over the past five years, around 4 million people a year have gained access to transitional cookstoves. Improvements of ICS and ABS cookstoves over the last decade have pushed several biomass models into higher ISO performance standards.

Use of solid biomass cookstoves has increased since 2015, driven by development finance, voluntary carbon markets and local production. Based on new IEA analysis of household surveys, cookstove distribution numbers from development organisations and carbon credit data, the IEA estimates that almost 8% of people living in sub-Saharan Africa cook with a solid biomass cookstove provided through carbon credit schemes or stove distribution programmes. Of these, 6% cook with lower tier basic biomass stoves (Tier 1-2), while 2% use transitional improved biomass cookstoves (Tier 3).

Uptake of lower-tier biomass stoves through carbon credit schemes or stove distribution programmes is strongest in East Africa (10%), followed by West (5%) and Southern Africa (2%). Transitional biomass stoves, which score a minimum Tier 3 rating on carbon monoxide and $PM_{2.5}$ emissions, are used most in East Africa (3%), followed by West (1%) and Central Africa (<1%). Although transitional stoves fall below the WHO's definition for clean cooking, they offer health and efficiency gains over traditional stoves and serve as an important transitional step as households move to clean cooking options. Development efforts have focused heavily on solid biomass cookstoves, though most deployed models remain below transitional tiers in terms of health and efficiency performance.

Overall, 16% of the population in sub-Saharan Africa primarily cooks with LPG, 6% with electricity, and 1% with bioethanol, biogas, or solid biomass used in clean advanced biomass cookstoves. The vast majority still relies on wood, waste, charcoal and kerosene burned in three stone fires, basic cookstoves, or transitional improved biomass cookstoves (Figure 1.5).

Figure 1.5 ▹ Share of the population in sub-Saharan Africa by primary cooking fuel, 2023



In sub-Saharan Africa, 16% of people primarily cook with LPG, 6% with electricity, and a small portion with other bioenergy. The vast majority still relies on polluting fuels.

Notes: LPG = liquefied petroleum gas. Other bioenergy includes biogas, bioethanol and solid biomass used in clean advanced biomass cookstoves (Tier 4-5).

Sources: IEA analysis based on WHO (2025b)

1.3 Investments

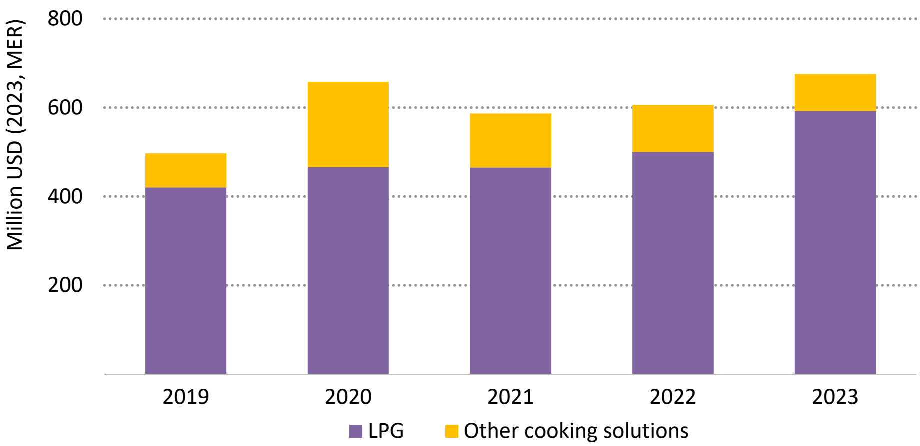
1.3.1 Overall investment

Total direct investment in sub-Saharan Africa's cooking sector grew by around 10% in 2023, reaching an estimated USD 675 million annually (Figure 1.6). This figure encompasses a range of public and private sources of finance going toward stoves, end-user equipment, and distribution infrastructure.

Direct investments in sub-Saharan Africa's cooking sector have been led by LPG, which reached USD 590 million in 2023 and accounts for nearly 80% of overall investment over the past five years. This was complemented by significant distribution, import and storage capacity investments in some markets. LPG investments can be broken down into cylinders (36%), stoves (29%), refilling infrastructure (15%) and primary storage (20%). Similar investment levels were seen in 2024 with a further increase expected in 2025. The strong growth in LPG investments has been boosted, in part, by innovations aimed at supporting markets in which affordability is a key issue. This includes adoption of pay-as-you-go (PAYG) models, reduced cylinders sizes, and partial refilling options in key markets.

Direct investment in sub-Saharan Africa for electric cooking devices, bioethanol, biogas, and other cooking solutions (including Tier 1 and 2) was USD 83 million in 2023 following a peak of 192 million in 2020. This market has historically relied heavily on development finance and carbon credit revenue to support projects. Select stove models are attracting consumers in some markets, particularly where such stoves are offered at competitive prices due to an increase in financing support from carbon credits and results-based finance.

Figure 1.6 ▷ Investments in sub-Saharan Africa's cooking infrastructure and equipment, 2019-2023



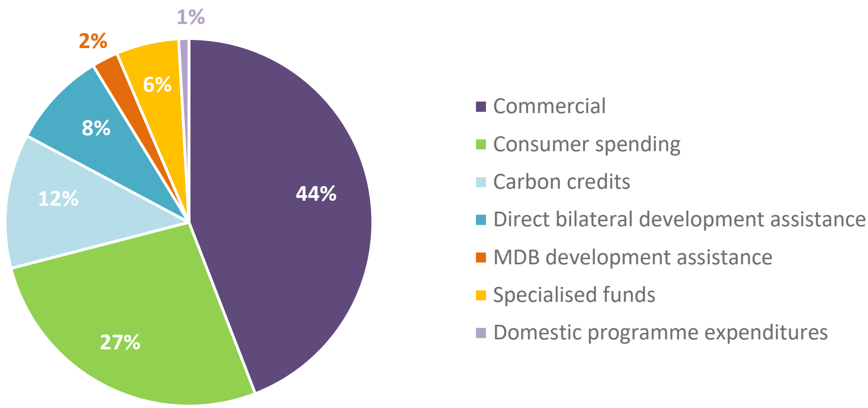
Direct investments in cooking infrastructure and stoves have been driven by LPG and rose to its highest year on record in 2023, reaching USD 675 million

Sources: IEA analysis based on MSCI (2025)[1] and OECD (2025).

Commercial investments accounted for the largest share of capital flows into sub-Saharan Africa's cooking sector in 2023 (Figure 1.7). Over 40% of total investment went to cylinders, refilling stations, and primary storage facilities, with a quarter of investments in direct-to-consumer stoves. Carbon credits (12%) and direct bilateral development assistance (8%) were the two other largest investment instruments. Specialised funds, multilateral development bank assistance and domestic programme expenditures make up 9%. Only a few African governments provide direct financial support for clean cooking from public funds, with most government programmes receiving funding via development assistance. These figures do not include implicit fiscal costs such as subsidies or regulated energy pricing, which may affect public finances.

[1] Certain information ©2025 MSCI. Reproduced by permission; no further distribution of MSCI data permitted.

Figure 1.7 ▷ Share of cooking sector total investment and financial support by source, 2023



Total investment and financial support for Africa's cooking sector in 2023 was largely from commercial sources

Note: MDB = multilateral development bank.

Sources: IEA analysis based on MSCI (2025)[3] and OECD (2025).

Box 1.2 ▷ Methodology for tracking cooking sector investment and finance

In this report, the IEA developed a new tracking methodology that relies on a wide variety of data sources to estimate the total investment in Africa's cooking sector. This includes stoves, fuel cylinders, specialised fuel delivery and distribution infrastructure to households including connections. The new methodology expands the scope of investments beyond those used in prior IEA clean cooking publications. For example, earlier models did not account for the full range of infrastructure, including storage, refilling facilities, and upgrades to household electricity and LPG connections.

LPG investment estimates are based on data for fuel and equipment imports, household uptake, LPG consumption and equipment turnover. This bottom-up approach estimates the required capital to supply LPG cylinders to new users and replace cylinders lost through attrition. Investments in LPG primary storage, terminals, refilling and bottling facilities are based on industry data and calculations to verify reporting and fill in gaps.

Tracking other stove deployment relies on several datasets, notably industry reporting on sales, carbon credit issuances, and project reporting for those funded by development assistance. Stove accounting using carbon credit financing and issuances is based on a

[3] Certain information ©2025 MSCI. Reproduced by permission; no further distribution of MSCI data permitted.

dedicated database of verified carbon credit transactions. Measures have been taken to minimise the risk of double counting financial flows. Multilateral development bank investment volumes are based on institutional reports from the World Bank and the African Development Bank Group among others. These figures are supplemented by direct information provided by the institutions. Finance from specialised funds, including the Green Climate Fund and others, is tracked through open-source datasets and reporting to the IEA.

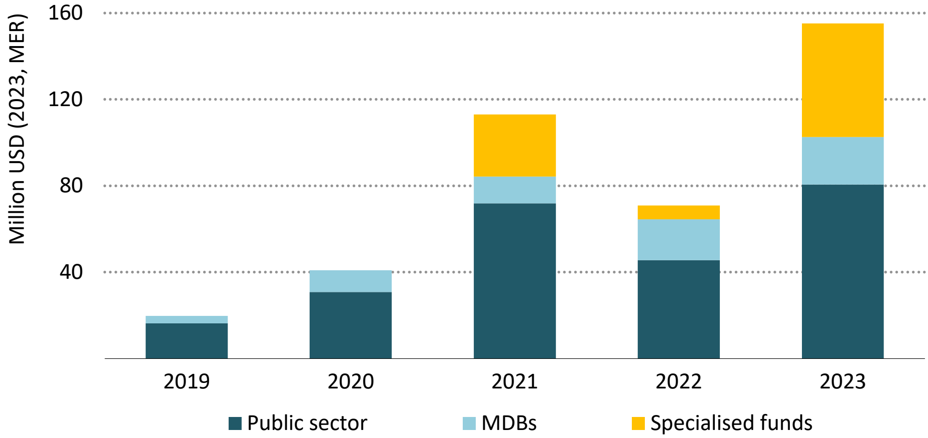
Tracking of stoves and support from bilateral development finance relies on the Organisation for Economic Co-operation and Development's (OECD) Development Assistance Committee Database (DAC). The IEA applies its own methodology to isolate cooking-related investments within broader energy and development projects. This involves identifying relevant cooking components and applying a proportional weight to the reported investment totals where cooking is only a component of a larger project.

Collectively, these sources provide a view of investment trends in Africa's cooking sector, combining infrastructure spending, development finance, market-based instruments, and climate finance to deliver a more complete picture of progress. This is benchmarked against overall access rates reported by countries and surveys, fuel consumption and trade from IEA data, and other accounts. These are used to compose the overall investment and financial flow figures used in this report. A similar methodology is applied to future projections of investment needs.

1.3.2 Concessional and specialised finance

Concessional support for the sub-Saharan Africa cooking sector, which ranges from grants, concessional loans, guarantees and technical assistance, reached new highs in 2023. This category also includes funds specialised in supporting clean cooking with blended finance. In total, disbursements of concessional funds for the cooking sector in Africa grew to around USD 155 million in 2023, the highest levels since 2019 (Figure 1.8). Norway and the United Kingdom were the donor countries that disbursed the most clean cooking development assistance in 2023. Governments that made commitments at the Summit represented 80% of direct clean cooking development financing in 2023. Between 2019 and 2023, the largest clean cooking programmes receiving development funds were Energising Development (endev) and Nordic Environment Finance Corporation (NEFCO)'s Modern Cooking Facility for Africa (MCFA), which together comprise nearly half of all direct assistance for clean cooking. Multilateral development banks represent a smaller share of disbursements on clean cooking in Africa, delivering around USD 22 million in 2023. Specialised funds, including the Green Climate Fund and Spark+ Africa Fund (managed by Enabling Capital), contributed around USD 53 million in 2023.

Figure 1.8 ▷ Disbursements from concessional sources and specialised funds for clean cooking in Africa by type of entity, 2019-2023

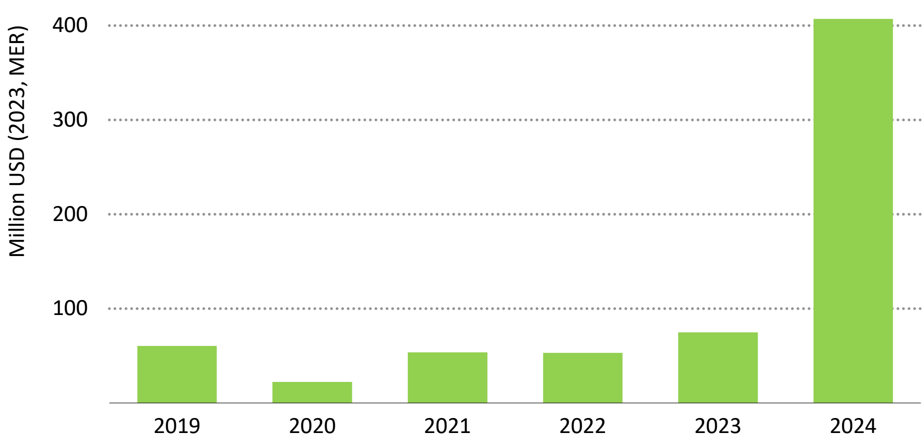


Public sector assistance has historically been the largest source of concessional support for clean cooking in Africa

Note: MDBs = multilateral development banks.

Source: IEA analysis based on OECD (2025).

Figure 1.9 ▷ Government commitments for clean cooking in Africa, 2019-2024



Government commitments towards clean cooking have increased significantly following the IEA Summit, but still remain far below the levels needed to bridge the access gap

Source: IEA analysis based on OECD (2025); 2024 value is based on IEA tracking and is not yet reflected in the reporting to DAC.

Between 2019 and 2023, development assistance commitments, not yet disbursed, averaged around USD 50 million per year. In 2023 alone, this figure was closer to USD 75 million. Although not yet reflected in OECD-DAC data, additional commitments in 2024 totalled to USD 407 million, with USD 281 million made at the 2024 Summit on Clean Cooking in Africa and the remainder largely coming as additions to those commitments (Figure 1.9). Some of these committed funds may be subject to rollbacks as development finance budgets have come under increased pressure in recent years. Additionally, some major donors to clean cooking in Africa have announced new strategies which have deprioritised spending on energy access.

1.3.3 Carbon credit revenue

Over the past decade, the cookstove market in Africa has evolved from being heavily reliant on development finance to one increasingly supported by carbon markets. In 2019, carbon credit revenues accounted for around 12% of total revenue for companies issuing cookstove carbon credits, but the share has increased to 35% in 2023 (CCA, 2025). The majority of these companies in the African market issue carbon credits based on solid biomass cookstoves, bioethanol cooking, and biogas, although credits have been issued for LPG and electric cooking too. The revenue generated for the sector has more than quadrupled from USD 25 million in 2020 to USD 107 million in 2024 (MSCI, 2025). Cookstove projects accounted for 80% of total energy carbon credit transactions in Africa over the past 10 years (IEA, 2025).

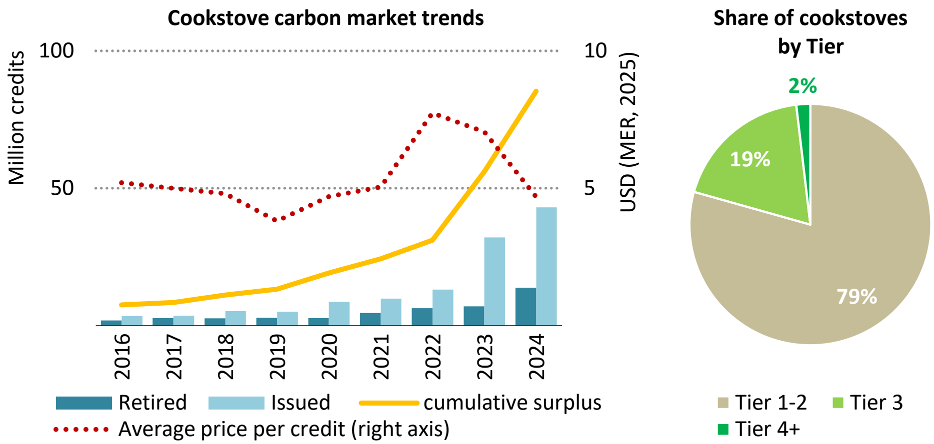
Africa's cookstove carbon credit market remains concentrated in a few key countries with ongoing projects and supportive policy environments. Kenya, Uganda, Malawi, Ghana and Rwanda are currently the continent's largest markets, representing around 70% of total issuances for all cookstove carbon credits since 2015 (MSCI, 2025).

However, several factors have contributed to uncertainty in Africa's cookstove carbon credit market. Chief among these are concerns over the cookstove carbon credit integrity – largely rooted in questions of verified emissions reductions from projects – and the large and growing stock of unsold legacy credits that remain on the market. These factors combined have led to a decline in prices since 2022 with average annual transactions declining to below USD 5 per credit after peaking at above USD 7 in 2022 (Figure 1.10).

Initiatives have been launched to address over crediting and other quality concerns. New and updated methodologies, some of which are applicable to all clean cooking technologies including LPG, focus on setting standards and parameters for the amount of deforestation and other land-use impacts credited to clean cookstove projects and implementing more reliable monitoring and verification. Recent transactions for these higher quality credits have exceeded broader market prices, with recent transactions quoted at around USD 18 per tonne (MSCI, 2025)[4].

[4] Certain information ©2025 MSCI. Reproduced by permission; no further distribution of MSCI data permitted.

Figure 1.10 ▷ Cookstove carbon market trends and shares of cookstove carbon credits by tiers in Africa, 2016-2024



Cookstoves carbon credit issuances have outpaced sales, leading to a surplus of credits, contributing to a fall in average prices per credit

Notes: Surplus does not include all data from before 2015. One credit equals one tonne of CO_2-equivalent.

Sources: IEA analysis based on MSCI (2025)[5]; Verra; Gold Standard; and Climate Forward voluntary carbon market registries (2009-2025).

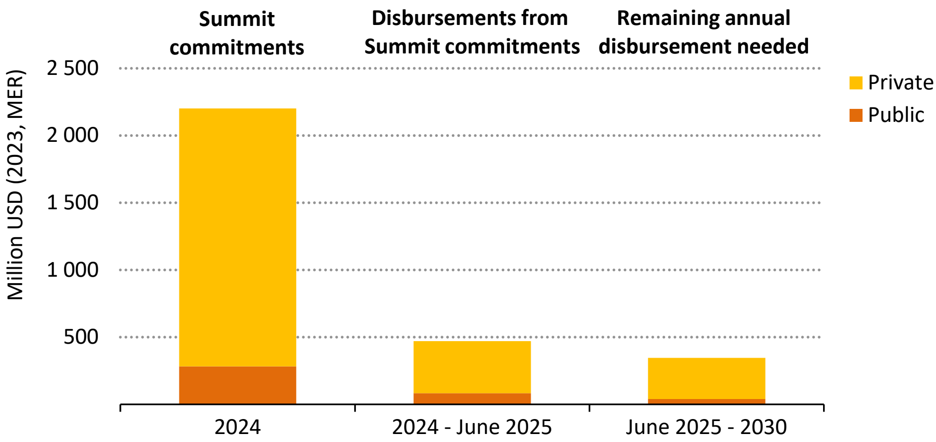
To date, most carbon credits for cookstoves have been issued through voluntary carbon market standards. The use of clean cooking carbon credits to comply with national or international targets is still limited, with only one recent example under Article 6.2 of the Paris Agreement between Switzerland and Ghana (Quantum Commodity Intelligence, 2025). Other African countries are engaged in the preparation of Article 6.2 transactions between countries involving cookstove projects. The aviation sector's Carbon Offsetting and Reduction Scheme for International Aviation (CORSIA) could also increase demand for high-quality cookstove carbon credits.

1.3.4 Tracking commitments from the Summit on Clean Cooking in Africa

At the IEA's Summit on Clean Cooking in Africa, USD 2.2 billion was pledged from public and private entities. Since then, the IEA has tracked USD 470 million in disbursements against these pledges with 18% coming from governments and 82% by private sector actors. This means public sector entities have mobilised 29% of their targeted total commitments and the private sector has disbursed 20% (Annex A provides detailed reporting on the Summit commitments). This annual average has the public and private sectors on track to meet their committed disbursements for 2030 (Figure 1.11). Two governments, Ireland and the United States, have fulfilled their pledges.

[5] Certain information ©2025 MSCI. Reproduced by permission; no further distribution of MSCI data permitted.

Figure 1.11 ▷ Progress tracking of IEA's 2024 Summit on Clean Cooking in Africa commitments[6]



Average annual investments by 2030 are on track to meet financial commitments made at the Summit on Clean Cooking in Africa

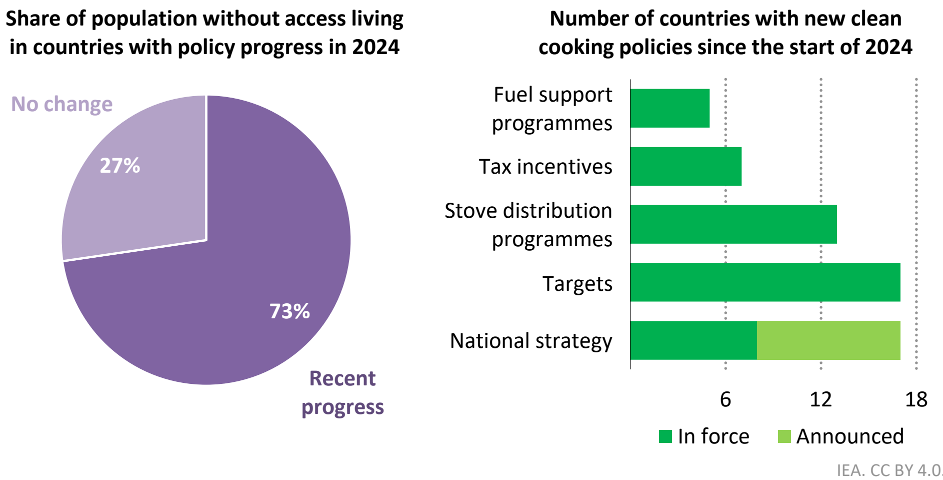
1.4 Policy inventory and progress

Recent momentum has led to a rise in the number of countries adopting clean cooking policies. The IEA tracks policies across different areas, including national strategies, targets, government incentives and programme plans. Since 2024, almost three-quarters of the African population without access to clean cooking lives in a country that made progress in one or more of these key policy categories (Figure 1.12). Across these categories, Ghana, Kenya, Malawi, Mozambique, Nigeria, Tanzania, Uganda and Zimbabwe have the widest coverage across key clean cooking policies today, while Tanzania and Kenya have exhibited the largest increase in policy coverage since 2024.

Since 2024, eight countries have launched new national clean cooking strategies, and nine more have committed to do so by the end of 2025. Several of these new national strategies were in response to the commitments made at the Summit on Clean Cooking in Africa, including Nigeria, Kenya, and Madagascar. Government targets are also being updated. Based on the IEA's tracking, seventeen countries have updated their clean cooking goals since 2024. Notably, Kenya pledged to reach universal clean cooking access by 2028 and Senegal set a new target of 2035. In addition, the 12 countries that launched Energy Compacts at the Africa Energy Summit included clean cooking alongside new targets.

[6] Summit commitment tracking reports on only progress towards the new commitments for Africa made at the Summit.

Figure 1.12 ▹ Countries with progress in clean cooking policies in sub-Saharan Africa since the start of 2024



Since 2024 almost three-quarters of the people without clean cooking access saw positive policy progress

To help implement these high-level strategies, governments are running various programmes and schemes aimed at advancing clean cooking solutions. Since 2024, 13 different clean cooking stove distribution programmes are being developed by African governments, largely targeting rural or informal communities. Both Ghana and Malawi initiated new clean cooking stove distribution programmes, supported by international development financing (GNA, 2024 and Carbon Pulse, 2024). Other programmes are focused on improving fuel affordability and availability. Uganda launched an initiative to support electric cooking by introducing the Electricity Cooking Tariff to make electricity more affordable for cooking. While many of these programmes aim to target lower-income households, they often struggle to reach them effectively. This is in part due to limited social security and welfare infrastructure, which makes it difficult to ensure that subsidies are directed only to those who need government support for clean cooking solutions.

Carbon credits have also emerged as a key source of finance for cookstove projects. However, many countries lack policies and legislation to support local carbon credit market development. As of 2025, only nine countries in sub-Saharan Africa have the regulatory frameworks to support crediting activities under voluntary carbon markets and Article 6 of the Paris Agreement (Gold Standard, 2025). Ghana has recently established a Carbon Markets Office and is pursuing carbon credit revenue to fund a significant part of its Nationally Determined Contribution (NDC) implementation, including clean cooking initiatives.

Table 1.2 ▷ Clean cooking policy landscape in selected countries in sub-Saharan Africa, 2024

Country	Target	Framework: National strategy	Framework: NDC provisions	Financial support: Designated authority	Financial support: Tax incentives	Financial support: Domestic Manufacturing	Regulations: Carbon market	Regulations: Government monitoring	Regulations: Cookstoves standards
Angola	–	–	–	•	•	–	–	•	–
Cameroon	–	•	•	•	–	–	–	•	–
Congo	–	–	•	•	•	–	–	–	–
Côte d'Ivoire	50% by 2030	○	•	•	●	–	–	–	–
DR Congo	30% by 2030	○	•	•	–	–	–	•	–
Ethiopia	100% by 2035	●	–	•	–	•	○	•	–
Ghana	50% by 2030*	○	•	•	–	•	●	•	●
Kenya	100% by 2028	●	●	•	●	●	●	•	•
Liberia	–	○	•	•	–	–	–	•	–
Madagascar	50% by 2030	○	•	•	•	–	–	•	–
Malawi	75% by 2030	●	•	•	–	–	○	•	•
Mali	100% by 2030	–	•	•	–	–	–	•	–
Mauritania	–	○	•	•	•	–	–	–	–
Mozambique	–	○	•	•	•	•	–	•	–
Niger	12% by 2030	•	•	•	●	–	–	•	–
Nigeria	100% by 2030	●	•	•	●	●	–	–	•
São Tomé and Príncipe	50% by 2030	●	–	•	–	–	–	•	–
Senegal	100% by 2035	●	•	•	•	–	–	●	–
Sierra Leone	100% by 2030	•	•	•	–	–	–	•	–
South Africa	–	–	–	•	–	–	•	•	–
Tanzania	80% by 2034	●	•	•	●	●	●	●	○
Togo	100% by 2030	•	•	•	–	–	•	•	–
Uganda	50% by 2030	•	•	•	●	–	●	•	–
Zambia	40% by 2030	○	●	•	–	–	•	•	–
Zimbabwe	50% by 2030	●	●	•	●	–	●	•	–

Notes: ● = regulation change since the start of 2024; ○ = announced/forthcoming policy change; • = regulation enforced before 2024; – = no known policy; *target focus on LPG fuel. Target = national goal set to increase access to clean cooking solutions; National strategy = official government plan outlining the path to scale up clean cooking; NDC (Nationally Determined Contribution) provision = clean cooking is included in the NDC; Tax incentives = fiscal exemptions or reductions for clean cooking fuels or appliances; Domestic manufacturing = policies supporting local supply of clean cooking technologies; Carbon market = legal framework on carbon market; Cookstoves standards = regulation requiring the use or sale of certain clean cooking technologies. The policy landscape in 25 selected countries in sub-Saharan Africa are included. Congo = Republic of the Congo; DR Congo = Democratic Republic of the Congo; Tanzania = United Republic of Tanzania.

Tax exemptions for clean cooking equipment and fuel could also lower consumer costs. Value Added Taxes (VATs) for these products range from 8% to 20%, while tariffs can be up to 55% for clean cooking fuels and up to 35% for equipment. Since 2024, seven countries made changes to their VAT or tariffs for clean cooking equipment or fuel. Kenya reduced its VAT on denatured bioethanol to zero in 2025. Nigeria exempted LPG and biogas – along with related equipment such as conversion kits, biogas digesters, compressors, and clean cooking accessories – from VAT. Uganda removed VAT from biomass pellets and from bioethanol and ethanol stove components, and Tanzania has announced plans to lower taxes and levies on clean cooking appliances and energy-efficient stoves. Assessing the impacts of these tax measure revisions and identifying alternative measures to offset the fiscal impact may be necessary for their scaling. Changes in taxation policy could conflict with other debt covenants agreed in these countries with institutions like the International Monetary Fund. While tariff removal can increase demand, reverting to higher tariffs may be politically difficult, and must be timed to manage the impacts of sudden price surges. Tariff reform assessments can also be paired with incentives for local supply development, as demand growth is often a key foundation for building up local supply chains. Only a few countries have measures in place to promote local production, including local content requirements or explicit assessment criteria for bidders to have local content.

Aside from incentives and managing affordability, safety regulations, standardisation, and enforcement are all essential policy supports to encourage market entry. Only a handful of countries have adopted regulations covering efficiency, emissions or safety with many focusing on charcoal and biomass stoves exclusively (Table 1.2). Clear performance standards are often highlighted by industry players as the most important aspect of the clean cooking policy landscape when they are considering expanding into new markets, especially for LPG. Only four countries tracked have active policies that mandate standards related to clean cooking. Efforts to install agencies responsible for regional standards and enforcement are also advancing. This could reduce implementation costs, help create a broader interconnected market and lower the cost of market entry, especially for land-locked countries.

Outlook for Clean Cooking in Africa

Off the back burner?

SUMMARY

- Based on today's policies, investment and market trends, only three African countries are set to reach universal clean cooking access by mid-century. Sub-Saharan Africa could achieve universal coverage by 2040, if countries were to replicate the best historical rates of progress seen in similar countries around the world – a pathway explored in the new Accelerating Clean Cooking and Electricity Services Scenario (ACCESS). It will require 80 million people to gain access annually, or a 4.7 percentage point improvement in access rates each year, comparable to rates of progress seen in Indonesia, Cambodia and Viet Nam.
- By 2035 in the ACCESS, nearly all households move away from cooking methods posing the most acute risks to human health, with almost 95% of urban households already having clean cooking access by that point. Southern Africa reaches universal access to clean cooking earlier than other regions, given current levels and policies, followed by West, East and then Central Africa.
- The ACCESS uses new geospatial analysis to assess the availability and affordability of all cooking solutions and the likely adoption pathway while optimising for more convenient, higher performing stoves. Liquefied petroleum gas (LPG) accounts for 61% of new clean cooking access by 2040, followed by electricity at 17%, modern biomass, bioethanol, and biogas together making up the remainder. Natural gas only plays a role in a few dense urban areas in gas-producing countries.
- The consumption of modern cooking fuels grows sixfold by 2040 in the ACCESS. This implies a fivefold increase in LPG and electricity consumption for cooking over today's levels, and ten-fold for modern bioenergy, albeit from a low starting point. These increases are meaningful for African and international markets in the long-term. Sub-Saharan Africa's LPG demand for cooking in 2040 is equal to 8% of today's global LPG market – around 940 kbd. Bioethanol demand would be 6% of today's global market. Electricity for cooking increases sub-Saharan Africa's electricity demand by 65 TWh by 2040 – 15% of the region's current total electricity generation.
- Achieving universal clean cooking access in Africa requires USD 37 billion worth of investment from now through to 2040 – more than USD 2 billion annually. But the benefits of universal access to clean cooking are immense. By 2040, the cumulative premature deaths averted in sub-Saharan Africa by pursuing the ACCESS instead of today's trajectory reaches 4.7 million. The average household more than halves the amount of time they spend gathering fuels, making and tending to fires and cooking each day. On net, Africa's annual greenhouse gas emissions fall by 540 Mt CO_2-eq – roughly equal to the emissions of international aviation. The total forest area spared from deforestation is equivalent to the size of Ecuador.

2.1 Introduction

This chapter examines the energy sector implications for sub-Saharan Africa under a new pathway to universal access, as outlined in the **Accelerating Clean Cooking and Electricity Services Scenario (ACCESS).** In this report, the scenario explores the impact of a coordinated effort across all African countries to match the most successful historic rates of progress in clean cooking access seen globally.

The ACCESS defines tailored pathways for urban and rural areas in each country, drawing on examples from countries with similar demographic, economic, and institutional contexts. Household transitions to clean cooking are determined through detailed geospatial analysis, accounting for both affordability and regional fuel availability. The scenario prioritises affordable solutions that align with consumer preferences – such as convenience and health benefits. Further details on the methodology and assumptions underpinning the ACCESS are provided in Box 2.1.

This chapter presents the key outcomes of the ACCESS, including projected access rates, fuel usage patterns, supply security, investment needs, and the broader impacts of switching to clean cooking. These results are compared against current policy and technology trends, highlighting the gap between today's trajectory and the 2030 target for universal access under Sustainable Development Goal 7 (SDG 7).

Box 2.1 ▻ The methodological approach behind the ACCESS

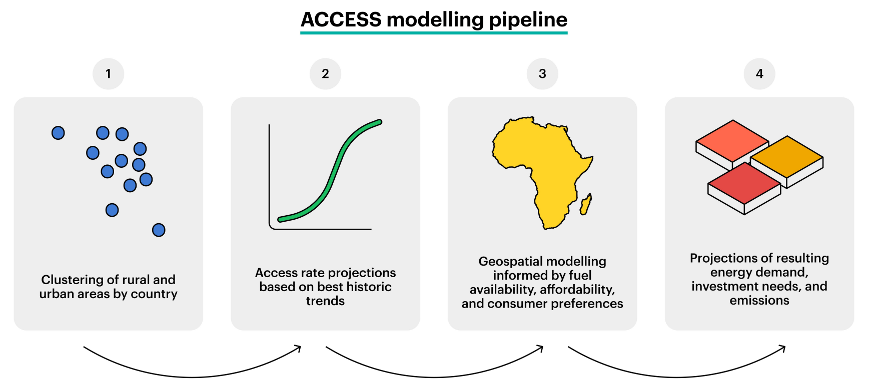
The IEA developed new modelling for the ACCESS, which in this report is applied to sub-Saharan Africa and focuses on clean cooking.

The new modelling is done country-by-country and establishes a distinct pathway for extending access to both rural and urban areas, drawing on economic, demographic, and geospatial data to identify appropriate benchmarks for the rate of extending access. The ACCESS accounts for practical constraints in scaling up policies, infrastructure, and programmes in the near term, as well as the slowing of progress when nearing universal access as efforts shift towards reaching the most remote and underserved populations. It then assesses the availability and cost of each clean cooking solution for every square kilometre in Africa and selects the clean cooking option that is most affordable relative to household incomes and maximises consumer benefits for convenience and health. Accordingly, the scenario is, by nature, exploratory in that it does not target a specific outcome but rather maps how energy and access trends evolve under the conditions outlined. The scenario takes a similar approach for electricity access gains which will be explored in other IEA reports.

In the ACCESS, the energy impacts are significant in emerging and developing economies, where the access gap is largest today. Their energy systems scale to meet this new demand in a way that is consistent with current trends in policy, technology, and market deployment. The incremental energy demand from extending energy access has an impact on global fuel markets, which adjust to accommodate these increases alongside prevailing demand projections.

A detailed step-by-step explanation of how the scenario was developed follows. It begins with 1) matching countries with appropriate benchmarks, followed by 2) projecting access rates based on best historic trends, 3) using geospatial tools to identify the available, affordable, and preferred clean cooking technology across Africa, and finally 4) assessing the energy demand, investment needs, and emissions associated with adopting this mix of clean cooking solutions (Figure 2.1). The energy demand, investment requirements, and emissions projections are derived using the Global Energy and Climate (GEC) model (IEA, 2024a).

Figure 2.1 ▷ Modelling framework for the ACCESS



The IEA developed new modelling for the ACCESS, which in this report is applied to sub-Saharan Africa and focuses on clean cooking.

Step 1: Clustering of rural and urban areas by country

Rural and urban areas within each country are first clustered based on shared characteristics such as energy access levels at the start year, income, demographics, country governance and fiscal health, level of infrastructure development, and the distribution of populations across the country. These factors collectively influence the pace of achievable progress towards clean cooking, guided by historical best practices.

The latest clean cooking fuels and technologies database from the World Health Organization (WHO) was used to assess historical progress in clean cooking access by country, disaggregated by rural and urban areas (WHO, 2025). Time series data were interpolated using S-curves, with the S-curve parameters serving as a benchmark to compare transition rates across countries. Reference cases were selected based on an analysis of data from approximately 130 countries for the main transition phase and around 30 countries for the final stage of access. Only countries that achieved an increase of more than 40 percentage points in access over recent decades were selected as reference cases for the main transition phase. Only countries that progressed from 90% to 98% access rates in available historical data were used as reference cases to model the "last-mile" phase.

A total of ten clusters were identified and linked to top examples of progress found in countries such as Cambodia, Egypt, India, Indonesia, Iraq, the Maldives, Peru and Viet Nam.

Step 2: Access rate projections based on best historic trends

Within each cluster, the scenario applies the best-performing historical trends to model both the main transition period and the final push to reach full access. The model also considers each country's readiness to begin its transition by assessing the current state of clean cooking policies and broader governance conditions and accordingly estimates a "ramp-up" period between one to five years. This helps ensure that the timelines developed are both ambitious and grounded in real-world potential. With these factors an S-curve is defined to project both urban and rural access rates in each country, ensuring a tapering of progress as efforts shift to closing the "last-mile" gap.

Step 3: Geospatial modelling to attribute clean cooking solutions

The choice of clean cooking solution adopted by households is determined first by availability and affordability, then by consumer preferences. Broader considerations – such as energy security and the scalability of supply chains – are also taken into account.

Using a 1 × 1 km geospatial grid, the model – built within the Open-Source Spatial Clean Cooking Tool (OnStove) framework (Khavari et al., 2023) – first calculates, for each pixel, the capital cost and one year of fuel expenditure for cooking with each option: electricity, liquefied petroleum gas (LPG), biogas, ethanol, natural gas, and solid biomass burned in clean advanced biomass cookstoves. Capital inputs come from a database with the latest costs for clean cooking equipment, while fuel costs use current prices but vary across each region based on key factors: grid electricity reflects each tariff zone; LPG and bioethanol reflect the added transport cost via road from the nearest wholesale depot. Biogas potential is constrained by livestock density, water scarcity and temperatures, while electricity is constrained by where the electricity grid is sufficiently reliable today – determined using night-time lights and reliability data – and where it may reasonably become available and reliable enough in the future.

In parallel, the model estimates purchasing power within each 2.4 km square, using Meta's Relative Wealth Index combined with national income distribution curves and settlement-level household-size data, yielding an average disposable income for each representative household.

The clean cooking solution that households adopt is then determined by identifying the modern cooking solution that maximises consumer benefits under a specified affordability threshold set for each country. Starting with the threshold that households spend less than 5% of their disposable income on clean cooking, this level is gradually raised until all households can afford at least one modern clean cooking solution. This is meant to reflect the use of targeted affordability support to allow all households to gain access. At this affordability threshold, the model selects from all available modern cooking solutions that the household can afford, maximising consumer preferences and perceived benefits of convenience (time savings), health and environment. The clean cooking technology allocation process is based on current affordability, assuming today's technology costs and household income levels remain constant.

The shares of technologies from this geospatial assessment are then applied to the earlier S-curve based approach for adoption rates, splitting technology by urban and rural areas. This aims to show that households, where the affordability gap is largest, are likely the later adopters.

This modelling approach is an approximation, and does not reflect a variety of factors which may influence consumer preferences for certain clean cooking solutions, such as local culinary traditions, the impact of policy efforts in the region, perceptions on the safety and the inferred social status, and the impact of various awareness campaigns. This approach also does not reflect fuel stacking, where many households may own and employ several cooking options.

Step 4: Projections of resulting energy demand, investment needs and emissions

Energy and emissions projections assume that households gaining access to clean cooking technology fully adopt it, relying exclusively on that technology to meet their cooking needs. New households obtaining clean cooking access in the model retain their initial technology solution until 2040. In contrast, households that already have access today may transition to alternative cooking solutions, notably benefiting from electricity grid expansions and improvements implemented under the ACCESS. These households progressively reduce fuel stacking practices, eventually phasing them out entirely by around 2040, once universal access is achieved in the region.

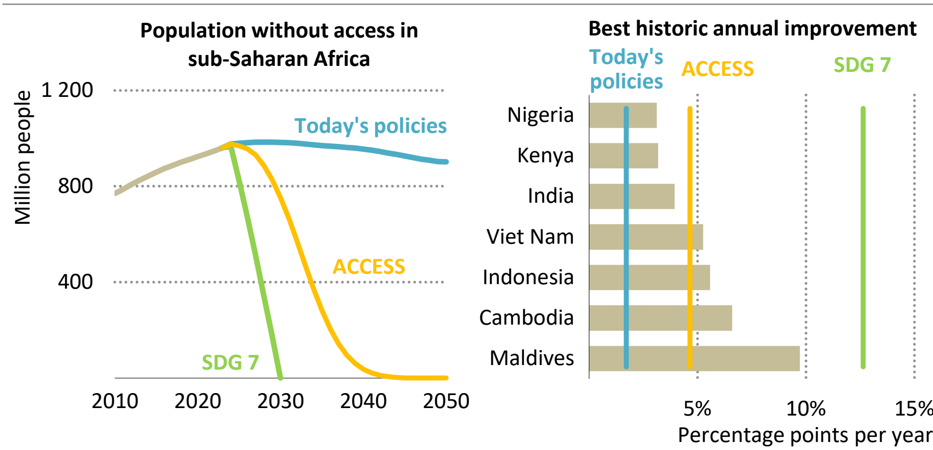
2.2 Clean cooking access rates

Under today's policies and trends, sub-Saharan Africa is not on track to achieve universal access to clean cooking even by 2050. Clean cooking access rates in sub-Saharan Africa are due to rise from around 23% today to 62% by mid-century under today's policies and trends. This implies that more than 30 million people gain access each year, with gains only slightly outpacing population growth. As a result, the absolute number of people lacking access to clean cooking remains largely unchanged from today. On this trajectory, only three African countries reach universal access by 2050, and most fail to even reach universal access in urban areas.

However, the outlook has improved in recent years. Based on policies in place in 2021, sub-Saharan Africa was projected to achieve just over 50% clean cooking access by 2050. Since then, international development finance flows have increased, total investment in clean cooking has reached new heights and new policies have been implemented. Since 2024, 40 new clean cooking policies have been adopted across countries that are home to over 70% of those without clean cooking access in Africa today (see Chapter 1).

Achieving universal access to clean cooking by 2030 is a key target within Sustainable Development Goal 7 (SDG 7), which seeks to ensure access to affordable, reliable, sustainable, and modern energy for all. Reaching this target on time and in full would require an unprecedented acceleration in progress (Figure 2.2). In sub-Saharan Africa alone, more than 160 million people must gain access each year by 2030 to align with this goal.

Figure 2.2 ▹ Population without access and annual improvement in clean cooking access rates – historic, scenarios and benchmarks

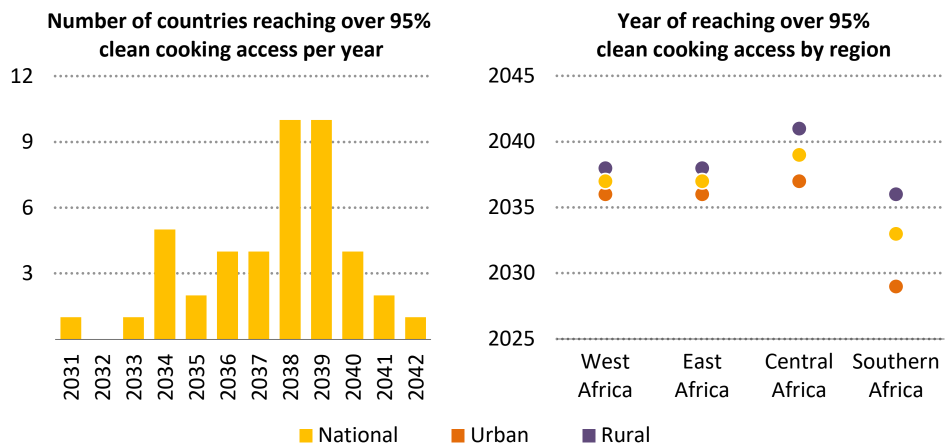


Ensuring universal access to clean cooking in sub-Saharan Africa would demand an unprecedented rate of progress, surpassing historic bests achieved around the world

Source: IEA analysis based on WHO (2025).

By accelerating progress to match the fastest historical rates observed globally in the ACCESS, sub-Saharan Africa could reach universal access by around 2040. This requires scaling up efforts to deliver clean cooking solutions to around 80 million people annually, peaking around 2033 These rates are comparable to national success stories such as Cambodia (6.6%), Indonesia (5.6%), and Viet Nam (5.3%), and the urban and rural rates of progress, taken separately, are comparable to those in India. Progress varies significantly between countries and regions depending on policy frameworks, current access levels, domestic infrastructure and fuel production capacity and population distribution (Figure 2.3). Countries such as Ghana, Kenya and Tanzania lead reaching universal access before 2040, while others advance more slowly. Fragile and conflict-affected states typically take the longest to accelerate progress.

Figure 2.3 ▷ Timeline of achieving over 95% clean cooking access by country, sub-Saharan Africa region, and urban-rural areas



Urban areas reach universal access around five years earlier than rural areas across sub-Saharan Africa regions, led by those with the highest access rates today

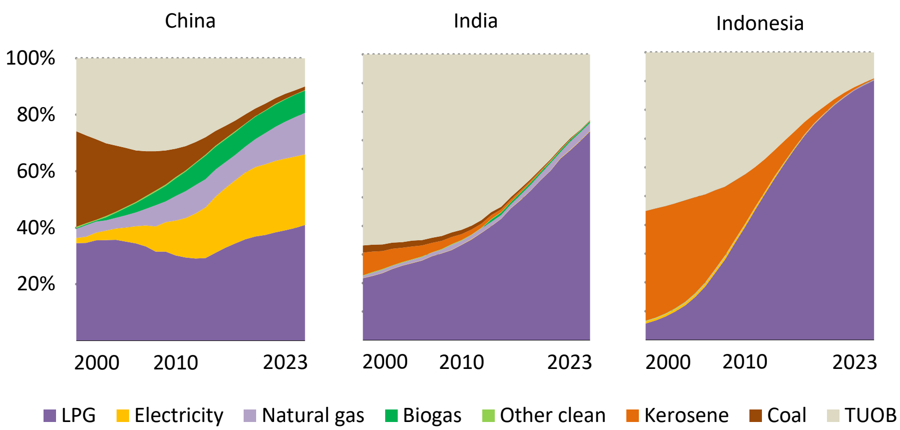
Urban areas reach universal access before rural ones, with urban access rates in sub-Saharan Africa nearing 95% by 2035. Peri-urban informal settlements represent a challenging segment to reach due to persistent affordability challenges. Targeted policy interventions in these areas can yield outsized benefits including reductions in local fuel pressures and improved public health. Rural areas face greater barriers. Access levels are lower, infrastructure is more limited, and household affordability constraints are more pronounced, with many subsistence farmers having limited access to commercial tenders to pay for fuels. As a result, progress in rural areas tends to lag, and typically requires greater policy attention and financial support to quickly close the access gap.

S P O T L I G H T

Leading country examples of rapid clean cooking transitions

Since 1990, around 35 countries have increased their national clean cooking access rates by over 40 percentage points, providing valuable real-world examples of how clean cooking transitions can take shape. Among them, India, Indonesia, and the People's Republic of China (hereafter, "China") have made remarkable progress in expanding access over the past two decades, each following a distinct path shaped by national priorities, infrastructure capacities, and geographic conditions.

Figure 2.4 ▷ Share of population primary cooking by fuel in China, India and Indonesia, 2000-2023



India and Indonesia achieved rapid cooking transitions via widespread LPG adoption, while China pursued a more diversified fuel strategy, leveraging existing infrastructure

Note: TUOB = Traditional use of biomass.

Source: IEA analysis based on WHO (2025).

Indonesia

In 2000, the clean cooking access rate in Indonesia stood at 7%. Among the population without access, around 40% relied on kerosene for cooking, while the remainder used traditional biomass. Since then, Indonesia has increased their clean cooking access rate to over 90% today, largely driven by the Kerosene-to-LPG Conversion Program, launched in 2007. The program distributed free LPG starter kits – including a 3 kg cylinder, single-burner stove, hose, and regulator – to households and micro-businesses. The initiative surpassed its original target, delivering 44 million starter kits in just two and a half years – ahead of the initial goal of 42 million over three years (World bank, 2021). This early success prompted the government to raise the target to between 53 and 56 million households in the subsequent years. Pertamina, the state-owned oil company, played a pivotal role in this transition by leveraging its existing kerosene supply chain to expand LPG infrastructure. The company rapidly established new LPG distribution points, ensuring widespread availability. Today, household use of kerosene for cooking has nearly vanished across the country.

This swift transition has not been without challenges. In many rural areas, households that had not previously relied on kerosene began using LPG alongside firewood, rather than fully replacing it. This was partly due to the limited capacity of single-burner stoves, which made it difficult for large families to cook efficiently. More recently, LPG price spikes – resulting from the global energy crisis – have placed increasing pressure on the national budget.

India

Over the past two decades, India has increased national access from 23% in 2000 to almost 80% today. This shift has also largely relied on LPG, accounting for 95% of the total gains in access since 2000. The government-led approach evolved over time, gradually enhancing the targeting of financial support to families most in need.

Historically, the government subsidised LPG through an untargeted mechanism – reducing the purchase price for all households and reimbursing oil market companies for the difference. To curb the diversion of subsidised cylinders to commercial markets, the government launched the PAHAL scheme in 2013-2014, which redirected subsidies directly to consumers' bank accounts. This eventually evolved into India's flagship scheme Pradhan Mantri Ujjwala Yojana (PMUY), launched in 2016. PMUY provided free LPG connections to women from below-poverty-line households, covering the costs of the stove, regulator, and initial refill. By 2019, the programme had reached 80 million households, expanding to over 100 million in its second phase. Although LPG use had been steadily increasing due to earlier policy efforts, the introduction of PMUY significantly accelerated the transition, achieving unprecedented improvements in access in the years that followed the programme's launch. Part of the success was linking the delivery of incentives directly to the purchase of clean cooking equipment and fuels, and channelling the support directly to women's bank accounts to avoid the money being co-opted for other expenses – linking to parallel efforts in India for financial inclusion.

Alongside targeted subsidies, India also invested in expanding and standardising its LPG distribution infrastructure, particularly in underserved rural areas. The number of LPG distributors rose from just over 9 000 in 2009 to more than 25 000 by 2024. Today, the LPG network covers virtually all households across the country. State-owned oil companies also played a key role in extending both storage and delivery infrastructure (Gaikwad et al., 2025 and SEforALL, 2020).

Despite the success of India's clean cooking transition, affordability remains a barrier. National surveys indicate that many rural families continue to rely partly on biomass, even when they own an LPG stove (CEEW, 2021). In response, the government has introduced capped-price refills for PMUY beneficiaries and launched behavioural change campaigns to encourage sustained use of clean cooking fuels.

China

At the start of the century, 60% of the population in China still lacked access to clean cooking and relied on coal and traditional biomass, but a rapid transition allowed access to increase from 40% to 90% by 2023. While in India and Indonesia the fast rate of improvement was achieved mainly through LPG, in China the share of the population cooking with LPG remained relatively stable over the past decades. The additional access gains were obtained through electricity, natural gas and biogas.

This transformation was underpinned by large-scale investments in electricity and natural gas infrastructure, supported by China's strong manufacturing base and outlined in successive Five-Year Plans. Although these initiatives were not specifically aimed at promoting clean cooking, they enabled a growing share of the population – particularly in urban areas – to adopt electric cookers and gas stoves. Rapid urbanisation played a key role in this shift, with the rural population declining from 800 million in 2000 to under 500 million today.

In rural areas, targeted government programmes also accelerated electrification. Initiatives such as the China Township Electrification Program (Song Dian Dao Xiang) and the China Village Electrification Program (Song Dian Dao Cun) facilitated the adoption of electric cooking appliances. In parallel, the Rural Household Biogas State Debt Project, launched in 2003, promoted the installation of domestic biodigesters across several provinces, giving biogas a prominent role in China's clean cooking transition. By 2011, over 40 million households had installed domestic biodigesters – up from fewer than 14 million in 2003.

2.3 Energy implications

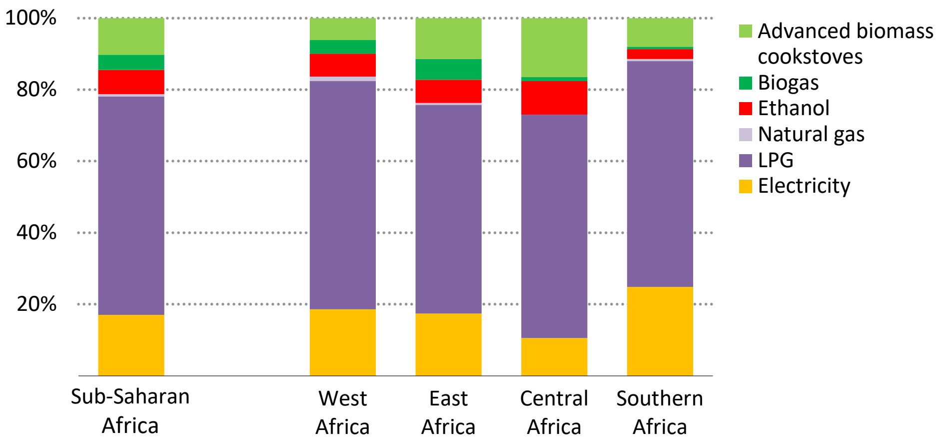
2.3.1 Clean cooking technologies

All cooking solutions contribute to accelerating progress in Africa, but where and how they can scale depends upon numerous factors. Geographic location, existing infrastructure, and socio-economic conditions all influence which technologies can be adopted and afforded by different communities, as do consumer preferences for more convenient, higher performing stoves suited to local cuisines and culture.

In the ACCESS, the IEA applies a new spatial analysis to assess the cost and feasibility of clean cooking solutions. This methodology evaluates the delivered cost of various fuels across each one square kilometre of the continent. It then estimates the most likely technology households would adopt, based on the assumption that they will select the most advantageous option within their financial means, also optimising for broader cons of energy security and the scalability of supply chains. The analysis accounts for anticipated improvements in infrastructure and fuel availability over time. Broader trends in energy supply and demand reflect current policy directions and technological developments (Box 2.1 for a full discussion of the methodology).

Based on this analysis, LPG accounts for 61% of new clean cooking access, while electricity provides 17%. Modern solid bioenergy – referring to solid biomass burned in clean, advanced biomass cookstoves (see Chapter 1) – represents 10% of new clean cooking access, concentrated in areas where affordability and a lack of robust distribution networks for other fuels are set to remain a challenge. Bioethanol and biogas account for 7% and 4% respectively. While natural gas is a major fuel for cooking in many countries globally, its role in sub-Saharan Africa in the ACCESS remains limited to a handful of dense urban areas where other industrial anchors or power plants are today, and which domestic natural gas production can easily reach.

Figure 2.5 ▹ Share of population gaining access to clean cooking solutions by fuel and sub-Saharan Africa regions in the ACCESS, 2024-2040



LPG accounts for more than 60% of new uptake in the ACCESS, followed by electricity. The mix across regions is shaped by infrastructure, affordability and available resources.

Notes: LPG = liquefied petroleum gas. Advanced biomass cookstoves only include clean advanced biomass cookstoves (Tier 4-5).

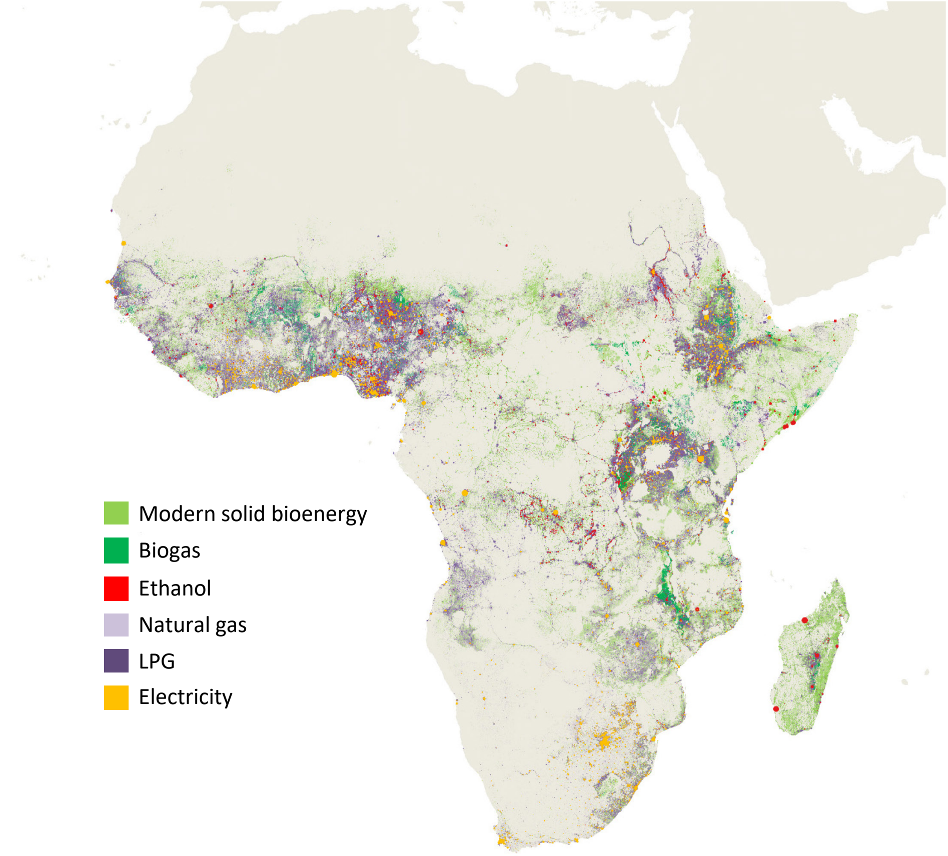
The role of each fuel differs across Africa, depending on country-by-country differences in availability, affordability, infrastructure and demographic spread. Electricity plays a more prominent role in Southern Africa, providing access to 25% of the currently unserved population in the ACCESS by 2040. This is driven by a greater proportion of the unserved population being able to afford electricity, as well as the presence of well-developed electricity grids in some countries, supported by a relatively mature and integrated power pool in sub-Saharan Africa. In Central Africa, advanced biomass cookstoves play a more prominent role than in other regions, accounting for more than 15% of new access. This reflects the region's greater financial constraints and lack of infrastructure. East Africa capitalises on its strong bioethanol foothold and biogas potential, with these fuels contributing to over 12% of new access by 2040. Nearly 23% of urban households in the region gain access to clean cooking through bioethanol – the highest urban share across Africa. However, the national share remains similar or lower to that of West and Central Africa due to the region's predominantly rural population. Biogas also plays a more substantial role in rural farming areas of East Africa than in other regions, but the high upfront cost of biodigesters remains a barrier for low-income households, preventing the technology from reaching its full potential. West Africa, currently experiencing the fastest growth in LPG demand in sub-Saharan Africa, sees the largest share of new clean cooking access provided by LPG among all regions.

Urban and rural households follow different fuel adoption pathways (Figure 2.6). In urban areas, clean cooking is increasingly dominated by electricity, LPG, and bioethanol, which together make up 95% of those gaining access. Higher household incomes, stronger electricity distribution networks, and greater market density tend to attract clean cooking companies and fuel distributors to these markets first. Some informal peri-urban settlements still rely on biomass, although as fuelwood and charcoal distributors see their markets dwindle, prices for these fuels may increase – potentially accelerating the shift to cleaner options even in these marginalised communities. New urban construction increasingly adheres to building codes that incorporate clean cooking set ups – such as LPG or electric connections – which, in the ACCESS, helps accelerate the shift.

In rural areas, the range of viable clean cooking solutions is broader. LPG and ethanol perform well in areas where existing infrastructure – such as petrol stations, supermarkets, or other retail outlets – can support the distribution of both stoves and fuels. However, electricity remains a more limited option due to lower grid access levels and inconsistent reliability. Many rural households that do gain access to electricity by 2040 in the ACCESS are expected to do so through small stand-alone solar systems, which often cannot deliver sufficient or affordable power for electric cooking. Where suitable, biogas digesters can use adequate animal waste to produce gas for cooking, provided that sufficient water resources are available. In the most remote parts of sub-Saharan Africa – where incomes are lowest and other fuels may not be viable – almost 15% of rural households without access today adopt clean advanced biomass cookstoves under the ACCESS, where affordability challenges and supply chain access remain a limiting reality.

The pathways explored in the ACCESS focus on the shift to higher-tier cooking solutions, however, affordability challenges and infrastructure lead times mean that transitional improved biomass cookstoves (ICS) still have an important role to play, particularly in remote rural areas. These stoves offer meaningful short-term benefits including reduced exposure to harmful emissions and time savings, while laying the groundwork for eventual transition to clean alternatives.

Figure 2.6 ▻ Distribution of people gaining access to clean cooking solutions in the ACCESS by 2040 in sub-Saharan Africa



Settlements closer to urban areas gain access mainly with LPG, electricity and bioethanol, while in rural areas other modern bioenergy solutions still play an important role to 2040

Sources: IEA modelling with modelling inputs provided by KTH Royal Institute of Technology based on the OnStove model developed by KTH Royal Institute of Technology (Khavari et al., 2023). Income levels per location are modelled based on Relative Wealth Index (Meta, n.d.).

In the ACCESS, the deployment of Tier 3 ICS accelerates until the early 2030s before stabilising. Over time, as clean fuels and technologies become more available and affordable – supported by ambitious policy programmes – rural households are expected to adopt higher-tier solutions. Roughly one-third of rural households adopt a transitional stove on their journey towards clean cooking between now and 2040. By 2035, practically all households would either have access to clean cooking solutions or have a transitional ICS (Figure 2.8).

The important role of transitional ICS in the ACCESS presents a valuable opportunity for African countries to develop a new local manufacturing industry. This industry could build on the foundation of existing basic cookstove production while introducing a moderate increase in complexity (Harvard, n.d.). It is sufficiently advanced to require skill development in essential areas such as metalworking, machining, forming, and welding, yet not so technically demanding as to create major barriers to entry. As such, it offers an ideal stepping stone for building workforce and industrial capacity. The skills and infrastructure developed through the transitional ICS industry could serve as a springboard for the production of more advanced clean cooking stoves and other manufactured goods. This approach ensures that today's investments will continue to generate long-term industrial benefits across multiple sectors.

Box 2.2 ▹ Affordability implications under the ACCESS

Affordability remains a primary barrier to household ownership of clean cooking stoves. At current income levels and market prices, around half of the population in sub-Saharan Africa – almost 600 million people – would need to spend more than 10% of their annual income to adopt any clean cooking solution (Shupler et al., 2021). This assessment considers both the capital expenditure cost of the clean cooking solution plus one year of fuel.

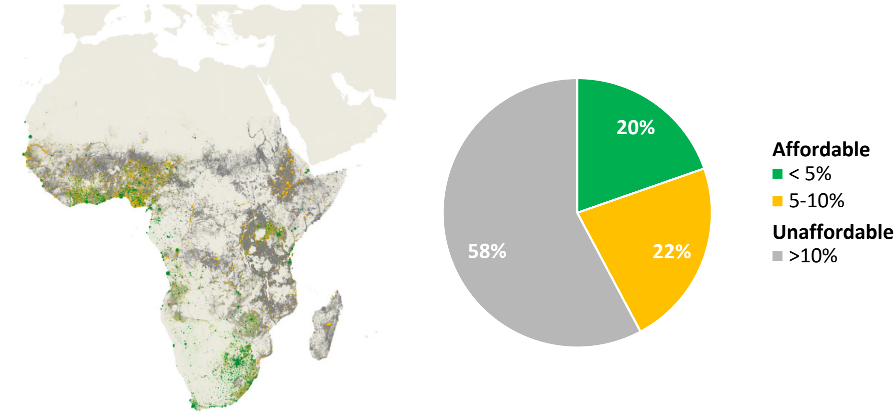
Measures to make clean cooking solutions more affordable play a central role in realising the ACCESS. The cost of adopting clean cooking solutions relative to household income is the primary consideration in attributing clean cooking technologies to the undeserved population in this scenario (see Box 2.1 for details on the methodology). Accordingly, without additional financial support, a large share of those gaining access to clean cooking in the ACCESS pathway would be unable or unlikely to adopt clean cooking solutions, even the most affordable option in their area (Figure 2.7). At today's income levels and market prices, the affordability gap – the amount of price reductions or affordability support required to bring clean cooking expenditure down to less than 10% of household income for every household for the first year of adoption – is estimated at USD 13 billion. A full discussion on affordability by fuel type is available in section 4.4.

There are many ways to lower the cost of clean cooking solutions. First, access tends to be more affordable in regions where supply chains and distribution infrastructure are better developed (see Chapter 3). New business model innovations, such as pay-as-you-go (PAYG) solutions and selling fuels in smaller volumes, can also play a significant role. Still, direct affordability support will likely be needed. Many African governments have recently revised taxes and import duties on clean cooking equipment and fuels to reduce final costs to consumers and support the build-up of nascent markets. Understanding the fiscal impacts of such measures is key to assess the sustainability of these measures.

For example, taxes and tariffs on LPG average around 7% across Africa, and bring in roughly USD 240 million worth of revenues in sub-Saharan Africa, though their significance varies widely across countries. In many parts of the world sudden revisions of taxes and tariffs for clean cooking have negatively impacted clean cooking markets (Das, Jeuland and Plutshack, 2022). Targeted affordability support is preferred to ensure that limited fiscal resources are directed toward helping the households most in need. However, this approach requires a significant increase in administrative capacity compared to current levels to ensure successful delivery and effective support for clean cooking. Models such as India's PMUY scheme, which delivered incentives directly to women's bank accounts linked to cylinder purchases, could serve as a basis for developing means to deliver targeted affordability support.

2

Figure 2.7 ▹ Affordability of clean cooking solutions in the ACCESS, from today to universal access



At today's income levels and prices, nearly 60% of households gaining access to clean cooking would need to spend more than 10% of their income on the upfront costs

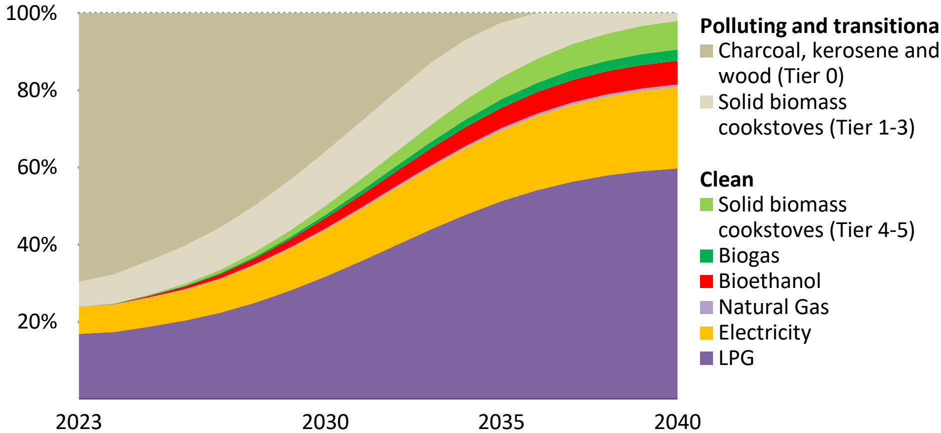
Note: Affordability is assessed as the share of households' disposable income spent on upfront costs, namely capital expenditure for clean cooking equipment, plus one year of fuel. A clean cooking solution is considered affordable if related expenditure is below 10% of household income.

Sources: IEA analysis based on the OnStove model developed by KTH Royal Institute of Technology (Khavari et al., 2023). Income levels per location are approximated based on Relative Wealth Index (Meta, n.d.).

2.3.2 Energy demand

The transition towards universal access to clean cooking in the ACCESS significantly reshapes the current landscape of energy – for cooking and beyond – in sub-Saharan Africa. At present, more than 75% of sub-Saharan Africa relies on the traditional use of biomass for cooking. Accordingly, solid biomass burned for cooking makes up around half of total final energy consumption in sub-Saharan Africa today. In the ACCESS, solid biomass falls to less than 10% of Africa's total final energy consumption by 2040, due to switching to more efficient fuels and equipment. This represents a massive modernisation in Africa's energy system – solid biomass is the single largest energy source in a majority of African countries today.

Figure 2.8 ▷ Change in primary cooking fuel by share of the population in sub-Saharan Africa in the ACCESS, 2023-2040



The ACCESS reshapes the landscape of energy use for cooking in sub-Saharan Africa, with the traditional use of biomass in three-stone fires and basic stoves phased out from 2035

Note: LPG = liquefied petroleum gas.

Source: IEA analysis with supporting data from MSCI (2025).[1]

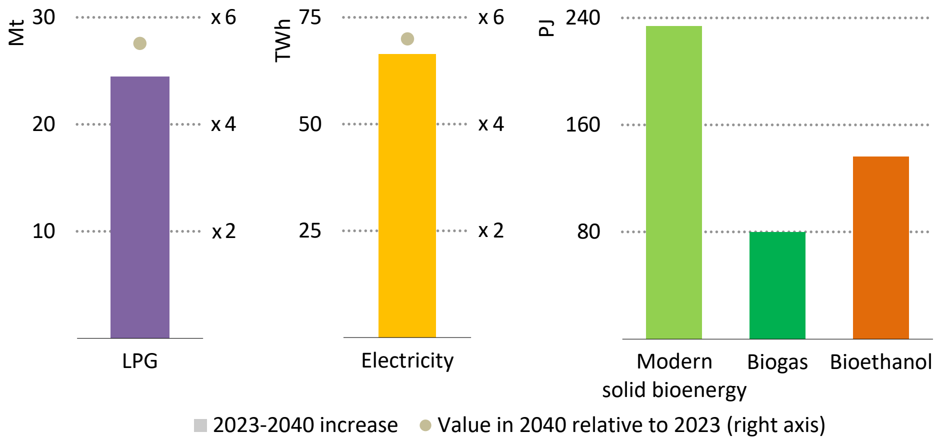
The demand for modern cooking fuels grows sixfold by 2040 in the ACCESS as consumers shift to cleaner cooking solutions. Residential cooking demand for LPG grows by more than fivefold by 2040, or around 25 Mt (Figure 2.9). The key constraint to achieving this growth is not fuel availability but the pace at which distribution infrastructure such as filling stations, cylinders, and storage can be built (see Chapter 3).

Electricity demand for cooking also rises sharply, increasing fivefold by 2040, or around 65 TWh, equivalent to around 12% of the total current electricity demand in sub-Saharan Africa. As a result, electric cooking contributes modest revenues to utilities in the near term, the extent of which depends on where electric cooking tariffs offering lower prices are implemented to spur adoption. Such measures also help to reduce import exposure for other cooking fuels.

Modern bioenergy demand for cooking increases almost tenfold by 2040, albeit from a low starting point. Bioethanol demand rises by 135 PJ, or 6.4 billion litres, playing an important role in expanding access within urban areas. Although bioethanol only represents 6% of the cooking fuel mix in 2040, its expanded use marks a significant shift within sub-Saharan Africa, where current consumption is limited to and concentrated in just a few countries. Growth in bioethanol demand could be supported by parallel efforts in the transport sector as blending mandates may help scale production and distribution systems.

[1] Certain information ©2025 MSCI. Reproduced by permission; no further distribution of MSCI data permitted.

Figure 2.9 ▹ Projected growth in annual energy demand for clean cooking by fuel in sub-Saharan Africa in the ACCESS, 2023-2040



Under the ACCESS, achieving universal access significantly boosts demand for clean cooking fuels, with LPG and electricity demand for cooking increasing more than fivefold

Notes: LPG = liquefied petroleum gas. Modern solid bioenergy refers to solid biomass burnt in transitional and clean improved biomass cookstoves (Tier 3-5).

Biogas expands by 80 PJ by 2040, or around 2 billion cubic meters equivalent (bcme), requiring the widespread rollout of biodigesters in rural areas with a high biogas potential. These systems are often supplemented with LPG to manage seasonal feedstock variability but both fuels use similar household infrastructure (e.g. stoves and piping), supporting flexible deployment.

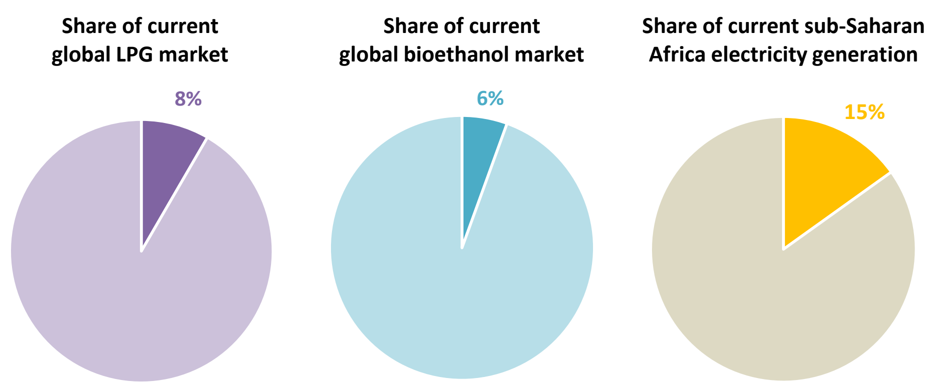
Solid biomass continues to play a central role in 2040, particularly in areas where affordability remains an acute challenge and where other fuel-supply infrastructure will be slow to expand. Demand for modern solid bioenergy for clean cooking increases by more than 230 PJ by 2040. This growth is accompanied by the emergence and expansion of modern solid biomass supply chains, including pellets and some formalised wood chip and charcoal production based on sustainable forestry practices.

Transitional ICS play a particularly important role in the short term, as these stoves already achieve reductions in energy consumption by a factor of two to eight, contributing to a reduction of over 20% in cooking energy demand across sub-Saharan Africa by 2030 and, in turn, the pollution associated with burning the biomass.

The adoption of clean cooking methods significantly boosts cooking energy efficiency in sub-Saharan Africa. Traditional cooking methods are highly inefficient, typically wasting 85-95% of the input energy. By 2040, total energy demand for cooking in the ACCESS pathway falls by almost three-quarters compared to today, despite a population increase of almost 50%. The adoption of modern cooking solutions reduces per capita cooking energy intensity to one-fifth of today's level by 2040. Overall, this transition in the region improves global energy efficiency, contributing roughly 5% towards the global target of doubling energy efficiency improvements by 2030 – a key outcome of COP28 in Dubai.

While this shifts the composition of the region's energy mix, the overall increase is modest in global terms and can be absorbed by international markets without substantial disruption in the near-term. The increase in LPG demand is around 25 Mt, or 765 kbd, raising Africa's LPG demand for cooking to approximately 8% of today's global LPG consumption (Figure 2.10), and to less than 1% of global oil demand. Under the ACCESS pathway, sub-Saharan Africa's LPG demand by 2040 would reach 940 kbd, comparable to today's levels in Central and South America or India, yet still account for only 60% and 35% of current LPG demand in the Unites States and China – the world's two largest LPG-consuming countries. Increased LPG use in sub-Saharan Africa could however have an impact on LPG market dynamics, notably its use as a chemical feedstock – which is price sensitive – but also how the oil industry markets natural gas liquids. African governments must also consider how fluctuations in global LPG availability and prices could impact consumers (Box 2.3).

Figure 2.10 ▷ Cooking fuel demand in 2040 under the ACCESS compared to today's global markets and regional energy demand



Providing clean cooking access across sub-Saharan Africa in the ACCESS would only require a minor share of global energy market's output

Sources: IEA analysis based on Argus Media Group, All rights reserved, and World Bioenergy Association (2024).

Sub-Saharan Africa bioethanol demand grows by around 110 kbd, or around 17.5 million litres per day (mlpd), in the ACCESS, representing less than 6% of today's global bioethanol market. Global bioethanol production is set to expand rapidly in the coming years, and currently has excess production capacity, largely from United States, Brazil, and India (IEA, 2024b). In 2040, electricity demand for cooking in the ACCESS scenario represents 15% of today's total electricity generation in sub-Saharan Africa – electricity used for cooking currently represents around 3% of electricity generation. This increase remains manageable within the broader context of rapidly growing total electricity demand in the ACCESS, driven by universal household electrification, reliability improvements, and the expansion of productive uses enabled by expanded access. Biogas demand reaches over 2 bcme by 2040, representing less than 2% of the region's current biogas potential (IEA, 2025).

Once households have access to clean cooking solutions, their cooking practices evolve. In the ACCESS, it is assumed that households fully adopt their new clean cooking solution upon gaining access and retain it until universal access is achieved. However, households that already have access today may transition to alternative clean cooking options before 2040. Among these households, the most significant shift in fuel use is towards electric cooking, both as their primary cooking method or adopting additional electric cooking devices. This transition is driven by the expansion and improvement of electricity grids under the ACCESS, the uptake of various electric cooking appliances, and government initiatives aimed at enhancing energy security and reducing reliance on fuel imports. In Southern Africa, efforts by some countries to ease pressure on the electricity grid in the short term also contribute to shifts towards LPG. Households with access to clean cooking today are assumed to gradually reduce fuel stacking practices, eventually phasing them out as universal access is achieved.

Beyond 2040, household use of modern fuels continues to rise steadily, eventually reaching levels of activity comparable to those in other emerging market and developing economies. Households also continue to shift or incorporate other types of clean cooking technologies guided by changes in consumer preferences, the adoption of new cooking appliances (such as kettles and pressure cookers), infrastructure expansion, and government policies.

Box 2.3 ▷ Ensuring energy security by managing import dependencies

In the ACCESS, the fuel mix is determined by optimising for availability, affordability and net household benefits (see methodology in Box 2.1). However, security of supply must also be considered to ensure the impacts of disruptions and volatility do not negatively impact consumers, risking a setback in progress towards clean cooking.

Over 60% of the underserved population today gain access to clean cooking via LPG in the ACCESS. Currently, around 50% of the LPG consumed in sub-Saharan Africa is imported. This share rises when only considering LPG for cooking, as the locally produced LPG is rich in propane, while safe and effective cooking in warm climates requires a higher butane blend. The United States supplies 62% of these imports followed by the Middle East (9%) and Latin America (9%) (Figure 2.11). At the same time, sub-Saharan Africa's domestic LPG production has declined in recent years. With production remaining stable, rising demand in the ACCESS is expected to more than outstrip local supply (see Chapter 3).

Figure 2.11 ▷ LPG imports to sub-Saharan Africa regions, 2014-2025

North America is the largest provider of LPG to sub-Saharan Africa, making up more than half of its foreign supply in the last decade

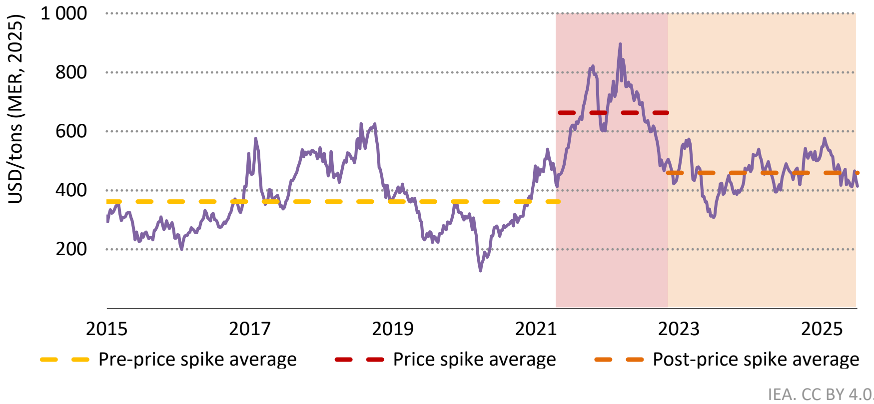
Source: IEA analysis based on data provided by kpler.com.

This reliance on imports raises concerns about affordability. As a globally traded commodity, LPG is priced on international markets, meaning that end-users are exposed to significant price volatility. While local pricing is influenced by transport, taxation and regulatory factors, long-term movements in global spot prices eventually pass on to consumers.

For households reliant on LPG, this introduces vulnerability to external price shocks. Because household cooking demand is highly inelastic, the modern clean cooking fuels bring an additional risk to urban populations: as countries dismantle the wood and charcoal delivery networks that now supply urban areas, households would have limited practical fallback solutions if LPG prices spike. This dynamic poses a fiscal risk for governments, which may be required to step in with subsidies during periods of high prices. Countries such as India and Indonesia, which have largely depended on LPG to provide clean cooking solutions for their populations, faced fiscal pressures when LPG prices surged during the recent global energy crisis.

Figure 2.12 shows LPG spot prices at Mt. Belvieu, Texas, the benchmark price for African LPG markets. These prices closely follow global oil trends with an average annual volatility of 35%, similar to oil. Statistically, a price increase of around 50% or more within a single year can be expected once every decade. Such a spike occurred between April 2021 and November 2022 when LPG prices averaged 83% higher than the levels prior to the Federation of Russia's full-scale invasion of Ukraine. If governments in sub-Saharan Africa had chosen to fully subsidise these elevated prices, the fiscal burden would have reached USD 1.7 billion. In the ACCESS pathway, if a similar spike occurred around 2040, the fiscal cost would rise to USD 9.4 billion, around a 5.5-fold increase.

Figure 2.12 ⊳ Mt Belvieu, United States LPG spot price, 2015-2025



LPG unlocks rapid gains in clean cooking, but its global price volatility can jeopardise affordability and strain public finances unless governments diversify and build safety nets

Note: LPG spot price is calculated by assuming a 60% butane and 40% propane mix.

Source: IEA analysis based on prices from Argus Media Group, All rights reserved.

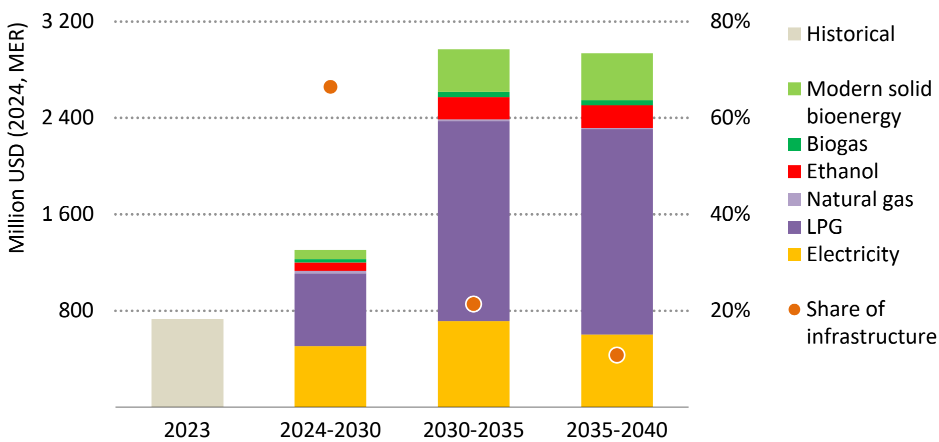
At the national level, rising imports and risks of price shocks may be compounded by macroeconomic vulnerabilities such as drawing down on foreign currency reserves, exchange-rate depreciation, placing further strain on household budgets and government balance sheets. The measures governments can take to manage energy security risks include: increasing domestic LPG storage requirements, putting policies in place to diversify to other forms of clean cooking, and ramp up mechanisms to better target affordability support to the households most vulnerable to price spikes. On a supranational level, countries can work together to create shared virtual reserves or advocate for the creation of an LPG futures market to hedge risks.

While the security of supply issues surrounding LPG must be carefully considered, given its critical role in the ACCESS, African governments should also consider the potential security of supply risks associated with ethanol imports and the import of key clean cooking equipment. These considerations also extend to improvement of electricity system reliability and resilience vis-à-vis electric cooking.

2.4 Investments

When looking at the broader picture of overall investments needed to enable adoption of clean cooking technologies, spending is required across cooking appliances, household installations, and enabling infrastructure. Realising the ACCESS for universal clean cooking in sub-Saharan Africa will require approximately USD 37 billion in investment by 2040, or more than USD 2 billion annually (Figure 2.13). Of this, the vast majority - 97% - is needed in sub-Saharan African countries other than South Africa. South Africa only requires around USD 1 billion to 2040 to close its access gap.

Figure 2.13 ▷ Annual investment required in the ACCESS and share of infrastructure by technology, 2024-2040



IEA. CC BY 4.0.

Early investments in infrastructure are crucial to hit peak rates of extending clean cooking access during the 2030s, where most capital goes toward providing end-user equipment

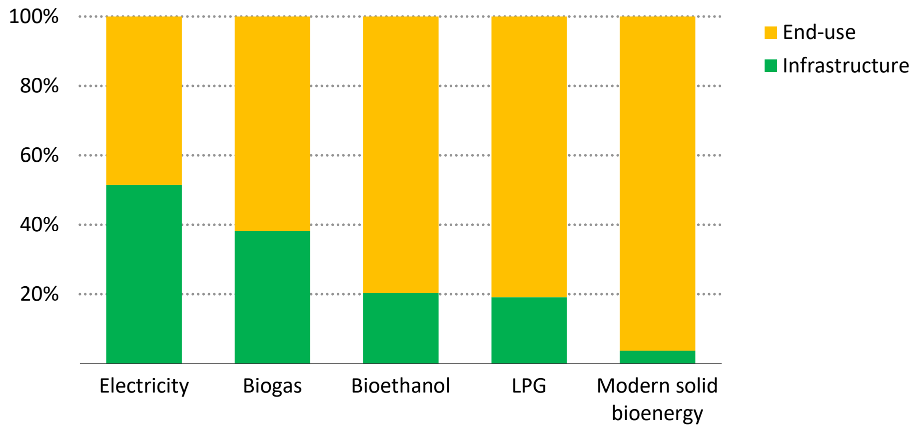
Note: LPG = liquefied petroleum gas.

In terms of asset allocation, around a quarter of the total investment is required for supply-side infrastructure including ports, import terminals, grid expansion and cylinder-filling plants. The remaining 75% goes to household appliances such as cookstoves and cylinders. This highlights the challenge of aligning financing for mass-distributed household appliances with the infrastructure backbone needed to support their use. The share of investments going to infrastructure in the ACCESS is higher in the first five years of the scenario, reflecting the need to build up adequate infrastructure in advance of the highest rates of rollout in the 2030s (Figure 2.13).

From now to 2040, more than three-quarters of all capital is needed in East Africa (USD 17 billion) and West Africa (USD 12 billion). Central Africa (USD 6 billion) follows, reflecting high population growth and extremely low baseline access levels. Southern Africa, outside South Africa, requires less than USD 1 billion.

In fuel terms, LPG and electricity account for 80% of the investment requirement in sub-Saharan Africa, excluding South Africa, attracting approximately USD 20 billion and USD 9 billion, respectively. The remaining 20% is spread across modern solid bioenergy, bioethanol and biogas. Natural gas plays a very limited role, reflecting its small role in universal access and rare contribution to first-time access, with the focus instead on fuel switching for existing clean cooking users. Details on the specific types of infrastructure that need to be deployed within each fuel is discussed at length in Chapter 3.

Figure 2.14 ▷ Share of clean cooking investment in the ACCESS by technology, 2024-2040



IEA. CC BY 4.0.

The share of investment needed for supporting infrastructure varies by clean cooking technology

Note: LPG = liquefied petroleum gas.

2.5 Health, time savings and emissions benefits

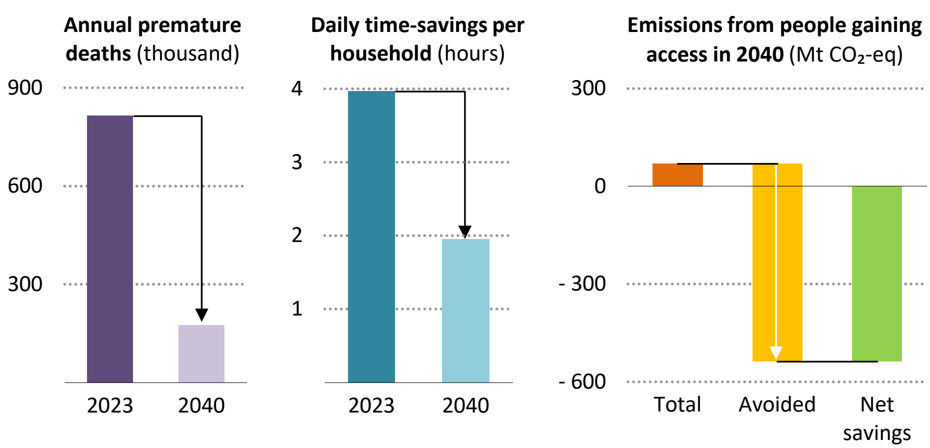
The benefits of extending clean cooking are substantial in terms of health, productivity and the environment. 815 000 people die prematurely each year in Africa due to poor indoor air quality, largely a result of a lack of access to clean cooking. This drops to roughly 175 000 annually by 2040 in the ACCESS. This means that in the ACCESS pathway, around 4.7 million premature deaths will be avoided between 2024 and 2040 when compared to a baseline where current trends in premature deaths continue in alignment with population growth.

Households also spend less time gathering and procuring fuel, and less time tending to fires by switching to faster, more efficient forms of cooking. The average time spent by households in Africa collecting fuel and cooking reduces from four hours each day in 2024 to around two hours by 2040. This is even higher for rural households that rely solely on gathered biomass, where the average household spends around five hours on fuel collection and cooking each day. The time savings yielded by this transition mean that by 2040 under the ACCESS, the shift to clean cooking yields time-savings roughly equivalent to the total annual working hours of Brazil each year when compared to a baseline where average collection times per household remain the same as today. Much of the time-savings benefit accrues to women and children, allowing them to pursue other opportunities such as education and employment.

In sub-Saharan Africa, today, the traditional use of biomass for cooking emits 410 Mt CO_2-eq annually – half from methane released during the incomplete combustion of biomass and the other half from unsustainable harvesting of biomass, largely from forests used for charcoal production. The traditional use of biomass is also a major source of black carbon emissions, a short-lived aerosol with high global warming impact. Were it included, the emissions from biomass would be even larger.

Although LPG combustion and electricity generation produce CO_2 emissions, the transition to clean cooking in sub-Saharan Africa ultimately leads to a significant net reduction in greenhouse gas emissions. In the ACCESS, by 2040, people who have gained access emit annually approximately 70 Mt of CO_2-eq for cooking. However, the transition away from biomass used in traditional cooking methods reduces greenhouse gasses emitted during the incomplete burning of fuelwood and charcoal in basic stoves by 280 Mt of CO_2-eq and curbs deforestation, saving 330 Mt of CO_2-eq when compared to a baseline scenario in which no additional people gain access compared to today. On net, this means actions to achieve universal clean cooking access in sub-Saharan Africa reduce greenhouse gas emissions by around 540 Mt CO_2-eq annually – roughly equivalent to the current annual emissions of international aviation.

Figure 2.15 ▷ Impacts of the ACCESS pathway in sub-Saharan Africa in 2040



IEA. CC BY 4.0.

The benefits of extending clean cooking access to all in the ACCESS are substantial in terms of health, productivity and the environment

Notes: Emissions are compared to a baseline scenario which assumes no further progress in access beyond 2023, with changes driven solely by population growth dynamics. Premature deaths refer to deaths caused by household air pollution.

Source: Premature deaths due to household air pollution in the ACCESS were modelled by the International Institute for Applied System Analysis (IIASA).

The impacts of reduced deforestation are also significant. From 2010 to 2020, the Food and Agriculture Organization (FAO) estimates that deforestation in Africa averaged around 3.9 million hectares per year – the world's highest rate of forest loss on a percent basis (FAO, 2022). Forest loss for clean cooking activities is estimated to be around 1.3 million hectares per year, although it is challenging to disentangle exact shares of charcoal and biomass harvested for cooking versus other applications in industry. The impacts are more acute in some regions than others, with hotspots concentrated at the interface of urban and peri-urban areas with forestlands in East and West Africa. In the Sahel region, the unsustainable use of forestlands also hinders efforts to curb desertification. In the ACCESS, the efforts to reduce solid biomass use and shift to more sustainable harvesting saves cumulative forest area the size of Ecuador compared to a baseline scenario where current trends in deforestation for cooking fuel continue in alignment with population growth.

Chapter 3

Clean Cooking Infrastructure

The right ingredients

SUMMARY

- Extending access depends on new infrastructure, with differing requirements across technologies and regions. This chapter maps for the first time ever Africa's existing clean cooking infrastructure, highlighting gaps and key considerations for expansion.
- Widening liquefied petroleum gas (LPG) distribution in sub-Saharan Africa requires the buildout of infrastructure. This includes additional primary storage – which is concentrated in oil producing states today – and improved port infrastructure, as 50% of LPG demand in the region is imported. On the distribution side, additional bottling facilities and specialised vehicles for safe transportation are required. With nearly 20 plants operating, cylinder manufacturing is a market segment where local players could have a competitive edge – provided quality meets international standards.
- Consumer uptake of electric cooking is on the rise globally, and in some countries, it has been a strategy to reduce fuel imports and better utilise electricity infrastructure. In South Africa, for example, over 80% of the population cooks with electricity. Successful rollout depends on increased reliability. Even for the 51% of Africans with electricity today, many do not have sufficiently reliable electricity.
- Across sub-Saharan Africa, at least 15 major cookstove production facilities are currently operating. While these facilities produce a range of stove types, many of them manufacture improved and advanced biomass cookstoves. The transition to higher-performing models is driving a shift toward modern, large-scale, centralised manufacturing, and in some cases a higher reliance on imports. Many advanced stoves require processed biomass pellets to meet specified air quality standards, rather than charcoal or fuelwood. Currently, at least 20 pellet production plants are operational or in development across 10 sub-Saharan African countries.
- Biogas systems convert organic waste such as crop residues, livestock manure, and human waste into biogas for cooking and nutrient-rich fertiliser. Biogas projects operate in at least 17 countries in sub-Saharan Africa today, and the region has the potential to produce over 110 bcme per year. Industry is shifting towards prefabricated digesters with lower costs and installation requirements to help scale. But without proper maintenance and training, many projects fall into disuse.
- Bioethanol for cooking has a significant footprint in East Africa today. Sub-Saharan Africa currently produces over 750 million litres of bioethanol annually across 25 facilities. New distribution models are emerging, including the use of "Fuel ATMs" installed at fuel stations and local shops. Some parts of the bioethanol supply chain – notably transportation and fuel storage – can leverage LPG infrastructure for their scale-up.

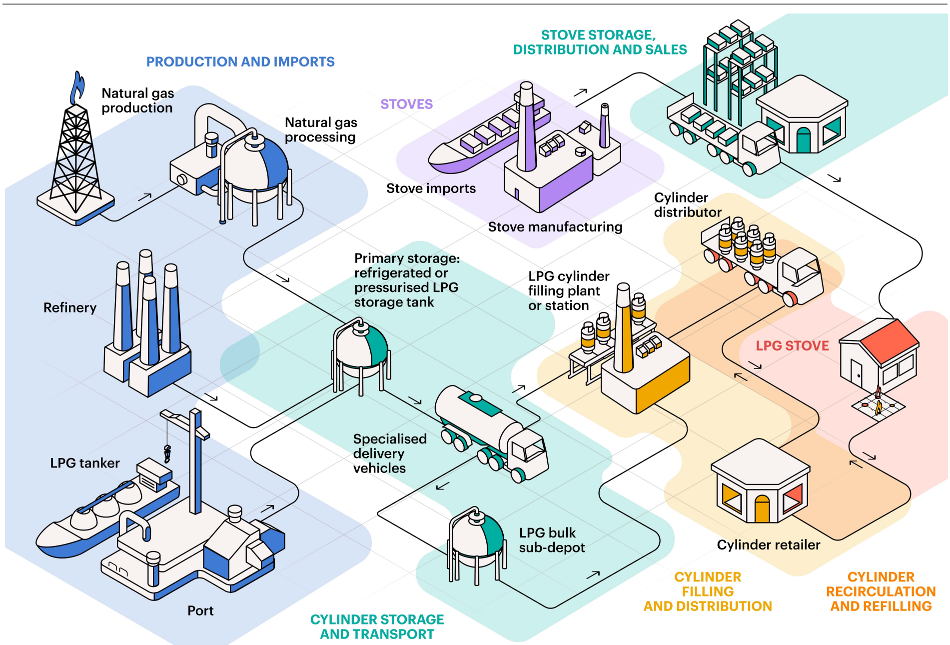
3.1 Introduction

This chapter provides a detailed examination of the value chains and infrastructure requirements of the key clean cooking technologies. It covers liquefied petroleum gas (LPG), electric cooking, improved biomass cookstoves (ICS) and advanced biomass cookstoves (ABS), bioethanol, biogas, and natural gas. For each technology, the analysis outlines the current supply chain, key infrastructure components and the associated challenges and opportunities for their expansion across sub-Saharan Africa. It includes new mapping of existing infrastructure across sub-Saharan Africa and identifies recent infrastructure developments by fuel type, as well as what is required to achieve universal access to clean cooking.

3.2 Liquefied petroleum gas

3.2.1 Introduction

Figure 3.1 ▻ Illustration of LPG cooking supply chains



The LPG supply chain is complex, requiring specialised equipment for safe storage, transport and distribution

Note: LPG = liquefied petroleum gas.

LPG, made up of propane and butane, has been the main driver of growth in clean cooking access in sub-Saharan Africa. LPG is a by-product of natural gas production and crude oil refining. In addition to cooking, LPG is also used in other sectors including industry (particularly petrochemicals) and transport (as a fuel for vehicles). Over the past five years, LPG was responsible for three-quarters of people shifting to clean and transitional cooking solutions in Africa, and more than 90% if Tier 3 improved biomass cookstoves are excluded. In the ACCESS, residential cooking demand for LPG grows more than five-fold by 2040. Due to safety risks and flammability, LPG requires specialised infrastructure (Figure 3.1) for its safe distribution and delivery, which has historically concentrated its distribution in urban areas. Several major initiatives aim to boost supply through improved refining, imports, storage, transport and distribution. With projected growth, imports would rise in many countries. Governments should therefore also consider strategies to manage energy security risks, as well as challenges related to the balance of payments and foreign exchange dependence. These strategies could include diversifying energy sources and the supplier mix, and expanding local storage and supply chains to help insulate economies from broader market shocks.

3.2.2 Infrastructure requirements

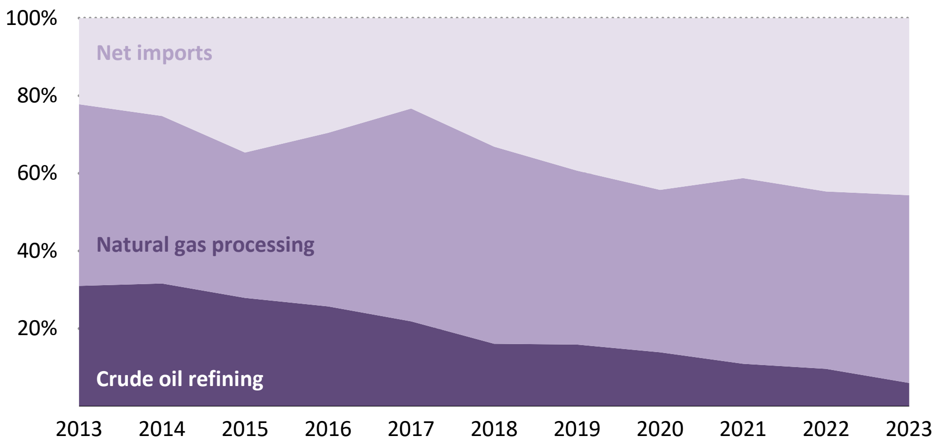
Production

LPG is a globally traded commodity produced from natural gas extraction and oil refining operations. Today at the global level, around 60% of LPG comes from natural gas production and 40% comes from crude oil refining. In sub-Saharan Africa, this share is around 85% natural gas to 15% refining today. Under current trends, global LPG production is set to rise in the near-term, with increases expected from several countries/regions including the United States and the Middle East as new production comes online. Worldwide demand for LPG is driven by markets outside Africa, with most of the growth coming from India, the People's Republic of China (hereafter, "China") and the Middle East. Global consumption is led by the residential sector for cooking, heating and water heating, while around 30% of LPG is consumed as a feedstock in the petrochemical industry, where producers can switch, at the margin, to other chemical feedstocks if they are more competitive. Flared well-head gas may contain propane and butane which, if captured by operators, could provide additional LPG capacity. Overall, LPG production from both natural gas liquids fractionation and from refining is expected to increase around 10% by 2030 due to continued growth in refinery capacity East of Suez and the steady expansion in natural gas production.

Sub-Saharan African LPG production lags demand and, despite prospects for rising domestic production, the region is set to remain a net importer. Around 50% of LPG demand is imported into Africa today (45% considering net imports – see Figure 3.2), primarily from the United States. A significant portion of Africa's LPG production consists of propane, while the LPG used domestically requires a high proportion of butane to ensure safe storage in hot climates. In West and East Africa, for example, the LPG blend is majority butane, reaching up to 85%. As a result, much of the locally produced propane – particularly in West Africa – must be exported, and butane is imported for blending. Today, only 15 countries in sub-Saharan Africa produce significant amounts of LPG.

Imports have been rising as a number of refineries in sub-Saharan Africa have closed or reduced utilisation. Sub-Saharan Africa's combined LPG production from natural gas liquids and from refineries has been flat, and slightly down over the last 10 years at roughly 100 thousand barrels per day (kbd). Yet, demand has risen, doubling over the past decade. Beyond 2024, new natural gas production is expanding or coming online in several countries, including Mozambique, Senegal, and Tanzania, helping to offset declines in LPG output linked to natural gas in other parts of the region. Additionally, Nigeria's new 650-kbd Dangote refinery started production in 2024, producing around 9 kbd of LPG (S&P Global, 2022).

Figure 3.2 ▻ Share of total LPG demand by source in sub-Saharan Africa, 2013-2023

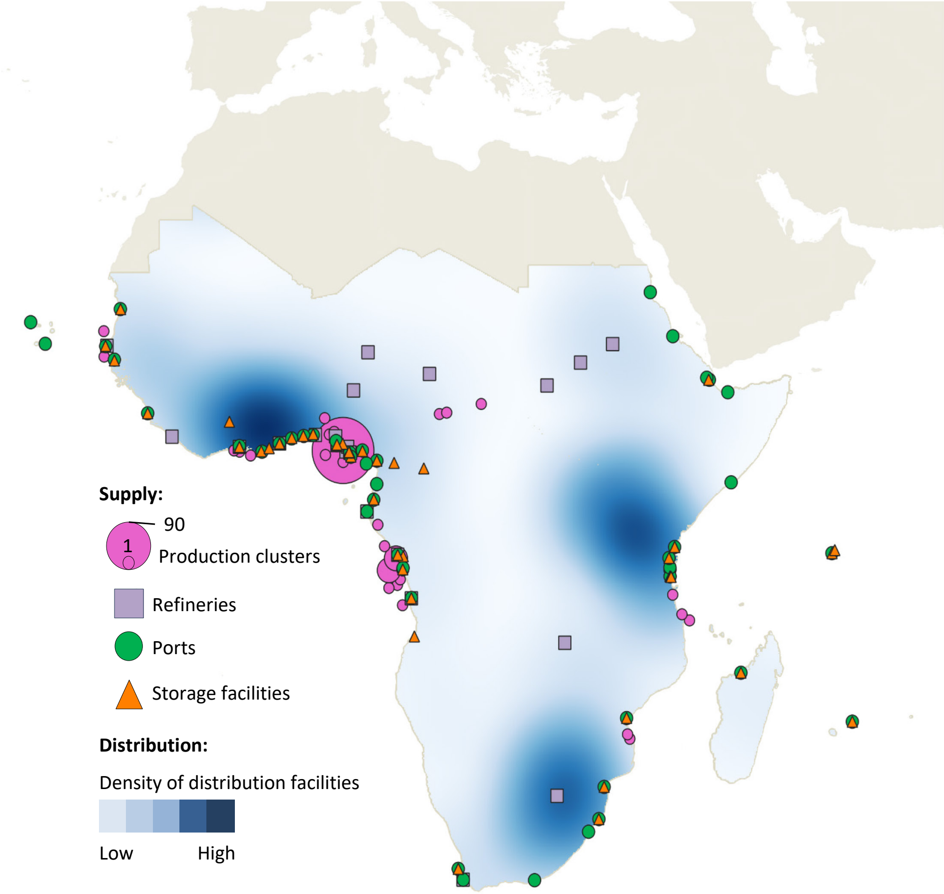


IEA. CC BY 4.0.

Declines in refining outputs in sub-Saharan Africa have increasingly tied domestic LPG supply to natural gas production, while imports continue to rise

Currently, a lack of appropriate port infrastructure limits import capacity in some countries. LPG imports are received by around 50 ports across sub-Saharan Africa, of which 85-90% have the infrastructure to support the medium gas carriers (MGCs), large gas carriers (LGCs), or very large gas carriers (VLGCs) which typically handle international imports. Of these, approximately 35 can handle LGCs and above which can transport in the range of 25 to 45 kt of LPG and bring economies of scale. Large carriers, however, also bring additional requirements, requiring deepwater ports (ports that can accommodate ships with drafts greater than 13 metres), berth lengths which accommodate ships of up to 250 metres (VLGC) and dedicated jetty facilities with unloading equipment. The major ports receiving LPG cargos are concentrated in just 14 countries, with most of these serving as regional distribution hubs to other countries including smaller and landlocked ones. Ports are concentrated in West and East Africa (Figure 3.3). Port infrastructure limitations for LPG are contributing to congestion, inefficient logistics and costly ship-to-ship transfers required to move LPG to onshore storage via smaller vessels. In some places the cost of ship-to-ship transfers can add USD 100 per tonne to the final delivered price of LPG compared to deliveries at ports with existing deep-water port facilities, a 10-20% premium at current market rates.

Figure 3.3 ▹ LPG port infrastructure, production sites and distribution density in sub-Saharan Africa



LPG production, port infrastructure, and storage is spread across sub-Saharan Africa, albeit concentrated in producer countries and those with higher levels of economic development

Notes: The density of distribution facilities considers the number of supermarkets, hardware facilities and fuel stations in a given cell. The ports included are those importing LPG. This map only shows current infrastructure.

Sources: IEA based on Global Energy Monitor (2025); data provided by kpler.com; and Argus Media Group, All rights reserved.

Scaling up jetty capacity and upgrading port infrastructure, with deeper and longer berths and appropriate handling facilities, will be critical to support growing volumes, minimise transport costs, and ensure supply reliability. Although many countries in sub-Saharan Africa currently have limited demand that may not justify the use of LGCs and VLGCs, those aiming to expand LPG imports in the future may need to invest in appropriate import infrastructure to accommodate growing needs and enable the unloading of larger shipments. For countries looking to import large quantities and serve as regional distribution hubs, ensuring port plans can accommodate larger ship sizes will be beneficial and bring economies of scale. In cases where ports do not have sufficient depth or length, Conventional Buoy Mooring (CBM), Single Point Mooring (SPM) or Multi-Buoy Mooring (MBM) systems which offload oil products (including LPG) offshore are emerging as an option to overcome port limitations. There are several such facilities existing or under construction in Africa today (e.g. Saldanha Bay in South Africa and Lekki SPM in Nigeria). Such mooring systems could help to scale-up imports while reducing infrastructure costs associated with upgrading port facilities, though investment costs can be substantial.

Storage, transport and delivery

LPG storage facilities are needed to safely store and hold LPG at points of production, export, import and delivery, and help ensure fuel availability and stabilise prices. Storage facilities can either be pressurised, refrigerated or semi-refrigerated/semi-pressurised. Large-scale storage is typically refrigerated. Storage facilities are often located next to ports to enable product loading or the offloading of gas carriers. In sub-Saharan Africa, there is currently more than 600 kt of storage capacity – equivalent to half the storage in Indonesia. While this storage is spread across around 20 countries, the majority is located along coastlines and used to store LPG either for export or import by ship. Two countries, Angola and Nigeria, account for over two-thirds of the storage capacity, linked to local production. In the ACCESS, to meet storage requirements for at least 30 days of storage for each country in sub-Saharan Africa by 2040, an additional 700 kt of LPG storage would be required. If current import shares were to be maintained, around half of this would be needed for coastal storage terminals that can support imports.

From primary storage facilities, LPG is distributed to secondary bulk storage depots or directly to cylinder filling plants. Inland distribution remains a significant logistical challenge, particularly in landlocked countries and remote regions where infrastructure is underdeveloped. Refilling facilities and fuel distribution points tend to have their own small storage facilities – both of which help reduce logistics costs and manage risks of local disruptions. Almost all primary LPG transport across Africa occurs via road tankers equipped with special pressurised vessels to safely transport liquefied gas. LPG could also use new and existing rail lines by purchasing specialised rolling stock. This could reduce LPG costs for communities further away from ports, with one such project announced in South Africa capable of transporting over 2.5 kt of LPG to inland hubs (WLGA, 2024).

Cylinder manufacturing, filling and distribution

Cylinders represent the largest capital outlay for the LPG sector, and their production, validation, transport and refilling represent a substantial network that needs to be built throughout sub-Saharan Africa. Imports account for the majority of Africa's cylinders, averaging USD 300 million worth of imports annually over the past few years (CEPII, 2025), but local manufacturing capacity is growing. In sub-Saharan Africa, there are almost 20 known cylinder manufacturing facilities, with notable developments such as a fully automated plant in Nigeria capable of producing more than five million cylinders annually. In the ACCESS, the number of LPG cylinders required grows almost four-fold to 2040 compared to current levels, increasing by over 340 million. Domestically manufactured cylinders can offer cost savings and present an opportunity to strengthen local supply chains. Ensuring consistent adherence to quality standards – both real and perceived – will be key to unlocking the full potential of domestic manufacturing.

LPG refilling represents a major part of distribution logistics and investment. Filling facilities in the formal sector typically range from smaller mobile facilities that are often used in new markets with a typical throughput capacity of around 1.5 million cylinders annually to larger plants that have a throughput capacity of up to 5.6 million cylinders. There are several potential cylinder ownership models that have an impact on the infrastructure needs for refilling. These include cylinder recirculation models in which cylinders are owned by LPG companies, customer-owned cylinder models where the consumer purchases the cylinder upfront, and hybrid pay-as-you-go (PAYG) models. The core considerations for each model are shown in Table 3.1.

Table 3.1 ▷ Considerations for different cylinder ownership models and associated infrastructure requirements

Model Type	Cylinder ownership	Infrastructure benefits	Infrastructure limitations
Customer-Controlled Cylinder Model (CCCM)	Consumer	Requires limited infrastructure, allowing for swift market entry.	Operations fragmentation results in limited oversight over safety, tracking, and cylinder maintenance.
Branded Cylinder Recirculation Model (BCRM)	LPG marketer	Centralised infrastructure supports streamlined quality assurance, safety protocols, and logistics management.	Significant upfront costs required for infrastructure, such as plants, cylinders and branded return systems.
Pay-As-You-Go (PAYG) Model	LPG marketer – but shared/ leased to user	Digital solutions support real-time consumption monitoring and efficient distribution planning.	Effective implementation depends on dependable tracking systems and initial investment in digital infrastructure.

The customer-controlled cylinder model (CCCM) is the prevailing model across much of sub-Saharan Africa. In CCCM markets, consumers refill cylinders at distributed sites with small (three to ten tonne) storage, often co-located with petrol stations. This requires training a wide network of workers on safe refilling. Regardless of the model, investment at retail points represents a substantial future infrastructure outlay across Africa. Geospatial mapping shows that distribution networks are heavily concentrated around urban centres, where higher sales volumes reduce costs per customer, while rural areas are significantly underserved.

In branded cylinder recirculation models (BCRM), customers exchange cylinders at distribution points or, increasingly, via home delivery. The BCRM is often advanced by major industry players with established service networks, as it supports industry-led cylinder management and accountability. The model can enhance safety by placing responsibility for cylinder integrity on the owner, help reduce risks of theft and illegal refilling, thereby helping to prevent potential incidents, including explosions. It can also reduce upfront costs for consumers, by embedding the upfront cylinder cost in the fuel pricing, requiring instead a deposit. These features also contribute to a more stable and investable market environment.

Large-scale cylinder filling plants, typically linked to BCRM markets, are capital-intensive but can manage large volumes of throughput cost-effectively, although transportation logistics to and from refilling facilities can bring additional costs. Cylinders are distributed via trucks fitted with safety storage cages. Distribution points – such as supermarkets and petrol stations – also require safety cages. Despite these benefits, it is also the most capital-intensive model due to the number of cylinders that are needed for the system to function effectively. PAYG is an innovative BCRM variant using smart meters to track LPG use and charge consumers. Marketers own the cylinders and meters, which are delivered to users who prepay via mobile apps. The meter stops gas flow when credit runs out and alerts users to top up. Empty cylinders are returned, inspected, refilled, and redistributed. PAYG can deter cross-filling, as tampering with sensors alerts distributors.

As markets mature, many will switch from CCCM, which can help with market entry, toward BCRM. Countries like Cameroon and Ghana have adopted or are transitioning to BCRM. Safety across the supply chain – especially cylinder inspection, refilling, and transport – is a principal concern for the industry when deciding where to expand their business. Cylinders should be revalidated every 5-10 years, but many countries lack testing facilities, posing compliance challenges. Scaling up filling sites and enforcing regulations are critical, as shown by issues in Kenya with illegal refilling and theft.

Box 3.1 ▹ Role of liquid renewable gases

Renewable liquid gas (rLG), such as bioLPG or renewable dimethyl ether (rDME) can be an alternative to conventional LPG. The similarities of properties between rLG and LPG can enable the use of the same distribution infrastructure and end-use equipment as LPG (occasionally with minor modifications required), providing opportunities for a transition to these renewable, lower-carbon products as they develop and becoming increasingly commercially available.

These products can be produced through various pathways, some of which are renewable. Traditional pathways involve production from natural gas or other hydrocarbon feedstocks. Renewable feedstocks can be used instead, including biogas or electrolytic hydrogen. Renewable feedstocks can come from various sources, including municipal waste, organic wastes and agricultural residues. rLG and rDME technologies are still in their early stages, with plans for commercial-scale plants only emerging in recent years and confined to advanced economies, although several countries in emerging markets and developing economies – including some in Africa – have conducted scoping studies for these technologies. Further, as an emerging technology with higher costs, the resulting fuels are more expensive, presenting additional challenges for affordability (de Jong et al., 2023). Accordingly, these fuels are not expected to play a notable role in scaling up access to clean cooking in the near-term.

However, in the longer term, the ability to make renewable liquid gas locally while using the same infrastructure could help reduce LPG import dependency and emissions. As these technologies develop, they could be increasingly blended with LPG. Countries with abundant agricultural waste hold production potential, and municipal waste streams also offer opportunities, including reducing direct methane emissions emitted from landfills. This could lessen import dependency, support local fuel production, and stimulate rural economies.

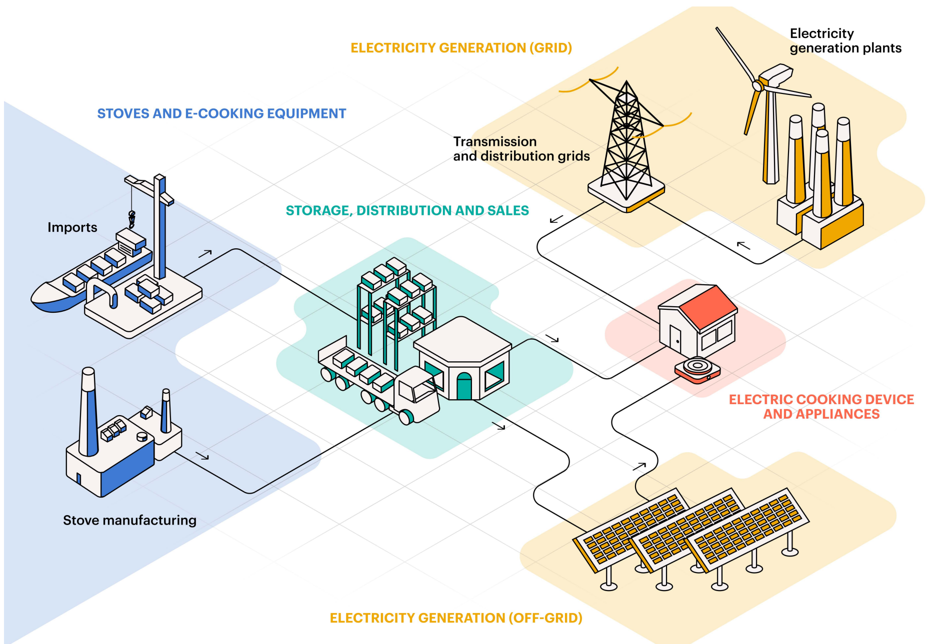
3.3 Electric cooking

3.3.1 Introduction

Electric cooking, or e-cooking, for the purposes of clean cooking access is defined as cookstoves that run on electricity and are used as primary cooking devices, which can operate via conduction or induction. The prevalence of electric cooking continues to rise globally. Around 50% of households in OECD countries now use electricity as their primary cooking fuel (MECS, 2024a) and in South Africa, more than 80% of homes use electric cooking. The scaling of electric cooking does not depend heavily on additional specialised infrastructure, but does depend on a reliable, robust electricity supply (Figure 3.4). It also sidesteps logistical challenges related to fuel distribution and some of the safety precautions needed to handle gaseous fuels.

In recent years, electric cookstoves have improved, with new designs being more efficient, having lower power draw, and costing less. E-cooking strategies have been advanced by countries as a means to boost energy security – especially where other clean cooking fuels must be imported and local electricity generation is relatively cheap and domestically sourced. Electric clean cooking has been included as an action area within Mission 300, which aims to advance electric cooking in co-ordination with efforts to provide 300 million people with electricity access by 2030 (Mission 300, 2025). All 12 countries that have developed Energy Compacts under this initiative reference clean cooking, with nine specifically mentioning e-cooking. Under the ACCESS, an additional 257 million people will cook with electricity by 2040 in sub-Saharan Africa and electricity demand for cooking rises more than five-fold. Beyond strengthening distribution channels for stoves, this will also require co-ordinated investments in expanding electricity access and strengthening household connections.

Figure 3.4 ▹ Illustration of electric cooking supply chains



Electric cookstoves require little specialised infrastructure for their rollout and operation beyond a reliable and affordable electricity system

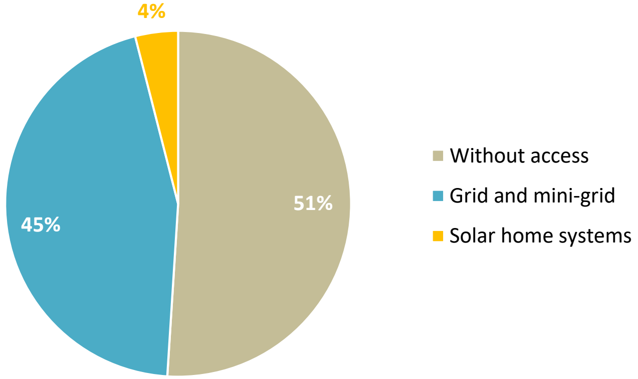
Box 3.2 ▹ Role of electric appliances beyond stoves in the clean cooking transition

While the focus of this report is on primary cooking devices (cookstoves), there are also a range of secondary electric cooking devices which households can use to complement them. These include electric pressure cookers, rice cookers and microwaves, which can be used for specific meals/functions and have a lower wattage draw than cookstoves – typically in the range of 0.5-1.2 kW compared to at least 1.5 kW for electric cookstoves. Some new devices, such as next-generation electric pressure cookers, can be very energy efficient, particularly for preparing long-boiling foods like Githeri – a boiled maize and bean dish that is a staple in Kenyan cuisine – requiring up to five times less energy than an electric stove (AFREC, 2024 and NIH, 2025).

While appliances like electric pressure cookers and rice cookers can contribute to the clean cooking transition, they are typically used for specific tasks and do not replace traditional cooking methods. It is also important to distinguish between low- and high-voltage electric cooking appliances. Lower-voltage plug-in devices often result in slower cooking and are more likely to be used occasionally, limiting their ability to displace polluting fuels. In contrast, higher-voltage appliances, which enable faster and more complete cooking, are more effective for fuel displacement but require more significant household investment, including electrical upgrades – practical and financial barriers that can be overlooked. Accordingly, the modelling focuses on primary, high-capacity electric cooking solutions that can serve as a household's main cooking method.

3.3.2 Infrastructure requirements

Figure 3.5 ▷ Population with and without electricity access by technology in sub-Saharan Africa, 2023



The vast majority of those with access to electricity in sub-Saharan Africa have access through grids and mini-grids

Access to a reliable electricity supply remains one of the largest barriers to the uptake of e-cooking stoves. Without dependable access to electricity, consumers are unlikely to adopt electric cooking solutions. Today, just 51% of people in sub-Saharan Africa have access to electricity, however only a fraction of these connections can support electric cookstoves, which typically require a minimum power capacity of 1.5 to 2 kW, and up to 15 kW for institutional settings like schools. Such power capacities can typically only be achieved with grid connections or mini-grid systems. Solar home systems (SHS) – which typically range from 0.05-0.1 kW for small systems suitable for lighting and phone charging to more than 0.5 kW for larger systems – are not suitable for e-cooking. In Africa today, 45% of those with access use grid and mini-grid systems, while 4% use SHS (Figure 3.5). While high grid and mini-grid penetration is promising for electric cooking, the ability of mini-grids to support it is context-specific. Not all mini-grid systems are designed to accommodate the higher power demands of e-cooking stoves compared to lower-voltage appliances, and including this capacity can drive-up the cost of mini-grids considerably (MECS, 2024b).

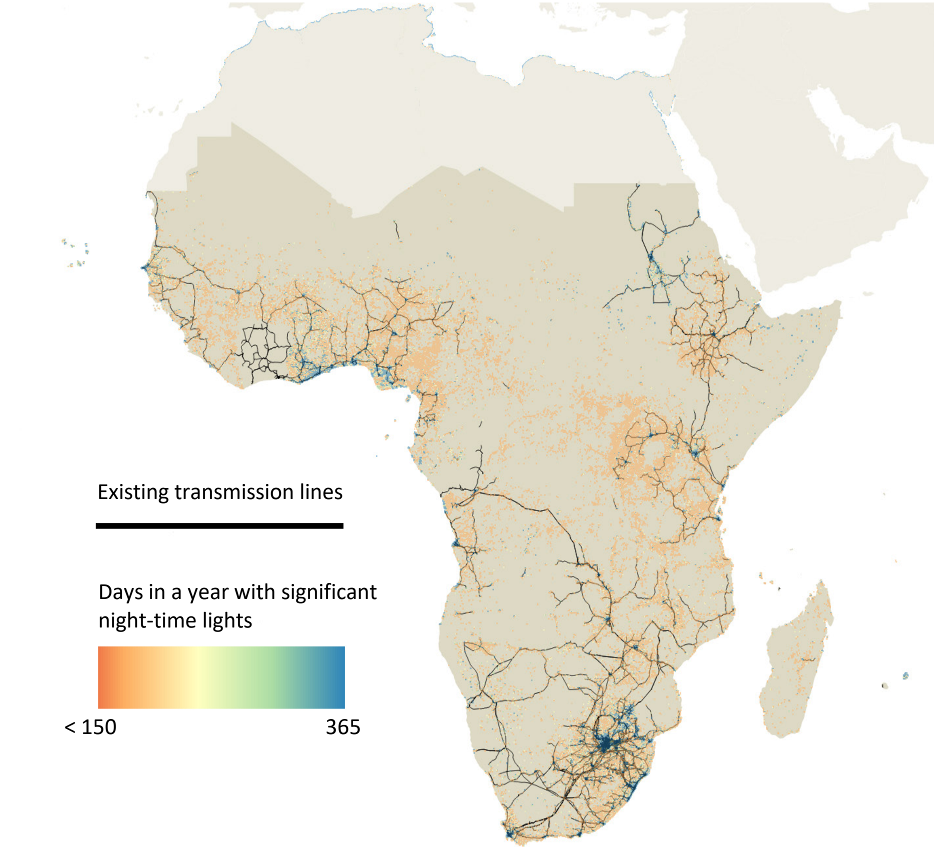
An electricity connection is only one part of the equation – beyond connection, reliability is crucial. IEA analysis of satellite data (Figure 3.6) on night-time lights in sub-Saharan Africa shows that, among those with electricity access, half the population experiences significant night-time lights – an indicator of electricity supply reliability – on fewer than 219 nights per year (60% of nights) during peak evening hours. In rural areas, the share of households increases to 70%. Reliability tends to decrease from urban to peri-urban and rural areas, where infrastructure is often weak, under-maintained, or unaffordable. Urban areas are generally better served.

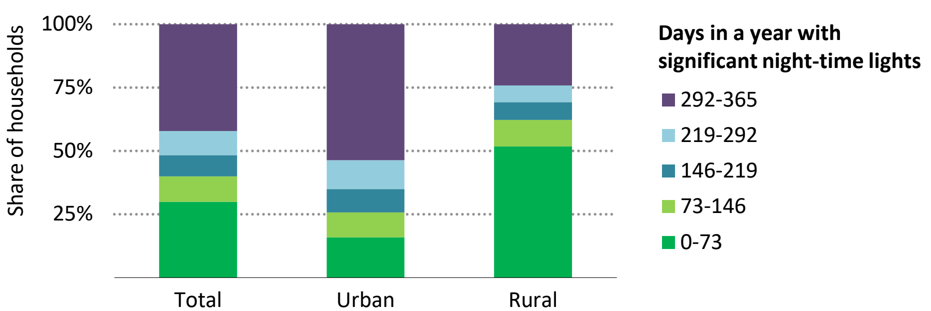
Extending grid or mini-grid connections is necessary but not sufficient to enable e-cooking, given the electricity demands of e-cooking solutions. In the ACCESS, most new e-cooking use occurs via grids in urban areas, where many households already with access to clean cooking shift to electric cooking. While new grid connections can typically support e-cooking loads, households also need internal wiring capable of handling these demands. Mini-grids are more common in rural areas, but many cannot meet e-cooking power needs. Upgrading them is more costly than integrating e-cooking into initial planning (MECS, 2024b). Innovation efforts are ongoing to combine low-wattage cooking with solar-PV and battery systems which have witnessed cost declines of more than 80% and 40% respectively since 2014 (IEA, 2024a). To support rural e-cooking adoption, countries could consider integrating e-cooking into off-grid planning efforts where feasible.

Coupling electricity access initiatives with the provision of e-cooking appliances helps ensure sufficient connection capacity is being provided for future e-cooking loads and could strengthen the financial case for grid and mini-grid access investments. Residential households using e-cooking in Africa typically consume almost twice as much electricity than the average, but this poses only a modest boost to utility revenues, especially if these users are on low-income or specialised e-cooking tariffs. For mini-grid options, these revenue boosts can be more sizeable and improve the financial viability of mini-grid projects by raising community and household demand – enabling mini-grids to overcome the persistent challenge of low electricity consumption impacting financial viability.

In the ACCESS, e-cooking demand in 2040 is 15% of electricity generation in sub-Saharan Africa today. Improving electricity system reliability is critical to increasing the adoption of e-cooking in Africa. Addressing reliability challenges will depend on a mix of measures, including upgrading transmission and distribution systems, improved monitoring and dispatch, upgrading customer connections, and addressing utility financial challenges. While e-cooking's impact on peak load varies across contexts, in South Africa, frequent power cuts in the early 2020s contributed to a slowdown and some setbacks in the uptake of electric cooking. Accordingly, ensuring electric cooking loads are considered in future electric planning will be important to avoid grid stress and enable the uptake of reliable e-cooking in domestic energy mixes.

Figure 3.6 ▷ **Electricity grid and days in a year with significant night-time lights in sub-Saharan Africa, 2020**





While electricity access is improving in sub-Saharan Africa, reliability remains a major issue. Many households with access still lack reliable electricity during peak evening hours

Note: The map shows number of nights in a year having significant night-time lights captured with nightly satellite observations, providing an indication of the reliability of the electricity supply.

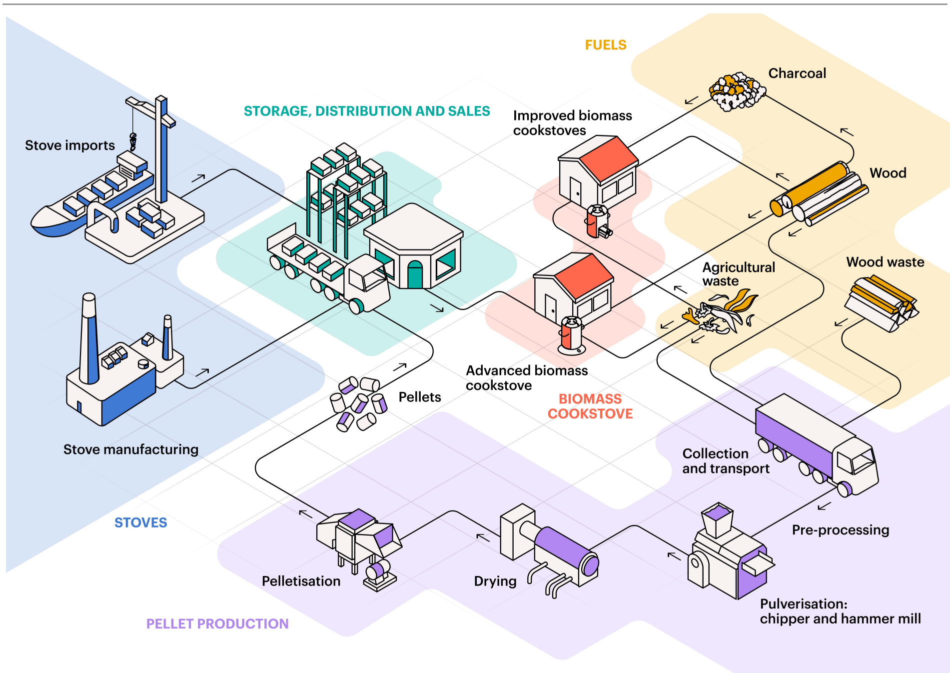
Source: IEA based on data from HREA (2020).

3.4 Solid biomass cookstoves

3.4.1 Introduction

There are several categories of solid biomass cookstoves. Basic biomass cookstoves, typically Tier 0-2, are usually made of clay or metal, produced in artisanal workshops and offer only slight improvements over open fires in terms of efficiency and indoor air quality. Built with simple, low-cost designs using clay, mud or low-grade metals, they are affordable, widely deployed, and currently frequently used in rural areas lacking access to fuel distribution networks. Typically manufactured by local artisans, these stoves fall short of World Health Organization (WHO) guidelines for transitional cooking for reducing particulate matter and carbon monoxide and are considered polluting. Accordingly, the manufacture of these stoves is not a core focus of scaling up infrastructure in this section.

Figure 3.7 ▹ Illustration of supply chains for improved biomass cookstoves (including advanced biomass cookstoves)



Improved biomass cookstoves in Africa are often locally made, while advanced models rely more on centralised production and imports

Improved biomass cookstoves (ICS) is the next tier up. They are built using engineered components and features – such as natural draft via inlets and better insulation – to improve thermal efficiency and reduce emissions and are typically made of metal and require more advanced manufacturing processes compared to basic stoves. Higher-tier ICS, referred to as advanced biomass cookstoves (ABS), rely on additional features such as forced air fans, gasification techniques and electronic devices, and need to be manufactured industrially. While this results in higher upfront costs, these stoves achieve greater thermal efficiencies and emission reductions – with several models now classified as clean under WHO classifications. ICS stoves can use a variety of fuels, including wood, charcoal, agricultural residues, or pellets (Figure 3.7). Some ABS, however, require specific fuels like pellets, limiting flexibility but often producing greater efficiencies and emission reductions.

Improved biomass cookstoves have played a notable role in past clean cooking efforts in Africa, reaching an estimated peak of 4 million stoves distributed annually in Africa in recent years, but the vast majority of these have been ICS of Tier 1-2. Only an estimated 750 000 stoves have been solid biomass cookstoves of Tier 3 and above. In the ACCESS, ICS with Tier 3 performance play a transitional role, with associated energy consumption peaking in 2035 and then declining as households shift to higher-tier clean cooking solutions by 2040. Accordingly, for the roughly 10% of households cooking with modern solid bioenergy in 2040 in the ACCESS, all are cooking with ICS that are Tier 4 and above – a standard only ABS have reached today. Demand for modern solid biomass grows substantially in the ACCESS, reaching 215 PJ by 2040.

3.4.2 Infrastructure requirements

Intermediate ICS incorporate simple engineered design elements such as natural draft inlets and chimneys. They are made from metals like mild steel and iron, with ceramic liners, and require an intermediate level of fabrication. Depending on the design and size of the manufacturing facility, production workshops can use both basic industrial manufacturing equipment and artisanal production from skilled workers.

ABS require more formalised production and quality control, often incorporating forced air systems, gasification chambers, or other engineered components including electronics. Accordingly, these stoves often require factory-based production to ensure consistent quality and performance and therefore require more investment in manufacturing. While many ABS stoves are currently imported, local production is growing. For example, in 2024, Ener-G-Africa announced a new facility in South Africa to manufacture around 45 000 ABS annually. While this facility integrates component fabrication and assembly, these steps could be done at different facilities, with centralised production of components produced at an industrial facility and local assembly of these components. This model reduces the logistical challenges, import tariffs issues, and supports local employment creation. Stove manufacturing, including other stove types not using biomass is discussed in Section 3.8.

Demand for biomass pellets is increasing, as some ABS rely on them to meet required performance and clean combustion standards, particularly those meeting the highest tiers and WHO's definition of clean cooking. While charcoal has about twice the energy content of pellets per kilogramme, traditional charcoal stoves are about half as efficient as gasifying pellet cookstoves meaning that one kg of pellets can replace about the same amount of charcoal[1]. The production and delivery of biomass pellets involves investments across its supply chain, from feedstock procurement to processing and final distribution.

Box 3.3 ▹ Charcoal production and fuel supply for cooking

Charcoal remains a major fuel used in basic cookstoves and ICS, especially in urban areas due to limited access to wood. Charcoal supply chains remain largely informal and unregulated in most parts of Africa. Its infrastructure needs are basic – relying mainly on traditional earth kilns and simple transport methods. Improved production kilns offer better efficiency but are more costly. They also reduce negative health, safety, and environmental impacts of charcoal production.

While charcoal will likely continue to play a role in the near-term, its unregulated nature hinders environmental sustainability and long-term clean cooking objectives. The production of charcoal contributes to deforestation and desert encroachment in some parts of sub-Saharan Africa. While the impacts vary significantly between countries, one study estimates an average of 14% of deforestation is caused by charcoal production in tropical African countries with the highest levels of deforestation (Chidumayo and Gumbo, 2013). Assessments show that around eight tonnes of wood are needed to produce one tonne of charcoal. Despite this inefficiency, charcoal remains a popular choice as it produces less smoke, is easier to transport and store, and is easier to use to maintain consistent heat output than wood fires. That said, using wood directly in ABS by chipping or conversion to pellets addresses some of these challenges, and would reduce the overall demand for wood, whether as charcoal, wood, or other processed solid biomass.

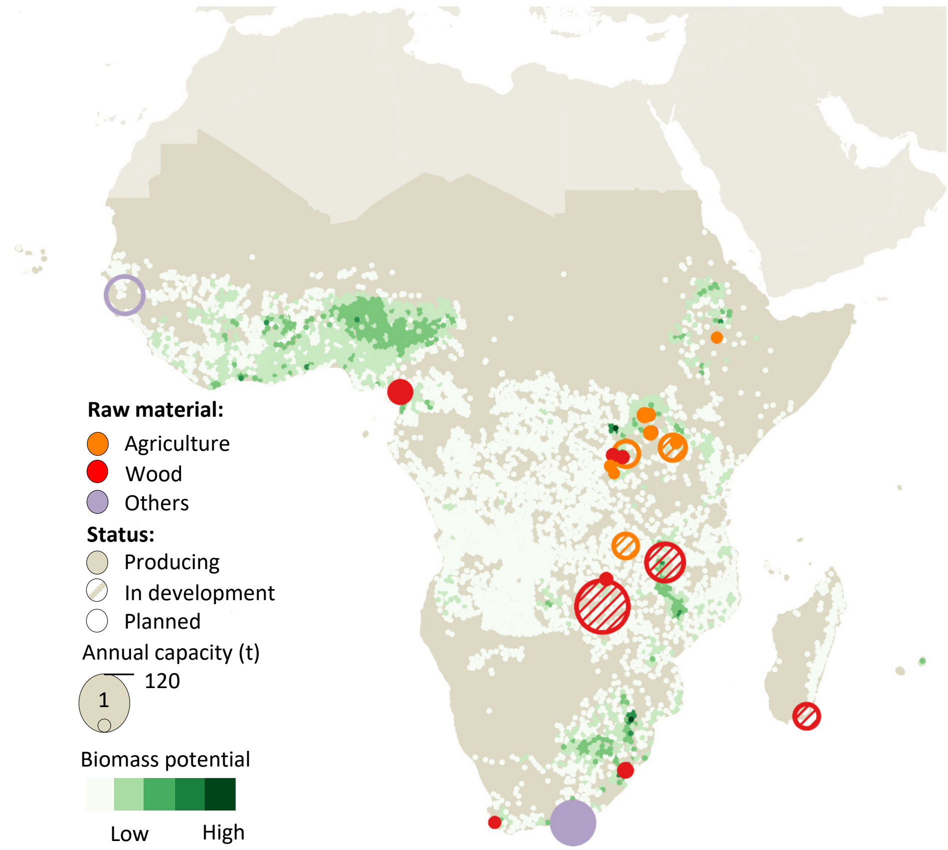
Accordingly, in the ACCESS, less policy focus is placed on modernising charcoal production than on building up other modern biomass pathways. The transition from charcoal supply chains to modern biomass supply chains could offer opportunities to leverage existing supply chains for transportation and distribution to support clean cooking objectives, including for modern biomass distribution, and retain local employment. The shift away from charcoal production can have wider socio-economic impacts (Box 4.3).

At present, there are at least 20 pellet plants operating or in development across sub-Saharan Africa in 10 countries, with an additional two planned. Historically, a large share of pellet production, particularly in South Africa (sub-Saharan Africa's largest pellet producer), has focused on serving industrial biomass demand and export markets, especially Europe. Recently, there has been an increasing and growing focus on pellet production for cooking, with the majority of current facilities – and around half of total production capacity

[1] Information received from World Bioenergy Association.

– focused on serving domestic cooking markets. Pellets can be produced from both forestry waste and agricultural waste. Pellet plants tend to be located in areas with established forestry industries (to provide a steady supply of woody residues) or areas with steady agricultural waste that can be converted into pellets. The design and operation of pellet facilities varies depending on the feedstock, but in general, it involves preparing the feedstock, drying, pulverising and compressing into pellets. Facilities rely on a range of industrial equipment, ranging from driers, pulverisers, conveyors, blowers and sifting devices.

Figure 3.8 ⊳ Pellet facilities under operation, in development or planned in sub-Saharan Africa and total biomass potential, 2024



There are at least 20 biomass pellet plants operating or in development across sub-Saharan Africa in 10 countries, with an additional two planned

Note: Biomass potential includes crop residues (agriculture) and woody biomass (wood), as well as other types of plant residues (others).

Sources: IEA analysis based on FAO (2024); HydroSHEDS (2022); WorldPop (2020); and WRI (2024).

Based on current technologies, in the ACCESS, pellet production will need to increase as around 140 million people use modern solid bioenergy for cooking in 2040. As shown in Figure 3.8, biomass potential is high in West Africa, but lower in the rest of sub-Saharan Africa, with the exception of a few localised areas. Identifying locations with concentrated supply will be important for any future pellet production – sugar mills, invasive species and abandoned tree plantations offer some potential sources.

The availability of nearby feedstocks represents a central supply-side factor for the economic viability of pellet facilities. Feedstock for pellet production may come from wood-processing residues, agricultural and agro-processing residues or dedicated energy crops. Seasonal variability can also lead to large variances in output, which may cause availability to fluctuate throughout the year or increase the distances travelled to procure feedstocks, adding to cost. To support national-level planning, methodologies such as the Food and Agriculture Organization's (FAO) Bioenergy and Food Security (BEFS) Approach (FAO, 2023) have been used to assess the bioenergy potential of crop, livestock, and woody residues. Such assessments can help identify viable feedstock sources and inform investment decisions in infrastructure for bioenergy.

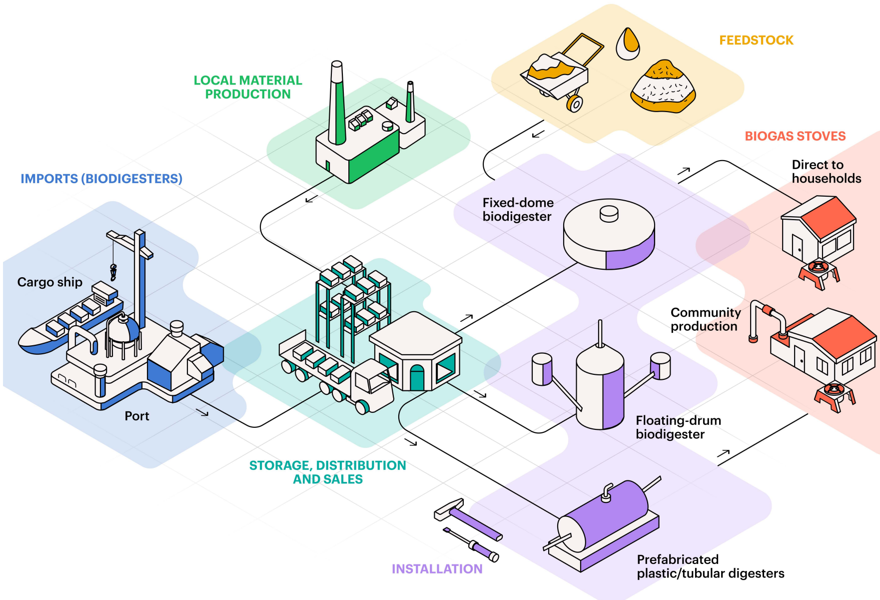
The size of pellet plants can range substantially, and sizing depends on both feedstock availability and demand. Industrial-scale pellet plants – typically producing at least 20 000 tonnes per year but capable of exceeding 100 000 tonnes – offer economies of scale but require substantial and long-standing sources of sustainable feedstock sources nearby, significant capital investment, imported equipment, and reliable supporting infrastructure. Locking in offtake from industrial players and power plants can help to facilitate demand and improve economic viability of these projects. Small-scale, community-based pellet plants may be less efficient, but they can be sited to reduce feedstock transport and logistics costs, reduce risks of system-wide disruption, and can generate local employment.

3.5 Biogas

3.5.1 Introduction

Biogas has, to date, played a limited role in expanding access to clean cooking in sub-Saharan Africa, but it offers potential synergies with broader agricultural priorities, such as improving waste management practices and producing organic fertiliser. Though its overall market share remains limited – at just over 0.1% of those with access – biogas remains a viable option in specific contexts, particularly in rural areas with access to large amounts of organic waste and water. Household-scale biogas systems operate using biodigesters, sealed tanks that convert organic waste materials, such as agricultural residues, livestock manure, and sometimes human waste, into two valuable outputs: biogas for cooking and nutrient-rich digestate that can be used as fertiliser (Figure 3.9). These systems rely on anaerobic digestion, a process in which organic matter decomposes in the absence of oxygen, producing a methane-rich gas suitable for use as a clean cooking fuel.

Figure 3.9 ▷ Illustration of biogas supply chains



Biogas systems in Africa can use both local materials and imported components, with supply chains increasingly relying on imports to meet quality and scalability demands

For biogas systems to function effectively, there must be a continuous supply of feedstock and water. Typically, to produce enough cooking gas for a household of 4-6 people, a biodigester requires around 40-50 kilogrammes of organic waste and the same to double the amount of water per day. As such, biogas systems are most appropriate in rural areas where livestock is kept, agricultural activity is prevalent, and water resources are accessible. The spatial footprint of biogas plants can also be significant, depending on the technology and size of the installation, reinforcing their suitability for low-density, land-rich environments.

There are three main biodigester technologies currently in use across Africa:

- **Fixed-dome digesters**, constructed from masonry or concrete, are durable and suited for long-term installations.
- **Floating-drum digesters**, which use metal or plastic containers, and offer more flexibility in construction and maintenance.
- **Prefabricated plastic or tubular digesters**, made from materials such as polyvinyl chloride (PVC) or high-density polyethylene (HDPE), are quicker to install and lower-cost, but generally have a shorter lifespan.

Each of these technologies has distinct cost, durability, and scalability characteristics, with suitability often determined by local conditions, resource availability, and end-user needs.

3.5.2 Infrastructure requirements

Today, at least 17 African countries have biogas projects in operation for clean cooking (IRENA, 2024). Fixed-dome biodigesters are the most widely deployed small-scale biogas systems in sub-Saharan Africa (Klintenberg et al., 2024). Typically built *in situ* by skilled labourers, they require gas-tight sealing and excavation to depths of 1.5 to 3 metres, with locally-sourced materials transported by road. Floating drum biodigesters are less common though they have been piloted in several countries; steel versions require welding expertise, while plastic models are usually imported. Prefabricated plastic or tubular biodigesters – made from PVC, HDPE, or similar materials – are rapidly gaining traction due to their flexibility, ease of installation, and low space requirements. Nearly all are imported, warehoused regionally, and transported to end users. Installation is simple and requires only basic training. Once installed, biogas is piped directly to cookstoves for household or community use.

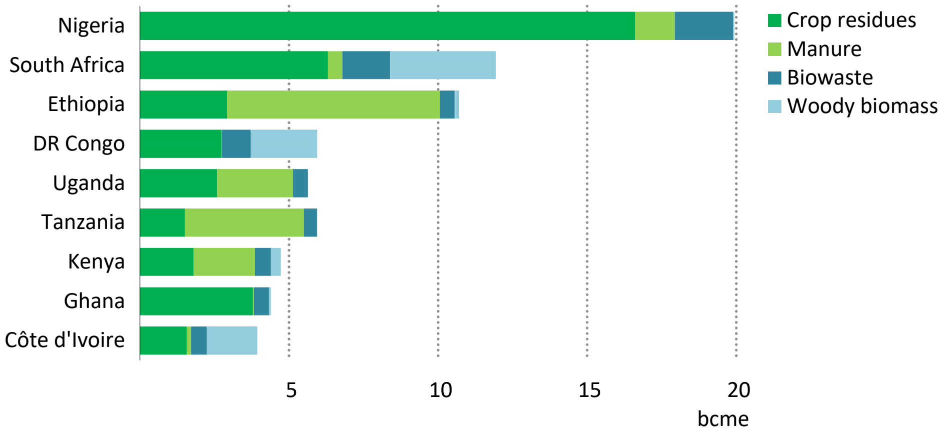
Biogas initiatives are expanding across sub-Saharan Africa. This year, ENGIE Energy Access Tanzania partnered with Sistema.Bio to deploy 1 600 biodigesters and 2 700 cookstoves using a PAYG model, backed by EUR 1.3 million in funding (MCFA, 2025). In 2024, the European Investment Bank partnered with Kisumu, Kenya, to launch a municipal-scale project converting organic waste – over 70% of the city's solid waste – into biogas and provide clean cooking access to 30 000 people, including households and restaurants (EIB, 2024). in 2025, the African Development Bank Group (AfDB) approved USD 8.79 million in financing for the Uganda Biogas and Electric Cooking Project (UBEP) to construct 47 community-scale biogas plants – including for schools, and support capacity building for implementation and scaling (AfDB, 2025).

Despite this progress, maintenance and repair remain a critical challenge, and there is generally a lack of capacity for biogas system technologies. According to studies, 30% or more of biodigesters stop being used, primarily due to inadequate maintenance and repair services (Clemens et al., 2018 and Diouf and Miezan, 2019). Ensuring long-term system performance requires investment in after-sales service networks, local technician training, and user awareness, making maintenance one of the most essential components of the biogas supply chain.

In the ACCESS pathway, 4% of people gaining access to clean cooking do so through biogas in 2040. While this represents a relatively small share of total clean cooking access, biogas will play an important role in rural energy strategies, particularly as affordability and scalability of biodigesters improve. While economic constraints are the biggest barrier to biogas adoption, in selected countries/contexts, lifecycle economic assessment for farm biodigesters shows they can be profitable (Meyer et al., 2021). In the ACCESS pathway, demand for biogas as a clean cooking fuel grows almost 350-fold from current levels. This remains well below sub-Saharan Africa's estimated biogas potential of over 110 billion cubic metres of biogas equivalent (bcme) per year.

Biogas potential is not evenly distributed across the continent; rather, it is geographically concentrated, with West and East Africa accounting for three-quarters of sub-Saharan Africa's total potential (Figure 3.11). Nigeria holds the highest estimated biogas potential in sub-Saharan Africa, at 20 bcme, followed by South Africa and Ethiopia, each with estimated resources exceeding 10 bcme (Figure 3.10). Seven other countries in sub-Saharan Africa have potential biogas production of 4 bcme or greater, a volume sufficient to provide cooking energy to approximately 100 million people.

Figure 3.10 ▷ Biogas potential in selected countries in sub-Saharan Africa



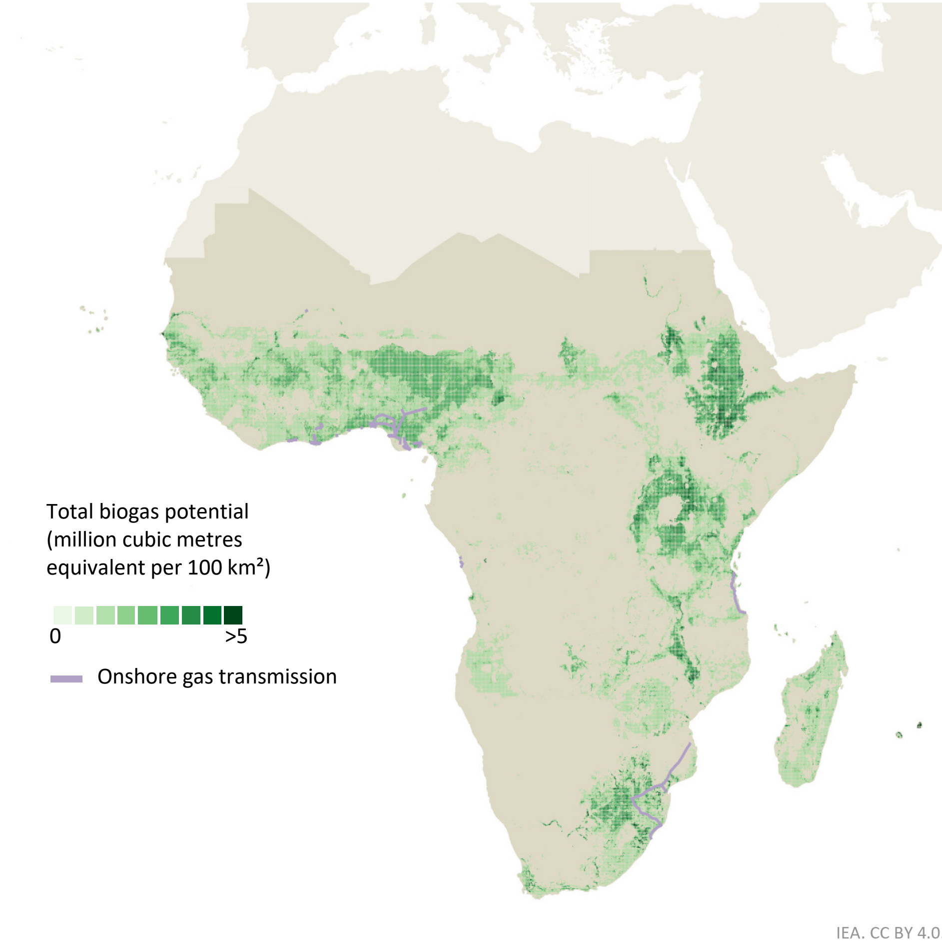
Nigeria, South Africa, and Ethiopia lead in terms of biogas potential in Africa, with crop residues and manure representing the greatest sources of feedstock

Notes: bcme = billion cubic meter equivalent; DR Congo = Democratic Republic of the Congo, Tanzania = United Republic of Tanzania.

Source: IEA (2025).

Realising the continent's biogas potential will require a significant scale-up in the installation of biodigesters for cooking. In the ACCESS, the IEA estimates that 10 million new biogas systems will need to be installed across Africa by 2040. Prefabricated plastic and tubular digesters are expected to account for almost all of this growth, due to their lower upfront costs, faster deployment times, and relative ease of transport and installation compared to more permanent masonry-based systems. Other biodigester technologies, such as fixed-dome and floating-drum systems, continue to play a role, particularly in areas with high organic waste availability and where existing installation and know-how currently exist.

Figure 3.11 ▷ Biogas potential in sub-Saharan Africa, 2024



Total biogas potential is around 110 bcme spread across sub-Saharan Africa

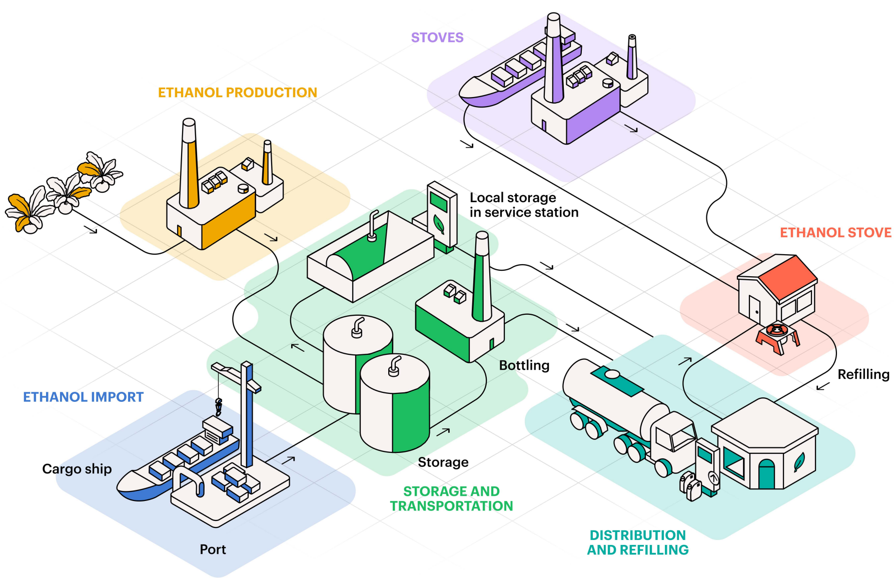
Source: IEA (2025).

3.6 Bioethanol

3.6.1 Introduction

Bioethanol compatible stoves are an emerging form of clean cooking gaining traction across sub-Saharan Africa. Bioethanol's use mirrors that of LPG, with reusable bottles/canisters distributed to consumers (Figure 3.12). Unlike LPG, however, bioethanol does not require specialised storage in pressurised cylinders and can be stored in plastic bottles, offering advantages for safety and handling in residential and institutional settings. Bioethanol is produced through the fermentation and distillation of sugarcane, molasses, cassava and other starch-rich crops including agricultural waste. Unlike alcohol intended for human consumption, cooking-grade bioethanol has a higher ethanol content and is denatured, typically with other chemicals like methanol, making it toxic and unfit for drinking. Production is sensitive to seasonal fluctuations and market competition with food crops or allocation of bioethanol to different competitive uses (e.g. transport, beverages, sanitation), raises important policy considerations for balancing with food security. With careful design and management, however, bioethanol production as a complement to food crops, to make use of post-harvest waste, can diversify income streams for producers.

Figure 3.12 ▻ Illustration of ethanol supply chains



Ethanol cooking supply chains require specific infrastructure for supply and, in some models, for distribution as well

Several countries have released bioethanol specific plans to support the sectors' development, and bioethanol companies in some countries have seen a rapid scaleup, in part due to the recognition of the safety benefits offered by bioethanol and its ability to be locally produced. While bioethanol emits carbon during combustion, these emissions are assumed to be offset by the regeneration of biomass feedstocks, rendering it effectively emissions neutral. In the ACCESS pathway, demand for bioethanol in cooking applications increases to over 6.4 billion litres by 2040.

3.6.2 Infrastructure requirements

Currently, bioethanol production in sub-Saharan Africa stands at more than 750 million litres, which is less than 1% of global production. In sub-Saharan Africa – like other places – bioethanol has a diversity of uses and is not used exclusively for cooking, but also in the beverage, transport, and cosmetics industries. Most ethanol produced today is used in these industries and demand is rising – for example, with countries such as Angola, Malawi, Mozambique, and Nigeria setting fuel blending mandates – with cooking contributing to the increase. Across sub-Saharan Africa, there are currently 25 operational production facilities, with an additional four facilities planned or under construction. These are relatively spread out, with seven facilities in Southern Africa, 14 in East Africa and seven in Western Africa. There is only one facility in Central Africa.

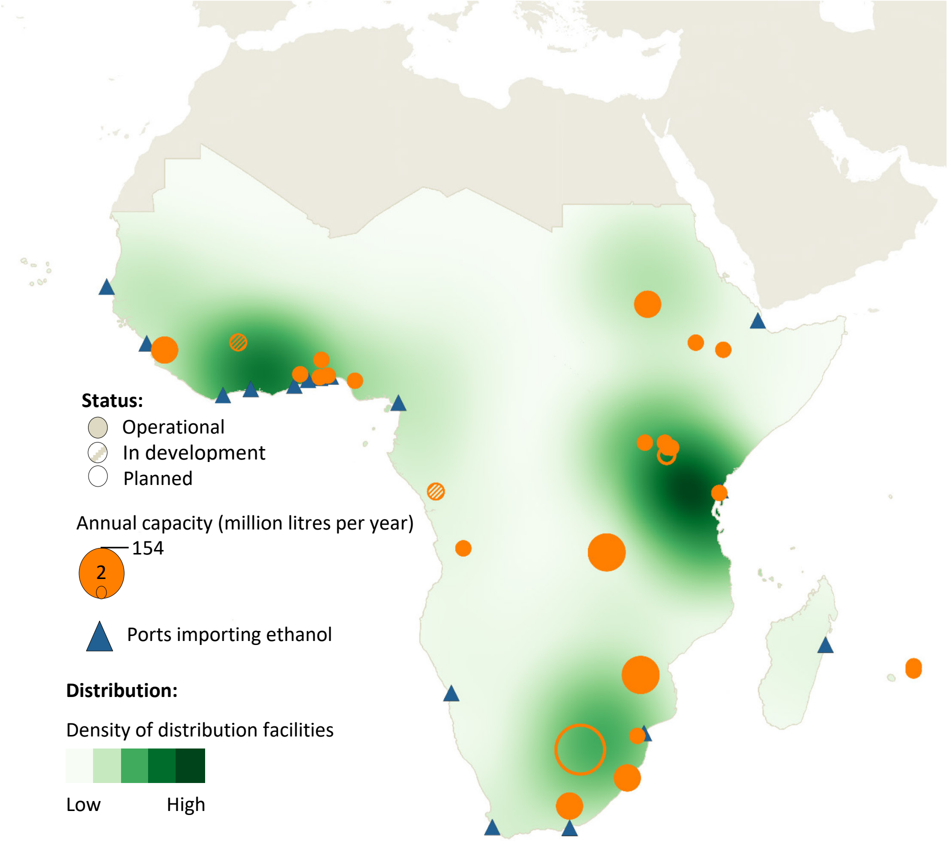
Production begins with the collection and transport of feedstocks such as sugarcane, molasses or cassava to ethanol refineries, which range from small-scale units to large industrial distilleries. These facilities convert biomass into ethanol through fermentation, distillation, and dehydration processes, requiring a range of specialised processing equipment. Where possible, production facilities are located near demand centres to reduce transport costs. The production of bioethanol can create useful by-products, such as animal feed and corn oil (from corn-based production), and highly concentrated carbon dioxide that could be used in other industries.

Some countries supplement domestic production with imports. Sub-Saharan Africa currently imports around 200 million litres of bioethanol each year. Currently, ethanol is imported into just 14 countries in sub-Saharan Africa (Figure 3.13). One of the biggest challenges faced by ethanol for clean cooking is the lack of distinction at import between cooking fuel, industrial and consumable and the import duties levied on each category. This means ethanol for cooking faces import duties which can go up to 55% – making it uncompetitive compared to other cooking fuels. Addressing the current policy gap in appropriate tariff structures for ethanol could help make ethanol more affordable, while still maintaining fiscal revenues on consumable ethanol (e.g. alcoholic beverages) by keeping these in place.

The lack of a cooking ethanol standard also hinders the growth of the industry. Some products have struggled to find sufficiently high-purity ethanol which, when watered down, may not burn or produce sufficient heat. Several African institutions are looking to develop or adopt bioethanol cooking fuel standards – for example, Mozambique's National Institute for Normalization and Standards is currently assessing implementation of relevant standards as is the African Organisation for Standardization and the ECOWAS Centre for Renewable Energy and Energy Efficiency.

Bioethanol production can be expanded, but must consider global price dynamics, and local food and water security. In the ACCESS, over 6.4 billion litres of ethanol will be required for cooking by 2040. With current production at roughly 10% of this level, meeting this demand will require significantly increasing ethanol supply. Some of this can be met by the new facilities coming online and higher throughput at existing facilities. While Africa has the agricultural resources in some regions to expand bioethanol production, this must consider impacts on the agriculture sector and water supply.

Figure 3.13 ▷ Bioethanol import and production facilities in sub-Saharan Africa, 2024



Across sub-Saharan Africa, there are currently 25 operational bioethanol production facilities, with an additional four facilities planned or under construction

Sources: IEA analysis based on Global Energy Monitor (2025) and data provided by kpler.com.

One of the major headwinds facing local production is the limited domestic demand for bioethanol, which makes it difficult to secure off-take agreements for upstream investors. In the short-term, global surplus production capacity from large production bases centred in Brazil and the United States to supply ethanol could meet incremental demand at competitive prices. This approach could help stimulate demand in local markets, making them more attractive for future capital investment in domestic production. Policy support, including incentives for local production, could attract additional investment in domestic manufacturing capacity. Some governments, such as Kenya, have introduced fiscal measures to prioritise the use of locally produced ethanol for clean cooking – for example, requiring ethanol cooking companies to source ethanol domestically before turning to imports (Kenya's Ministry of Energy, 2021). Building up robust local production also benefits from robust environmental and agricultural frameworks which help manage fluctuations in crop production – countries such as Brazil, India and Thailand offer valuable examples.

There are different models to distribute bioethanol, which can generally be grouped into two categories. In centralised filling models, ethanol is transferred into plastic bottles at a central facility (often the bioethanol plant itself) and distributed via trucks to retail outlets. In cases where bottling occurs at secondary packaging facilities, ethanol must first be transported in bulk via tanker trucks and stored in dedicated tanks before being bottled.

An alternative model is decentralised storage and dispensing via "Fuel ATMs," tanks installed at local shops, allowing customers to refill reusable containers. This model relies on interim bulk storage depots at fuel stations. The bioethanol is then transported via dedicated micro-tankers to fill "Fuel ATMs" where customers can come and refill their canisters. This model can reduce distribution costs, allows consumers to refill without having to purchase new packaging and enables bioethanol to undercut charcoal in some urban markets. KOKO Networks has pioneered this model, building thousands of smart dispensers across the countries in which it operates. Since 2019, KOKO Networks has reached over one million households (KOKO Networks, 2023). These models also benefit from improved tracking of utilisation rates – a critical input to verify carbon credit issuances which represent a major part of the current business model for bioethanol clean cooking.

Both models can work together. While "Fuel ATM"-based models can be effective in urban settings where there can be a high distribution of refilling points, in peri-urban and urban settings, it is not feasible or economic to install such a high density of fuel-collection points. To support the use of bioethanol in rural households, bottled models will be important. Such systems can utilise parts of the LPG supply chain – such as specialised transportation vehicles, distribution and sales facilities – reducing the costs of developing future infrastructure.

3.7 Natural gas

3.7.1 Introduction

Natural gas is a widely used clean cooking fuel in many advanced economies, meeting approximately one-quarter of total residential cooking energy demand. However, in most developing country contexts, including in sub-Saharan Africa, its contribution to expanding clean cooking access has been minimal due to a lack of distribution networks, and the high capital requirements to establish them.

Globally, natural gas is piped into houses and buildings, especially in dense urban settings where permanent infrastructure is in place. While widely used in North African cities today

– accounting for 60% of residential cooking demand – piped natural gas use remains nearly non-existent in sub-Saharan Africa, limited to just 13 cities with some infrastructure, all located in natural gas producing regions. In the majority of these cases, gas networks primarily serve industrial users. Only five cities have established residential distribution networks, and most of these building-level distribution networks are co-located with industrial demand. There are also plans to expand several industrial networks to serve residential areas, with the industrial demand helping justify the infrastructure investment required for such extensions. Emerging technologies such as micro-LNG and mini-natural gas networks are beginning to attract interest, offering alternative approaches to traditional piped infrastructure. However, these systems remain in the early and/or pilot phases and are not yet deployed at scale.

In the ACCESS, natural gas plays a limited role in expanding clean cooking access. Scale-up is expected only near natural gas production sites and in urban areas where distribution networks already exist or where strong industrial demand creates viable economies of scale.

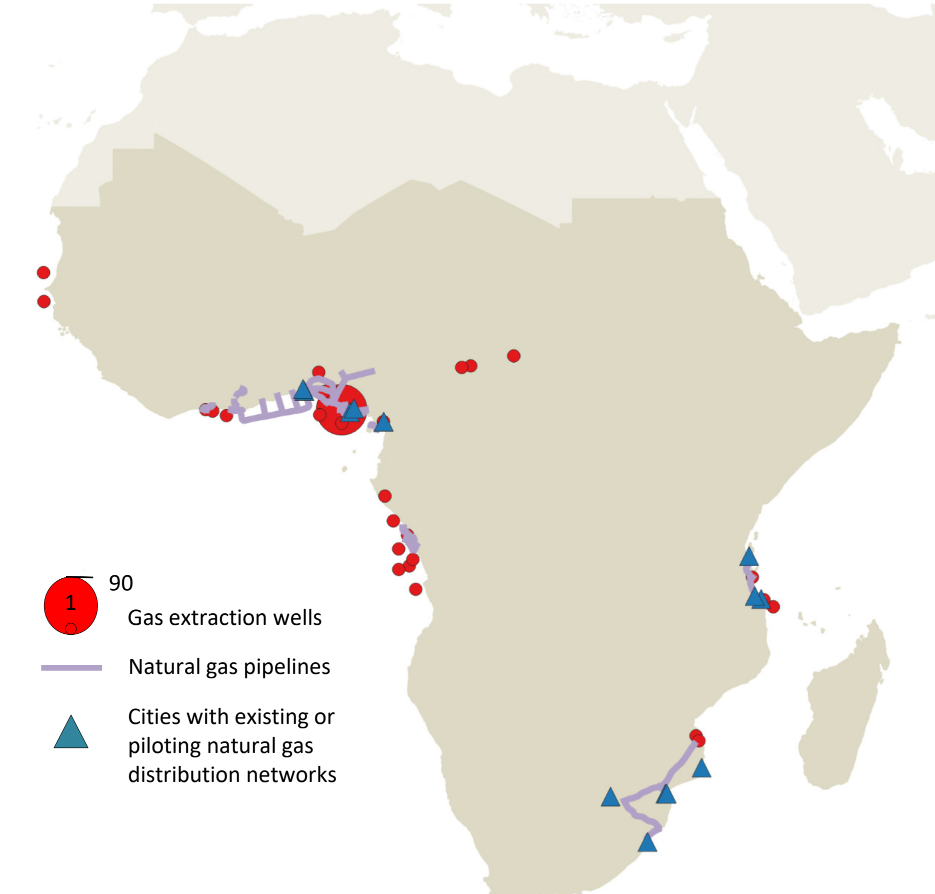
3.7.2 Infrastructure requirements

Approximately one-third of countries in sub-Saharan Africa produce natural gas, with a significant portion – around half of total production – dedicated to exports. Africa's natural gas pipeline networks radiate out from these production hubs, with pipelines connecting to major cities. Today, these pipelines are primarily used to supply export terminals or serve industrial hubs and power plants. New innovations in natural gas liquefaction and compression on a small scale is enabling economically viable distribution to major sites by truck instead of pipelines, opening up new opportunities, largely focused on delivering to large users or dense consumption hubs.

In sub-Saharan Africa today, domestic natural gas is prioritised for use by large industrial players and power plants – not households. Only 13 cities have natural gas distribution networks (either established or in pilot stages), with several new projects and expansions underway (Figure 3.14). Some regions leveraged natural gas networks to close clean cooking gaps in urban areas but often relied on large industrial bases or large heating demand to anchor bringing natural gas into these cities in the first place, as was seen in China and India. In sub-Saharan Africa, a few cities in producing countries have the requisite density of potential demand.

Nonetheless, a few African countries are exploring targeted uses of natural gas for cooking. Tanzania's national clean cooking strategy includes natural gas as one of its options. A pilot programme is underway in Tanzania to connect 1 000 homes via natural gas networks. These systems deliver compressed or liquefied gas via specially designed tankers to city-based distribution hubs, industrial users and households. The model is faster and less capital-intensive than broad pipeline deployment. Other countries are also beginning to explore natural gas distribution potential. Rwanda is advancing the Lake Kivu initiative, which will produce compressed natural gas (CNG) for use across sectors including cooking with an emphasis on domestic energy security and fuel diversification.

Figure 3.14 ▷ Current natural gas pipelines across sub-Saharan Africa and cities with natural gas distribution, 2024



Only 13 cities in sub-Saharan Africa have natural gas distribution networks, with several projects and expansions underway, often in areas close to pipelines

Source: IEA analysis based on Global Energy Monitor (2025).

Despite these developments, the ACCESS pathway does not project a significant rise in natural gas usage for cooking across Africa. The high upfront costs of establishing networks are only economically justified in markets with robust, consistent demand typically from industrial or large-scale commercial users. Moreover, rapid urbanisation, informal settlement growth and high residential turnover complicate long-term infrastructure planning in many African cities.

Mini- and small-scale natural gas grids may address some of these challenges, but they still require substantial capital investment and depend on predictable offtake volumes to be financially viable. As such, natural gas for cooking is expected to remain a niche solution, limited to urban areas where infrastructure already exists or where combined residential and industrial demand can sustain the required investment.

Box 3.4 ▹ Other emerging clean cooking solutions

This report has focused only on established and scalable clean cooking technologies. There are, however, some emerging and other technologies that were not considered. This includes solar cookers, which employ concentrated solar radiation to heat a cooking vessel. These systems require no fuel or grid connection, making them a potentially low-cost solution in remote areas. Solar cooking has low levels of adoption, with its main limitations including the need for available sunlight at the right time and incompatibility with certain cooking techniques, often requiring a secondary cooking method to meet all household needs.

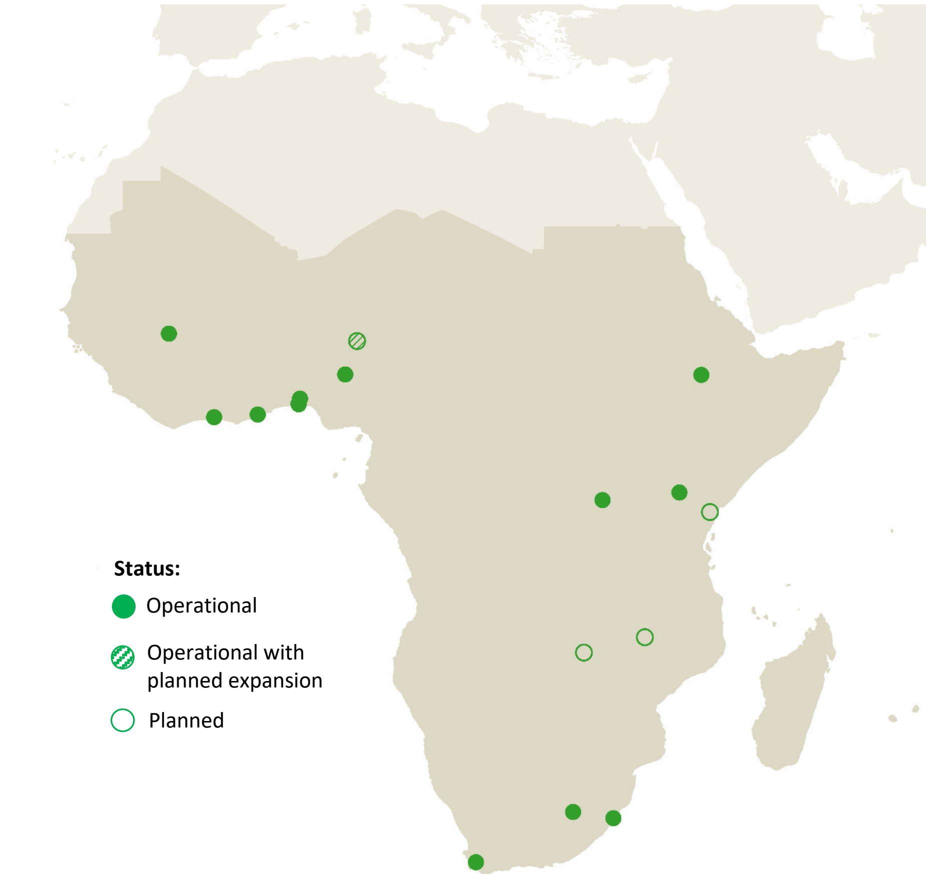
There are also ongoing efforts to develop hydrogen-based specialised stove burners in development contexts, including at least one stove available in a pilot capacity today. These burners operate similarly to traditional fossil fuel stoves, although with specialised burners for hydrogen. However, they remain in the early stages of development and have not yet been widely commercialised. The viability of hydrogen cookers is further constrained by the high cost of hydrogen production, the absence of hydrogen distribution infrastructure, and the lack of means to manage safety risks of consumer-sited hydrogen fuels. Although some countries are exploring the blending of hydrogen into existing natural gas networks, in sub-Saharan Africa this is not a relevant option in areas with low natural gas infrastructure.

3.8 Clean cookstove manufacturing

Reaching universal access to clean cooking will require more than scaling up fuel supply. It also demands a significant expansion of clean cooking equipment production. This includes stoves, equipment (e.g. cylinders), and associated hardware, much of which is still imported. While establishing a domestic manufacturing base across Africa is not a pre-requisite for universal clean cooking, boosting domestic production can help to ensure the economic and social benefits of achieving universal clean cooking access are also realised on the continent.

At present, there are only 15 major cookstove production facilities (Figure 3.15). Many clean cooking appliances are manufactured abroad, reflecting broader trends in the sub-Saharan Africa's import dependence for manufactured goods. This results in higher consumer prices, amplified by import duties, transport costs and exchange rate fluctuations. Scaling up local manufacturing, where appropriate and manufacturing standards can be met, offers a pathway to lower delivered costs and stronger industrial development.

Figure 3.15 ▷ Major cookstove manufacturing facilities in sub-Saharan Africa, 2024



Although many stoves are imported, sub-Saharan Africa is now home to at least 15 major stove manufacturing facilities, with several more in the pipeline

There is growing interest from the clean cooking industry to establish or expand domestic production. Companies are already operating large-scale stove manufacturing facilities in Africa, with many more small-scale operations underway. Others are pursuing phased approaches: acquiring manufacturing equipment, refining designs in global manufacturing hubs like China and India and positioning for eventual local production when market and policy conditions allow.

In countries where full-scale manufacturing is not yet viable, local assembly models offer a near-term alternative. Under these models, companies produce cookstove components in one country and then assemble them locally. Companies such as BURN Manufacturing are already adopting these models, which offer tangible benefits by reducing import tariff burdens, reducing shipping costs, and creating local jobs even before full production capacity is in place.

A further advantage is the modularity of modern stove manufacturing. Clean stove factories can be set up to produce a range of stove types, meaning that investment in multipurpose production lines offers flexibility and responsiveness to changing market needs. Building up local manufacturing capabilities should align with broader industrialisation strategies. In regions where purchasing power is constrained, the relative cost of imported stoves is often many times higher than global averages, making domestic production not just feasible, but economically attractive.

Logistic infrastructure also plays a critical role in achieving universal access to clean cooking. Today, a significant share of the overall cost is linked to transportation including shipping, port delivery and distribution. Without improvements, these costs would make efforts to reach all consumers in need of clean cooking solutions prohibitively expensive for many of the poorest households. This would also present headwinds for local manufacturers. Reliable transport infrastructure is foundational both to bring in raw materials and to deliver finished goods to market. Additionally, reliable energy infrastructure is essential to cost effectively operate local manufacturing. Today, South Africa leads on these enablers, while West and Central Africa face challenges, particularly with transport and electricity reliability (IEA, 2024b).

Regional co-ordination will also be key. Many African countries lack the domestic market size to justify large-scale production on their own. A regionally integrated approach, featuring shared production zones and cross-border supply chains, can enable economies of scale and reduce costs. Existing examples, such as approaches of centralised manufacturing with decentralised assembly hubs, offer replicable models. These facilities manufacture at scale in one region, then flat-pack stoves for assembly in target markets, combining cost savings with local economic impact.

To identify the best locations for such facilities, governments and investors should consider establishing industrial clusters near reliable energy sources and transport corridors, supported by streamlined permitting and business regulations. Success also depends on finance and human capital. Linking vocational training and skills development to industrial objectives will strengthen workforce readiness. Affordable access to working capital and machinery finance, particularly for small and medium enterprises, will also be vital.

Scaling clean cooking manufacturing in Africa is a strategic investment. If embedded in broader industrial development plans, it can lower equipment costs, increase resilience to global price shocks, and unlock widespread economic benefits.

Implications and Policy Considerations

A new recipe for success?

SUMMARY

- Progress on clean cooking requires efforts from a wide range of stakeholders. These include efforts to enhance countries' policy frameworks, address consumer affordability and other barriers to adoption, cultivate a skilled workforce and mobilise additional financing to the sector – themes discussed in this chapter.
- Access to low-cost debt will be key for companies to grow their customer base quickly. In the ACCESS, the share of debt financing in the sector increases from 35% today to over 50%. This depends on more financiers being able to assess and appropriately price risk clean cooking companies and investments. Technical assistance and concessional finance can help, especially for small and medium-sized enterprises that play an important role expanding clean cooking where commercial players will not.
- At current prices, the cost of gaining clean cooking access would exceed 10% of household monthly income for nearly 600 million people in sub-Saharan Africa. Affordability varies significantly by fuel type, but financial incentives and business models that allow consumers to make purchases in small increments play an important role across all market segments. Some measures include value added tax (VAT) and import tariff exemptions for clean cooking stoves, fuels and equipment, pricing regulations, targeted affordability support for the lowest-income households, and using clean cooking carbon credit revenue to offer solutions at lower prices.
- Access is not guaranteed by affordability alone, as non-financial barriers play a key role in the adoption of clean cooking technologies. Factors like stove design, cooking speed, safety, ability to prepare traditional meals, and fuel availability all affect the uptake and enduring use of clean cooking methods. The success of clean cooking campaigns depends on building awareness, providing training, incorporating cultural traditions into programme design, and strong community-level engagement.
- Policy efforts play the central role in co-ordination between industry and government, international and grassroots efforts. Many measures that require little to no fiscal outlay can significantly reduce operation risks for clean cooking companies, including implementing and enforcing standards and regulations for fuels and equipment, facilitating infrastructure development, improving local data and tracking, and increasing awareness of clean cooking initiatives and their benefits.
- Scaling up Africa's clean cooking supply chains can help reduce delivery costs and support local development. The operation of clean cooking supply chains in Africa will require 460 000 additional workers by 2040 in the ACCESS. Most of these roles require fewer than four weeks of vocational training, with clean cooking companies playing a big role in training new workers.

4.1 Introduction

Achieving real progress in scaling up clean cooking solutions across Africa requires navigating a wide and interconnected set of challenges and opportunities. This includes developing supportive and coherent policy frameworks, mobilising diverse sources of finance, addressing affordability for consumers, and investing in the training and growth of a skilled workforce. Equally important is addressing non-financial factors that influence adoption such as stove usability, cultural compatibility, fuel availability, and the need for training and awareness. Building resilient local supply chains is also critical to sustaining delivery, fostering innovation and helping to cultivate wider economic motivation for clean cooking efforts. Communicating these benefits can strengthen public support and national commitments. This chapter explores each of these dimensions, offering a holistic view of what it takes to accelerate clean cooking transitions. It concludes with a set of priority actions and implementation strategies drawn from the *Roadmap for the Brazil G20 Presidency's Clean Cooking Strategy*, co-developed by the IEA, which provides a practical blueprint for co-ordinated progress.

4.2 Creating an enabling policy environment

Governments have a central role to play in establishing strong and functioning clean cooking markets and supply chains. Elevating clean cooking to a national priority is a critical first step, particularly when it's integrated into broader energy planning and aligned with development agendas such as Nationally Determined Contributions (NDCs) and Just Energy Transition Partnerships (JETPs). However, this must be followed by concrete regulations and programmes that help mobilise the necessary support across the sector.

The IEA's mapping of current policies shows that leading countries already have many of the broad-based clean cooking policies required to drive progress, though the approaches are varied (see Chapter 1). Targeted measures are also emerging to support delivery of the outcomes seen in the ACCESS pathway. Examples of policies being explored or implemented by countries include:

- **Integrating clean cooking into national planning and programmatic efforts,** so that clean cooking is considered a cross-cutting issue requiring government-wide efforts, including utility planning, rural electrification, public health campaigns, agricultural development policies, schools-based food programmes and NDCs.
- **Formulating stove and equipment distribution programmes** that incentivise local production, build domestic manufacturing capacity and invest in infrastructure to improve supply chain reliability and last-mile delivery. Ensuring households are within a reasonable distance of distribution points is key to enable consistent access and use.
- **Enacting affordability measures** such as price regulations that index with global market trends while ensuring long-term certainty, the exempting of clean cooking stoves, fuels, and equipment from value added tax (VAT) and import tariffs (while balancing fiscal

constraints), tailored results-based finance (RBF) programmes, and the use of carbon credit revenues to provide affordability support. These measures should be closely co-ordinated with existing social safety net initiatives to reach the most vulnerable communities and make the process equitable and inclusive.

- **Ensuring rigorous standards and regulations for fuels and equipment** to deliver safety, efficiency, interoperability, and compatibility. These standards can be enforced through regular inspections and compliance mechanisms.
- **Requesting financial support for clean cooking programmes**, with clearly defined objectives and a detailed outline of the required resources, to be included in official appeals to international partners for development assistance.
- **Procuring clean cooking technologies and fuels for public buildings** including schools, hospitals and government buildings and embedding clean cooking requirements into national building codes.
- **Delivering competitive infrastructure development through concession models**. For example, India's approach of awarding exclusive service zones to clean cooking providers with defined performance targets could be adapted to African markets without distorting the existing market (Indian Oil Corporation, 2023).
- **Engaging communities in awareness and behaviour change campaigns** via trusted local networks alongside community leaders, health professionals, educators, and faith-based organisations to communicate the benefits of clean cooking and counter misconceptions. These efforts play a critical role in stimulating demand and creating the necessary conditions for a more viable and scalable market.
- **Identifying measures to better target policy to reach women** as users, entrepreneurs, and employees, addressing barriers such as lack of access to finance and limitations in determining the use of household finances.
- **Developing carbon credit market in host countries**, including measures such as establishing a national carbon credit registry, issuing guidance on qualifying methodologies and benchmark values for credits, and enhancing disclosure to better track clean cooking.
- **Designing data and tracking systems to monitor access** and inform evidence-based policymaking and incentives programmes based on key issues like fuel use, emissions, carbon credits and behavioural trends such as gender impacts.

To be effective, many of these measures must be tailored to specific fuels and technologies. Developing fuel-specific strategies and roadmaps, while maintaining a level playing field across all technologies, can help ensure broad-based and balanced support across the clean cooking sector (Table 4.1).

Several countries have implemented some of these approaches with success. This list is not exhaustive and no single model is universally applicable, however, these examples could act as starting points for governments seeking to accelerate progress towards universal clean cooking access.

Table 4.1 ▷ Examples of fuel-specific policy measures for clean cooking

Fuel	Examples of enabling policy measures
Liquefied petroleum gas (LPG)	• **Implement and enforce standards:** Market models that enhance cylinder safety for cylinder refilling, transportation, safety training requirements, and standard inspection cycles and ensure enforcement. This could include adopting a nation-wide Branded Cylinder Recirculation Model (BCRM), where operators retain ownership of cylinders, making them responsible for ongoing maintenance and safety. Flexible refilling regulations can also be explored. • **Install LPG connections and integrate into building codes:** Support installations in public buildings, low-income households, or by offering incentives for households to install a pressure regulator, hose, and other initial equipment. • **Prioritise distribution infrastructure development with a streamlined permitting process:** Consider clean cooking in wider port and rail infrastructure projects to reduce costs and improve supply chain efficiency. Develop a well-defined permitting process for new storage and refilling facilities, including proactive efforts to develop appropriate zoning for this, and other distribution infrastructure. Where needed, explore financial guarantees to fill LPG storage capacity.
E-cooking	• **Introduce electric cooking tariffs:** A differentiated tariff structure that improves the affordability of electric cooking, such as raising the threshold for policies such as South Africa's Free Basic Electricity or block tariffs for e-cooking users, making it more economically viable for consumers. • **Integrate clean cooking into electrification programmes.** Ensure electricity connections are sized to support the future uptake of electric cooking. In some cases, utilities are given explicit mandates to promote clean cooking alongside electricity access. These efforts could be supported by bulk procurement of efficient electric cooking appliances. Some utilities also offer repayment of stoves through the electricity bill with zero or low interests.
Biogas	• **Harmonise with agricultural and livestock policies:** This could include tapping into funding available for agricultural waste management and efforts to produce organic fertiliser, or broader campaigns to enhance agricultural practices. • **Support training on operation and maintenance:** Ensure communities have the knowledge to avoid and manage digester contamination and system failure. • **Offer incentives and specialised financing products:** As most capital-intensive clean cooking technologies, additional upfront incentives or specialised financing terms are important as most rural households lack the means to provide a down payment, etc.
Ethanol	• **Support ethanol production market development:** Measures to create a larger demand base such as increasing biofuel blending for transport fuels and adjusting blending requirements based on changing yields for key crops such as molasses or cassava to ensure market stability and food security. • **Establish ethanol fuel regulation:** clear regulations for ethanol as a clean cooking fuel to avoid counterfeit products and defining ethanol for cooking as a distinct fuel category separate from ethanol for industrial or human consumption, which enables a differentiated tariff regime with separate import duties, taxes, and VAT schemes.
Solid biomass cookstoves (improved and advanced)	• **Support agricultural waste to fuel**: link to efforts on agriculture waste management and make incentives available for farmers to sell, or producers to buy, crop residuals and manufacture them into pellets, and link efforts to manage crop burning. • **Address the illegal charcoal trade:** by strengthening enforcement against illegal charcoal production and identifying opportunities to leverage existing charcoal distribution networks to shift to clean cooking fuels in urban areas. • **Introduce certification and standards:** requiring suppliers to comply with performance and efficiency levels for cookstoves and the pellets they use.

Box 4.1 ▷ Policies to support local manufacturing of clean cookstoves, equipment and fuels

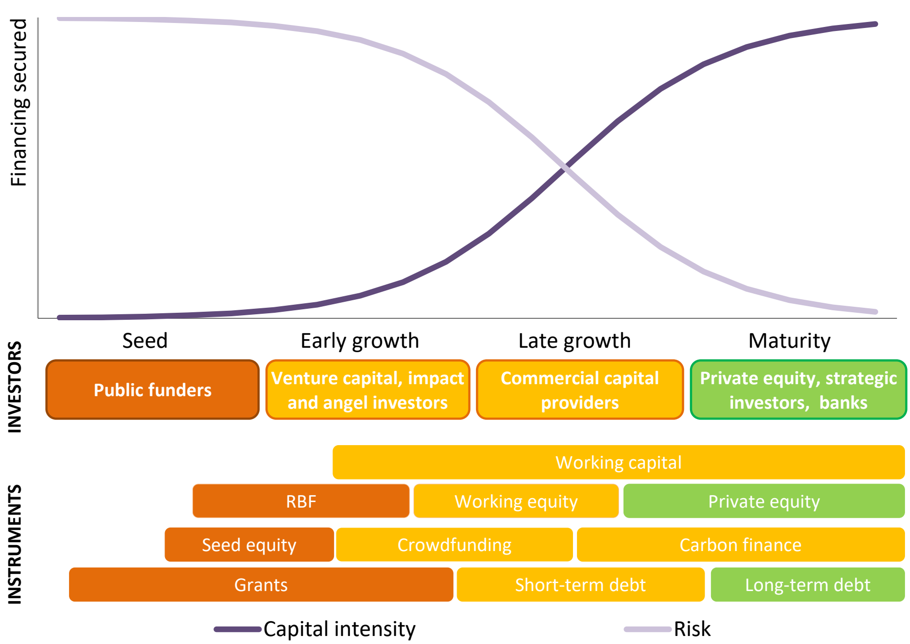
Establishing a domestic manufacturing base across Africa for clean cooking equipment and fuels could lower delivered costs by reducing transport and import expenses, while ensuring that economic and social benefits – such as job creation – are realised locally. While not a prerequisite for the ACCESS, governments seeking to encourage local supply chains can engage with industry and adopt a range of policies to build-up local manufacturing. A balanced policy approach is important: low-cost imports from established markets can stimulate early-market growth, but without the right signals and incentives, local supply chains may not materialise. By working closely with industry, governments can take strategic steps to develop domestic value chain and identify time-horizons to bring projects online. Potential policy levers include:

- Integrating clean cooking into long-term industrial plans, as demonstrated by Kenya and Nigeria, Africa's two leading clean cookstove producer countries.
- Establishing robust performance and efficiency standards for cookstoves and fuel production to ensure local suppliers meet international distributers' requirements and can become preferred vendors.
- Adjusting tariffs and import taxes for components and equipment required for clean cookstove manufacturing and assembly, to reduce costs and incentivise onshoring of clean cooking manufacturing.
- Providing financial or policy support for companies, developing local manufacturing capacity, including providing or pre-permitting land for factory development or developing neighbouring infrastructure to support logistics and distributions.
- Prioritising local vendors for government-run programmes, if they are able to meet quality standards and at competitive prices.
- Exploring regional clusters for clean cooking infrastructure — such as ports, manufacturing facilities, and refilling stations — can deliver significant economies of scale and serve multiple countries. With the right benefit-sharing frameworks, this approach can overcome pressures to establish facilities in every country and reduce the risk of overbuilding capacity, while still supporting local job creation and regional co-operation. Such models have been successfully adopted in other industries and by companies like BURN Manufacturing.

4.3 Financing clean cooking

Methods for financing clean cooking in Africa vary depending on the fuel and specific segment of the value chain: private finance has played the largest role within the LPG value chain while development finance and carbon revenues have played a larger role for other types of cookstove projects. LPG accounted for over 85% of Africa's clean cooking investments in 2023, most of which was financed by operators of oil and gas distribution supply chains, often via debt raised on the balance sheet of these companies. Other cookstove segments have historically been more dependent on public sector and concessional sources, although with increasing shares of private sector financing. Carbon credits for cookstove projects have played a significant role in attracting private finance, with some companies being able to use future carbon credit revenues to anchor and collateralise debt financing.

Figure 4.1 ▻ Figurative representation of investors and financing instruments in typical clean cooking market development



As clean cooking companies mature, capital needs rise but the risk decreases, allowing for a larger share of private finance and long-term debt

Note: "RBF" = Results-Based Finance.

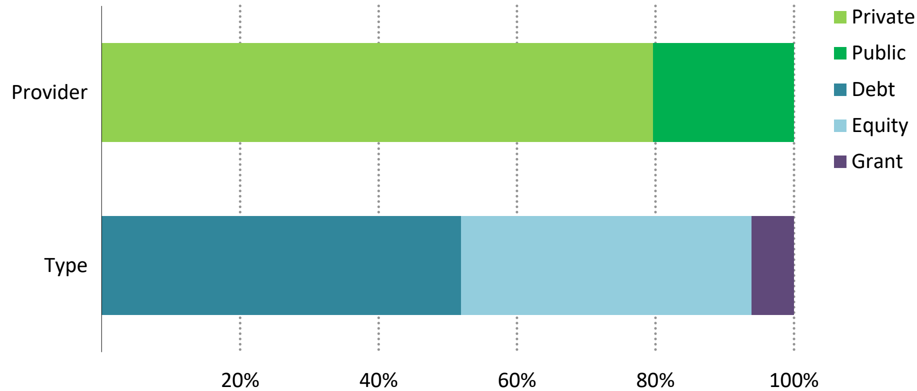
Financing needs and gaps also change based on the maturity of the market segment and the size of the company. A figurative representation of which financing approaches are needed at different stages of development is depicted in Figure 4.1. Mature clean cooking companies operating in Africa today are able to secure financing from some of the largest banks in Africa and internationally, including some large cookstove manufacturers, LPG distributors, ethanol cooking providers, and clean cooking project developers. Still, many clean cooking companies face premiums applied to reflect the high repayment risks associated with the industry, especially in emerging sectors such as biogas, which also face higher premiums to reflect risks around scalability and profitability.

Companies with a global footprint and broad portfolio have a distinct advantage by being able to access lower-cost capital from the international market without paying the risk premium facing many countries in Africa today. On average the country premium (the rate above five-year US treasury bonds) is 8% in Africa, notably higher than in other emerging markets such as Latin America and the Caribbean (5%) and Southeast Asia (2.2%). This is true for major LPG distributors that fund their expansion on the balance sheet of international oil and gas companies that raise capital in overseas markets.

Small and medium-sized enterprises have struggled to access finance or they pay particularly high costs of capital. These companies have historically played the largest role in expanding service into “frontier” markets, often in communities that struggle with affordability and where commercial players wait for nascent markets to mature before investing. Small and medium-sized enterprises often rely on local commercial banks that charge interest rates often over 15% and demand extremely high collateral. As such, many companies finance their operations off their own balance sheets, which, in turn, slows wider expansion of the business. Development banks and other concessional finance providers have gradually employed new support vehicles to reach this group of companies with the aim of enabling access to lower-cost private sector finance.

Scaling clean cooking access requires expanding the range of finance providers and instruments available to clean cooking developers. This includes increasing the availability of low-cost, flexible debt that can cover the working capital of companies as they grow their customer base but have not yet started earning revenues from fuel sales or carbon credits. In the ACCESS, the overall share of debt financing increases from 35% today to over 50% (Figure 4.2), and the share of private sector finance reaches 80% toward 2040. Some of this expansion will follow naturally. As more clean cooking companies demonstrate successful revenue models, more commercial banks will see the sector as less risky and become more practiced at evaluating their lending to the clean cooking sector. This should also enable companies to access finance at lower rates with smaller collateral requirements and longer tenures, which will influence the rate of expansion in the sector.

Figure 4.2 ▷ Share of clean cooking investment by source of finance in the ACCESS, 2024-2040



Private sector finance continues to play a dominant role, however, public finance and grants remain important to extend access to commercially unattractive market segments

There are actions that policymakers, development finance institutions, companies, and commercial lenders can take to encourage lending at more competitive rates to the clean cooking sector. Many are actively used today but require further scaling. Increased deployment of concessional instruments can play a central role. These actions, while not exhaustive, are detailed below:

Increasing availability of equity finance for clean cooking companies: The sector often lacks sufficient equity to access cost-effective debt at scale. In the clean cooking sector, equity has traditionally been built by the company, while equity increases are typically the purview of large international companies in which clean cooking represents one area of business activity. Medium-sized enterprises with proven business models have been able to attract angel investors, venture capital and private equity to provide high-risk, high-return capital that companies rely on to develop their business models. Technical assistance grants play a key role to support business development for early-stage companies, and other flexible grant instruments can sometimes be used to fill an equity gap for small to medium enterprises. Access to flexible debt facilities on concessional financing terms, such as short-term or revolving debt facilities, can help cover fluctuations in cash-flows which could address some constraints on working capital coverage and available equity.

Accessing affordability support: More than half of people in Africa who do not have clean cooking access today face affordability challenges, particularly at current market prices (see section 4.4). In many cases, clean cookstoves are replacing a solution that was either free or low cost such as gathering firewood. For projects to be viable for price sensitive consumers, stove and fuel costs need to be low, thereby reducing the likelihood of achieving an attractive risk-adjusted return for private investors. In part, and due to this affordability concern, it has been difficult to develop economies of scale outside urban areas in African countries. Several finance and policy solutions have emerged to reduce the risks of serving price-sensitive communities, including the use of carbon credit revenues; results-based finance (RBF) by multilateral development banks; government affordability support; and the use of concessions or other company incentives. Expanding these measures to ensure they are sustained over a sufficiently long period, and providing transparent impact reporting, can help private sector lenders better assess and scale their lending to companies operating in these contexts.

Expanding the use of concessional instruments that reduce risk for new financiers: Development finance institutions provide several instruments today that help reduce barriers for international investors. These include guarantees to cover defaults either for large individual projects or for aggregated vehicles of smaller clean cooking companies, political risk insurance to mitigate the impact of sudden policy changes that could undermine clean cooking markets, and currency risk hedging instruments.

Exploring opportunities to lend to small-scale projects: Most clean cooking companies or projects are looking to secure financing of smaller amounts than most large commercial banks and development financing institutions (DFIs) might consider financing. Many financiers, including DFIs, have specific thresholds for projects to justify the transaction costs and processing time on small deals. While local banks would traditionally fill this gap, many banks are not familiar with clean cooking business models and are unable to price the risk at an affordable level. To address this, DFIs could consider revising thresholds or creating bespoke instruments to support such transactions. Alternatively, policymakers could explore the mass procurement of stoves to help address low volumes. Technical assistance directed toward African banks to develop capacity and evaluate clean cooking companies and projects could also increase lending to small and medium-sized enterprises in the sector.

Adopting business models that reduce repayment risk: Viable business models are essential to access debt finance. Many successful businesses have adopted models that accommodate the affordability issues faced by most households, including approaches such as pay-as-you-go (PAYG), savings schemes, third-party financing and utility-led financing (see Table 4.2). While these solutions can reduce repayment risk, in some cases it adds additional cost, as is the case with PAYG models where additional equipment (remote-shut-off gas gauges and meters) is needed, and smaller cylinders mean a higher capital-to-gas ratio. Some studies estimate the 'PAYG premium' at 4-7% (Perros et al., 2024). Continuing to expand and evolve different end-user financing and payment models, and providing transparent reporting on repayment impacts, would help familiarise financiers with these models, and their associated creditworthiness.

Table 4.2 ▷ End-user financing approaches for clean cooking

Approach	Description	Examples
Cash or savings schemes	The user buys the stove outright in cash or makes regular payments into a savings pot until the stove can be bought outright.	Multiple companies, such as KOKO Networks; often involving carbon finance internally at development to lower the cost of the stove at the point of sale.
Pay-as-you-go (PAYG)	The stove is provided at very low cost or free; the users pay regular small instalments for fuel and/or to recover the cost of the stove.	Within LPG, examples include Circle gas, PayGas and PayGo Energy, as well as BURN Manufacturing's pay-as-you-cook for electric cooking.
Third-party financing	A third party, such a micro-finance lender, finances the stoves and deals with repayments.	Various crowdfunding solutions, including the Kiva platform, or funds like the Fair Climate Fund.
Utility model/ on-bill	The original device costs are paid by the utility or a third-party finance provider; repayments are made through the utility bill or fuel purchases.	Next-gen utility model used by Bboxx; subscription model by SupaMoto, EcoSafi; on-bill schemes are not yet widespread, but a pilot is underway in Rwanda.

Enhancing the use of carbon credit revenues to underpin financing deals: As discussed in Chapter 1, carbon credit revenues for cookstove projects have been rising and now make up over 10% of capital flows to the wider clean cooking space. Some companies have used future carbon credit revenues as collateral to secure loans, helping to finance their expansion. Often, this comes at a lower financing cost than prevailing rates in Africa – as many of the off takers of carbon credits are large, credit-worthy companies or countries. The practice of using carbon credit revenues streams to underpin financing deals, which falls under the broader category of carbon finance, remains limited in scale today. Many financiers do not have the tools or experience to properly assess carbon credit market risks. To date, carbon finance has mostly been provided by impact-focused and development institutions, including via the pre-purchase of offsets. This has included specialist funds such as Bix Capital, who have created models that provide finance, primarily debt, that is repaid by future carbon credit receivables, or via developers signing direct off-take agreements with non-profits such as the Fair Climate Fund.

When the clean cookstove carbon credit market stabilises, advancing finance solutions based on carbon credits could allow commercial banks to become more involved in clean cooking projects. This could be further bolstered should the use of future carbon receivables to back securitisation deals progress, which is currently being explored within the wider sector. Both approaches would rely on banks finding solutions to the future price and delivery risks. For example, price risk can be mitigated by securing a fixed offtake agreement, and delivery risk can be reduced using traditional due diligence or statistical analysis tools, or with the use of dedicated carbon rating agencies.

4.4 Managing affordability and fiscal burdens

At current prices, around half of the population in sub-Saharan Africa, an estimated 600 million people, cannot afford any form of clean cooking technology (See Chapter 2). Based on prevailing technology costs, affordability varies significantly by fuel type. For low-income households in the region, the upfront cost of a transitional improved biomass cookstove typically represents around one-third of monthly income. For more modern cooking solutions this share rises; up to half for LPG stoves; for electric cookstoves, up to three-quarters; and for biogas stoves and digesters, the cost can be as much as six times the monthly income.

Despite this, when annualised, switching to improved intermediate and advanced biomass cookstoves often results in significant savings. For households that purchase firewood or charcoal, the higher energy efficiency of these stoves can yield fuel savings that repay the investment within one year, and up to four times over the stove lifetime. In nearly all urban areas, a switch to clean cooking solutions pays off over the lifetime of the stove. However, in rural areas, the economics are more complex. Households that rely on collecting firewood or agricultural residues do not experience direct monetary savings from switching to modern fuels and often perceive the transition as an added expense. For these households, particularly those with limited access to cash, switching to paid fuels can be a barrier even if traditional cooking methods impose high hidden costs in terms of time lost and adverse health impacts. This market failure, where the societal benefits of cleaner solutions outweigh the returns, underscores the need for proactive government intervention.

To better understand local affordability dynamics, the IEA performed geospatial mapping that compares clean cooking costs to household income at the square kilometre level. This analysis reveals not only the affordability range for each technology but also where policy and private sector action can most efficiently expand access. Since upfront costs form a significant barrier for clean cooking adoption, affordability is measured as the ratio between the cost of a stove plus one year of fuel to household income, with the cost of a fuel being dependent on geospatial factors. The affordability metrics consider the number of people gaining access, grouped into 5% increments.

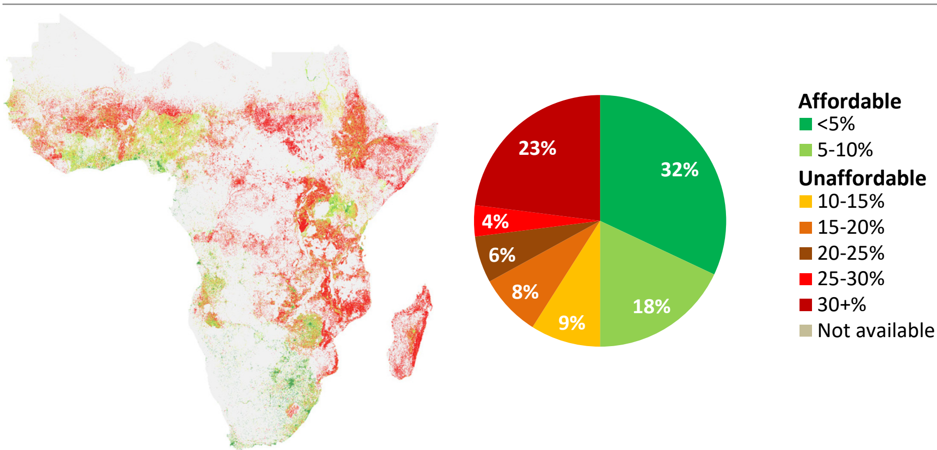
Addressing both upfront and ongoing cost barriers is necessary to achieve universal clean cooking access under the ACCESS scenario. Incentives and innovative business models are already playing a role in extending access to households where affordability remains a challenge. Key developments include the use of carbon credit revenues to subsidise stove prices, partial refilling models for LPG, PAYG metering, smaller LPG canisters and other strategies that reduce entry costs. Governments are also deploying a mix of affordability measures through regulated pricing, providing free or subsidised stove distribution combined with support to low-income households.

Liquefied petroleum gas (LPG)

LPG enjoys one of the broadest affordability footprints among commercial modern fuels as it is available and affordable for half of the population. Coastal areas and riverine corridors (Ghana's coast, southern Nigeria, and South Africa) dominate the affordable zones, illustrating how proximity to ports and refineries trims logistics costs. LPG affordability is most restricted in land-locked Sahel and central African regions where lower incomes intersect with increased prices, because overland transport can add 15% to 25% to final prices.

The upfront costs, including the cylinder deposit or smart-meter starter kit, often represents one-quarter of first-year spending. Shifting to smaller user-owned cylinders or PAYG technology could cut entry costs by up to 40% and could make LPG affordable for millions of households. Company-owned cylinders also provide benefits with regards to cylinder safety regulation and inspection enforcement.

Figure 4.3 ⊳ Affordability of LPG in sub-Saharan Africa, 2023



Coastal and river-corridor hubs keep LPG prices low by shaving up to 25% off logistics costs

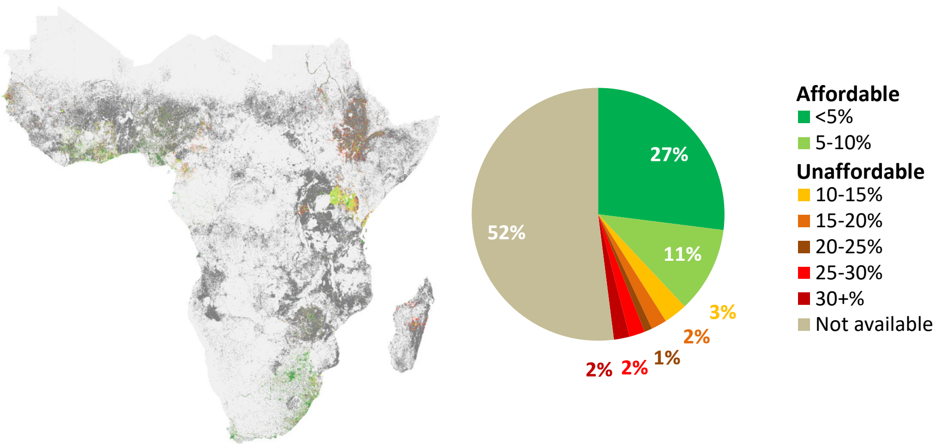
Notes: The map displays where LPG is affordable, while the accompanying pie charts translate that same information into population shares. Map colours match the legend, with one exception: areas where electricity or biogas are unavailable are shown in grey on the maps. LPG = liquefied petroleum gas.

Sources: IEA and KTH Royal Institute of Technology analysis based on the OnStove model developed by KTH Royal Institute of Technology. Income levels per location are approximated based on the Relative Wealth Index (Meta, n.d.).

Electricity

Electricity-based cooking is economically viable for nearly 40% of African households today, of which 27% could cook with electricity while keeping their energy bill below 5% of income, and another 11% within the 5-10% band. However, for six in ten households, electric cooking remains unaffordable or unavailable. Clear pockets of affordability exist in South Africa and national capitals but in much of Central and west-central Africa it remains unaffordable due to high tariffs, unreliable grid connections and limited reach. The urban-rural gap is pronounced, even where grid connections exist in rural areas. For example, stove prices and lower service reliability can almost double first-year costs for rural consumers compared to those in urban areas. Tariff structures are crucial, with the model showing that a 20% reduction in electricity tariffs could increase the number of people who could afford electric cooking by 10%. Expanding access to lifeline tariffs and undertaking broader market reforms could also offer fast, low-cost wins.

Figure 4.4 ▷ Affordability and availability of electricity in sub-Saharan Africa, 2023



High tariffs and weak grids in Central and West-Africa pose a significant barrier to adoption of clean cooking solutions

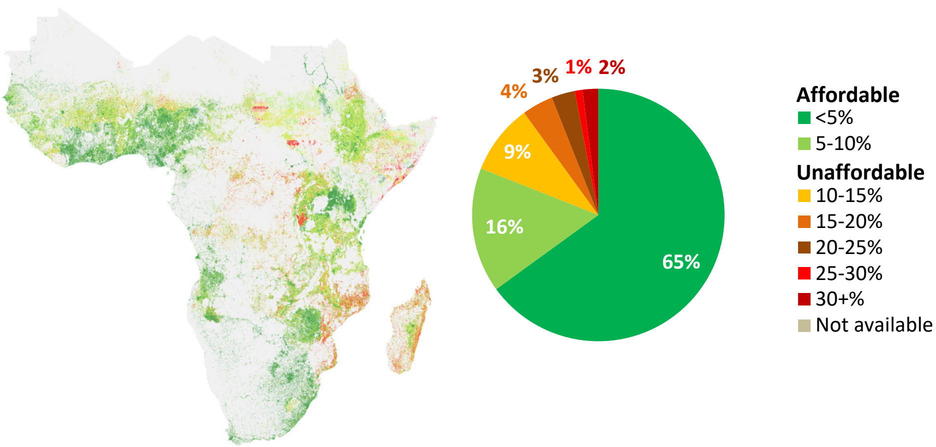
Notes: The map displays where each technology is affordable, while the accompanying pie charts translate that same information into population shares. Map colours match the legend, with one exception: areas where electricity or biogas are unavailable are shown in grey on the maps.

Sources: IEA and KTH Royal Institute of Technology analysis based on the OnStove model developed by KTH Royal Institute of Technology. Income levels per location are approximated based on the Relative Wealth Index (Meta, n.d.).

Intermediate improved biomass cookstoves (ICS)

Intermediate improved biomass cookstoves (Tier 3), designed for basic fuels like gathered firewood, are by far the most affordable option. These are within reach, from an affordability perspective, for 82% of households, with just 10% spending more than 15% of income. Though not classified as clean under World Health Organization (WHO) standards, they can serve as an important transitional technology. Affordability is near-universal across rural zones from the Sahel to the Congo Basin, where fuel-wood is typically gathered. However, urban users face higher costs due to ongoing fuel purchases. The primary cost barrier is the stove itself, which is priced between USD 10-25. Bulk procurement could halve this cost and bring nearly all rural households within the <5% affordability band. Emissions reductions of 40-70% and annual fuel-wood savings of up to one tonne per household offer clear health and environmental co-benefits without raising household cooking costs. Widespread deployment of intermediate ICS can serve as a stepping stone while clean cooking solutions scale, preventing backsliding in affordability during the transition to fully modern cooking.

Figure 4.5 ▹ Affordability of improved biomass cookstoves in sub-Saharan Africa, 2023



Intermediate improved biomass cookstoves provide an affordable transitional technology for most households

Notes: The map displays where each technology is affordable, while the accompanying pie charts translate that same information into population shares. Map colours match the legend, with one exception: areas where electricity or biogas are unavailable are shown in grey on the maps. ICS = improved biomass cookstoves.

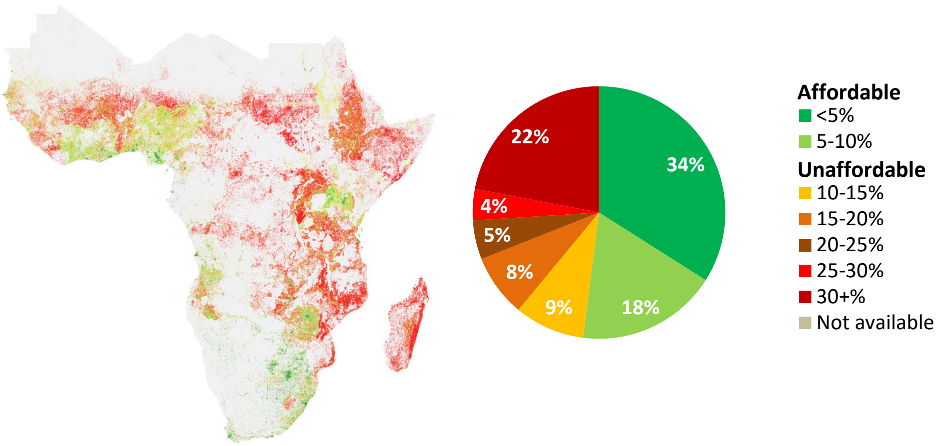
Sources: IEA and KTH Royal Institute of Technology analysis based on the OnStove model developed by KTH Royal Institute of Technology. Income levels per location are approximated based on the Relative Wealth Index (Meta, n.d.).

Advanced biomass cookstoves (ABS)

Advanced biomass cookstoves using modern solid bioenergy mirror LPG in affordability, with 32% of households falling under the 5% income threshold and another 18% within the 5-10% range. They are, however, more costly than intermediate improved biomass cookstoves due to their engineered components and formalised production processes, with their cost typically ranging from USD 50 to USD 130.

Advanced biomass cookstoves using pellets are most affordable in areas with reliable access to agricultural residues. While pellet prices are generally more stable than charcoal, they can still fluctuate due to shifts in feedstock availability and transport costs. Stove costs account for around a quarter of a household's first-year costs for adopting advanced biomass cookstoves using pellets based on today's prices. Long-term supply contracts and national or supranational quality standards are critical to ensure consistent pellet quality and build user trust. Without this, poor-quality pellets often drive users back to charcoal, undermining both affordability and adoption.

Figure 4.6 ▷ Affordability of advanced biomass cookstoves in sub-Saharan Africa, 2023



IEA. CC BY 4.0.

Advanced biomass stoves are widely affordable, with more people able to afford their adoption today than other fuels

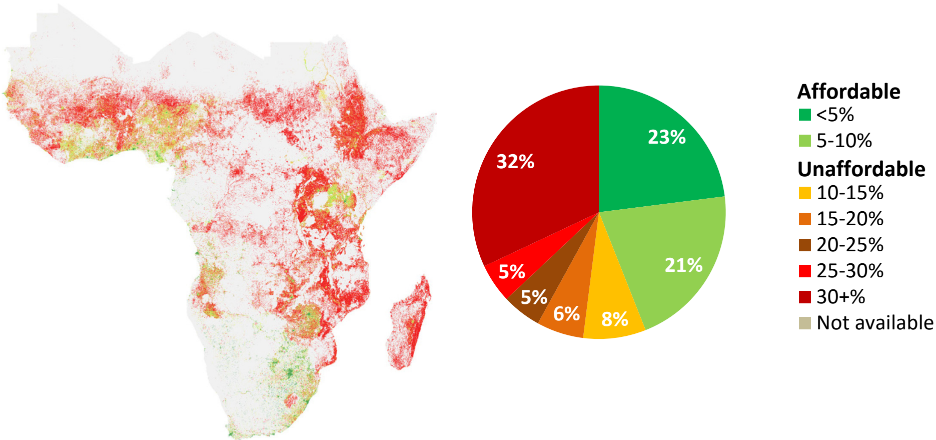
Notes: The map displays where each technology is affordable, while the accompanying pie charts translate that same information into population shares. Map colours match the legend, with one exception: areas where electricity or biogas are unavailable are shown in grey on the maps. ABS = advanced biomass cookstoves.

Sources: IEA and KTH Royal Institute of Technology analysis based on the OnStove model developed by KTH Royal Institute of Technology. Income levels per location are approximated based on the Relative Wealth Index (Meta, n.d.).

Bioethanol

While less widespread, ethanol is affordable for about 23% of households at below 5% of income, and for another 21% within the 5-10% band. Country borders on the affordability map are sharply defined, reflecting a patchwork of regulatory frameworks and high tariffs that hinder trade. Ethanol prices are also volatile as they respond directly to price movements in sugar markets. However, feedstock selection plays a role in cost control. For example, in Kenya, using molasses instead of sugarcane juice can reduce the production cost of ethanol by up to 30%.

Figure 4.7 ▷ Affordability of ethanol in sub-Saharan Africa, 2023



The map reflects tariffs and regulations that confine low prices for ethanol to cities like Nairobi and Harare

Notes: The map displays where each technology is affordable, while the accompanying pie charts translate that same information into population shares. Map colours match the legend, with one exception: areas where electricity or biogas are unavailable are shown in grey on the maps. To assess potential affordability, the modelling assumes ethanol distribution points to be available in all urban centres.

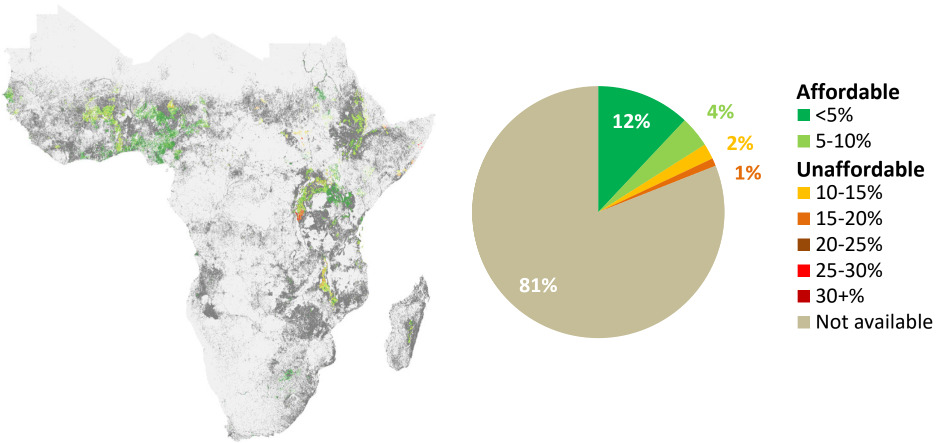
Sources: IEA and KTH Royal Institute of Technology analysis based on the OnStove model developed by KTH Royal Institute of Technology. Income levels per location are approximated based the Meta's Relative Wealth Index (Meta, n.d.).

Biogas

Biogas remains the least affordable technology overall. Only 12% of households could cook with biogas for under 5% of income, and just 4% fall into the 5-10% affordability range. Over 80% of households remain priced out, largely due to feedstock and water constraints. Feasible zones are concentrated in Nigeria and highland areas of Ethiopia, Kenya and Rwanda. Biogas is typically viable only for households with at least three cattle or an equivalent source of organic waste, which further limits the potential market, even in favourable regions. The high upfront cost of digesters, up to 90% of first-year outlays, remains a major barrier. However, spreading costs over five years would make biogas affordable for 11% more eligible households. Additional uptake can be supported through credit lines, financing and bundling with sanitation benefits. Still, biogas is unlikely to scale to the levels of grid or cylinder-based fuels due to its limited availability and localised nature.

Despite progress, clean cooking solutions remain unaffordable for a substantial share of the population. Households that are unable to afford any clean solution and that must rely on intermediate improved biomass cookstoves are concentrated in regions such as the Eastern Sahel and the Horn of Africa. As the analysis shows, small reductions in stove or fuel costs can rapidly shift millions of households into affordability, offering a major return on public investment. These represent no-regret options for government programmes, which can unlock private savings, improve public health, reduce time burdens and mitigate emissions. For stove manufacturers, these gains also translate into the potential to access new markets by innovating to lower costs.

Figure 4.8 ▻ Affordability and availability of biogas in sub-Saharan Africa, 2023



IEA. CC BY 4.0.

The market for biogas remains limited by stringent feedstock and water requirements

Notes: The map displays where each technology is affordable, while the accompanying pie charts translate that same information into population shares. Map colours match the legend, with one exception: areas where electricity or biogas are unavailable are shown in grey on the maps.

Sources: IEA and KTH Royal Institute of Technology analysis based on the OnStove model developed by KTH Royal Institute of Technology. Income levels per location are approximated based on the Relative Wealth Index (Meta, n.d.).

Box 4.2 ▻ Clean cooking in humanitarian settings

As of 2024, over 120 million people globally live in displacement settings – either as refugees or internally displaced persons (IDPs) – with a third located in Africa (UNHCR, 2024). Within these populations, more than 80% lack access to modern cooking solutions. The daily fuel needs of displaced communities have led to cases where local forests were depleted, creating conditions where illegal charcoal and fuelwood providers make inroads, and put many people – especially women and children – increasingly in harm's way as they travel further afield to collect fuel, exposing many to sexual violence or putting them in conflict with host communities (Chatham House, 2015).

Displacement settings – often at the edge of peri-urban areas – are typically the last to receive clean cooking solutions. Financial, logistical, and political barriers, along with short-term humanitarian funding cycles and legal limitations for refugees to seek employment, continue to impede adoption.

Yet evidence shows clean cooking can be viable in these contexts. In many camps, households already purchase wood and charcoal at prices comparable to clean alternatives. Where free firewood is unavailable, willingness to pay for cleaner options can be high. For instance, in Niger's SEED project, 70% of 25 000 refugee households continued to purchase LPG after subsidies ended (Chatham House, 2022). In Rwanda, the RE4R programme introduced pellet-based cooking for refugees which proved to have sustained uptake after the pilot phase (GPA, 2022).

Clean cooking can also ease local tensions. Reducing pressure on local forests, which may be used widely as a fuel source, may help mitigate potential conflict between displaced populations and host communities, while formalising fuel markets can reduce predatory pricing.

For companies to serve displacement settings with clean cooking solutions, concessional finance and affordability support are essential. Without them, the perceived risks of entering these markets – from uncertain demand to political and logistical complexity – often outweigh the potential rewards. Tools like stove subsidies, results-based finance, carbon credits, and grants are critical to lowering upfront costs, attracting private investment, and ensuring sustained access for vulnerable populations.

Although displaced communities may eventually integrate into host communities or relocate, many settlements persist for years – even decades. Yet clean cooking efforts can remain excluded from national energy strategies, which often silo displacement communities from broader energy and development plans.

Unlocking clean cooking at scale in these contexts requires a more integrated, multi-sectoral approach leveraging humanitarian distribution systems, and co-ordinating funding streams across humanitarian, energy, and environmental sectors – a primary focus of the Global Platform for Action.

4.5 Addressing non-financial barriers to adoption

Affordability alone does not guarantee adoption. Some households may have sustainable access to clean cooking fuels and the required equipment, but, for a variety of reasons, do not use that cleaner method as their primary mode of cooking. In households with access to clean cooking solutions, factors such as cooking speed, safety, the ability to prepare traditional meals, proximity to distribution infrastructure, and the number of burners on the stove are often stronger predictors of actual use than price. A lack of focus on behavioural adoption can significantly hinder progress on clean cooking. There are many examples of clean cooking programmes which have distributed stoves, only for these to fall into disuse due to a lack of focus on adoption. Furthermore, cooking is deeply tied to cultural and community identity, and any transition to clean cooking must respect and reflect this connection. Effective strategies should honour local traditions while also addressing the cultural and practical barriers that can hinder the adoption of clean and transitional cooking practices.

In sub-Saharan Africa, most households with access to modern cooking solutions today practise fuel stacking (Shankar et al., 2021). Some adopt modern fuels as their primary option but continue using traditional methods for meals requiring long cooking times, or multiple burners. Others treat modern fuels as a secondary option, using them only for quick tasks such as boiling water, reheating food, or making breakfast, while relying on wood or charcoal for most daily cooking. Addressing barriers to long-term adoption of clean cooking solutions is therefore critical. Table 4.3 shows key considerations – and approaches – to support adoption of clean cooking solutions.

Table 4.3 ▷ Key considerations to support long-term adoption of clean cooking solutions

Description	Approaches to support adoption
Ensuring accessibility and practicality	
Practical constraints can limit adoption, including long distances to distribution points, unreliable fuel availability, and households owning modern stoves with too few burners.	Align technology and infrastructure with households' needs by: • Distributing or subsidising clean cooking stoves with numbers of burners to match household size and cooking routines, ensuring that families can rely on them exclusively without needing to revert to traditional methods. • Shortening the distance from fuel distribution points, especially for households living in remote areas. Even a 10-minute difference in travel time can determine whether a household adopts a clean fuel or not, making proximity a key factor in long-term, consistent use (Shupler et al., 2021). Many leading clean cooking technologies gaining popularity across sub-Saharan Africa today offer multi-burners.
Supporting cultural and culinary preferences	
Cooking is often central to cultural and community identity. Clean cooking solutions that do not align with local traditions or cooking methods tend to see lower uptake. In sub-Saharan Africa, some dishes (e.g. cassava, Githeri, slow-cooked meats) require long cooking times, raising affordability concerns due to fuel use. The taste imparted by open-fire cooking can also be a valued aspect of culinary practices.	• Develop and promote clean cooking technologies that are adaptable to traditional cuisines and cooking methods, including support for required heat levels and compatibility with traditional cookware. Recipe books and cooking demonstrations tailored to local dishes can help ensure cultural responsiveness. For example, Modern Energy Cooking Services (MECS) has developed eCookbooks to measure the energy, time and cost savings of cooking traditional dishes on electric appliances, as well as country-specific recipes and instructions on how these can be prepared (MECS, n.d.). • Including men and community leaders in these efforts is important, as men's dining preferences can often influence household food decisions. Campaigns and strategies, such as community cooking demonstrations, can encourage all household members to try clean cooking technologies and taste the results. The Modern Kitchen Campaign in Bangladesh, launched under the slogan "Times have changed, change your kitchen", used diverse media and outreach strategies, including an outdoor soap-opera-style family drama, and it increased brand awareness by 40%, and sold nearly 15 000 clean stoves. In addition, men were specifically targeted in the behaviour change messaging, given their influential role in household financial decision-making (CCA, 2017).

Table 4.3 ▷ Key considerations to support long-term adoption of clean cooking solutions (continued…)

Description	Approaches to support adoption
Building awareness through information campaigns	
A lack of familiarity with clean cooking and its benefits, along with distrust of unfamiliar technologies, can hinder adoption. Ensuring users understand the full range of benefits and the safety of new technologies is key to long-term uptake.	• Launch awareness campaigns through traditional and social media, highlighting the health, economic and time-saving benefits of clean cooking. For example, the "Clean Cooking Is…" campaign invites people to share what clean cooking means to them by posting short videos on social media. • Target campaigns at key groups – such as youth and women's groups – to drive adoption among the next generation and the primary users of cooking technologies. • Promote local champions and peer-to-peer advocates, who often build more trust than centralised campaigns. A recent Clean Cooking Champion event in Bodh Gaya, Bihar, India, offered valuable insights into local challenges, adoption strategies and effective demand aggregation for clean cooking (MECS, 2024).
Providing training and education in the use of clean cooking stoves and equipment	
Reinforcing campaigns with training and education for sustained impact. Without training, cooking devices may be misused or underused, leading to dissatisfaction or safety concerns and a return to traditional practices. This is especially relevant for technologies requiring regular maintenance, such as biogas systems.	• Develop training programmes – especially at the community level in local hubs and through peer-to-peer models. These should be multi-modal (e.g. in-person, digital, peer-led) to ensure broad stakeholder reach. Ongoing training on use and maintenance is essential for complex technologies like biogas digesters. In Kenya, the African Biodigester Component (ABC) programme trained farmers as peer educators, with over 80% of the 21 000 installed biodigesters still functional in 2022 (endev, 2022). • Support households in adapting to clean cooking practices through safety education, cooking classes, and recipe books. • Provide mentorship and entrepreneurial training across the clean cooking supply chain, with a focus on women as key agents. The Women in Clean Cooking mentorship programme supported 179 early- and mid-career women by 2023 through mentorship and professional development (SEforALL, 2021).
Reinforcing adoption at the community level	
Community-level reinforcement can assist with buy-in, providing social proof and accelerating adoption through making clean cooking more desirable. Local networks can make adoption more resilient and sustained.	• Reinforcing clean cooking at the community level is also critical for long-term adoption. Embedding clean cooking adoption efforts within broader community development programs can be effective, as seen in Eni's Clean Cooking Programme, which adopts a catalytic approach, recognising its potential to address deforestation, stimulate local supply chains and employment, empower women and improve public health (eni, 2024). As an example, in Mozambique a project leveraged five small local companies to produce cookstoves. • Encourage community ownership through participatory planning and local engagement.

To realise the goal of universal access to electricity, it is important to look beyond access to how countries can ensure long-term, sustained adoption of clean cooking technologies that meet consumers' needs and preferences and which are culturally responsive. As the principle and majority target group for many clean cooking technologies, empowering women will be crucial (Box 4.3).

Box 4.3 ▹ The central role of women in advancing clean cooking

In most parts of Africa today, meal preparation is a responsibility that primarily lies with women. As such, women are vital agents of change to ensure the adoption of clean cooking technologies and practices within communities. However, the uptake of stoves and ongoing fuel purchases for clean cooking relies on the availability of household funds and whether women can influence allocation. In the past, successful clean cooking programmes and businesses have often been women-led initiatives in part due to how household dynamics are considered in business models, policies, and programmes. In Kenya, for instance, a study found that women engaged in the clean cooking sector sold nearly three times as many stoves as their male counterparts over the course of the study (CCA, 2015).

Clean cooking policy and programme design can explicitly tailor provisions to address existing challenges. Some examples include:

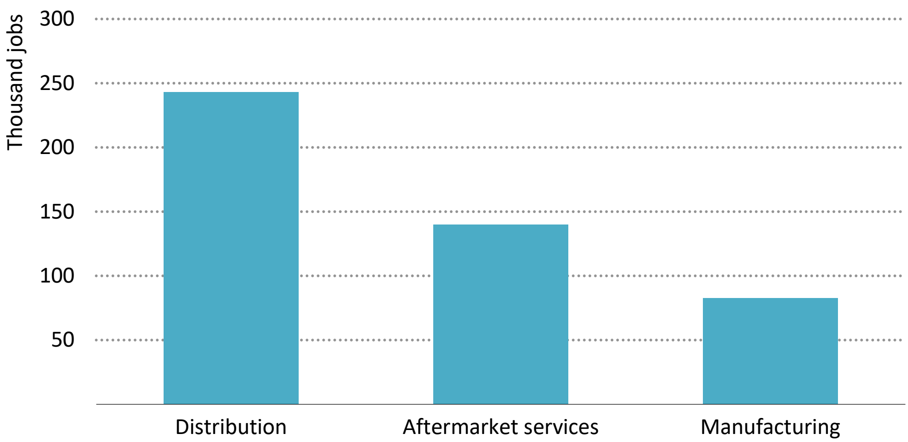
- Ensuring women have equal access to finance, including measures such as accepting non-spouse co-signees (e.g. friends or relatives), or developing a network of lenders known to lend to women-led businesses (to help sidestep lending biases).
- Supporting any government entities charged with clean cooking have high-level women representatives in their official structure.
- Collaborating with existing women's networks to lead peer-to-peer awareness campaigns on clean cooking.
- Engaging women in consultations on infrastructure siting, safety, pricing, and business model design to ensure solutions meet their needs.
- Providing targeted information through marketing and communication strategies for both women and men, that influence respective roles in household decisions on finance and cooking.
- Sponsoring women-focused training and career support, including on topics such as entrepreneurship and finance, and ensuring this support is available at times and places that women can access while balancing other obligations.
- Making affordability support and monetary incentives (including those disbursed via results-based finance and carbon credits) exclusively accessible via the purchase of clean cooking fuels, or administered directly to women, thereby avoiding the risk these incentives are co-opted for other purposes.
- Working with ministries of finance to co-ordinate parallel efforts to set up bank accounts or personal identification for women where they are not available today.

4.6 Building a clean cooking workforce

The rollout of clean cooking stoves and equipment, the construction of supporting infrastructure and the sustained supply of clean cooking fuels will require a significant expansion of semi-skilled labour, most of which must be locally sourced within Africa. The IEA estimates that around 460 000 workers will be needed for delivery, aftermarket services, and manufacturing of clean cooking solutions by 2040 under the ACCESS pathway (Figure 4.9).

The majority of jobs are concentrated in the distribution of cookstoves and fuels to households. While many of these roles do not demand extensive training, typically requiring fewer than four weeks including on-the-job instruction, establishing a trained and competent workforce is essential for scaling clean cooking markets and ensuring local firms can compete effectively.

Figure 4.9 ▻ New jobs in the clean cooking sector in sub-Saharan Africa in the ACCESS, 2024-2040



Providing clean cooking solutions generates employment across distribution, aftermarket services, and manufacturing

Training is particularly important for potentially hazardous areas such as stove installation and inspection, safe handling and transportation of flammable fuels and refilling of fuel canisters. Many companies involved in clean cooking fuel distribution already provide such training to their workforce, but broader co-ordination will be needed to meet rising demand.

Local manufacturing of stoves and cylinders presents one of the most immediate and viable opportunities for homegrown African industry. These products do not require highly specialised technology or materials, and because transport makes up a substantial portion of their total cost, local production can provide a clear cost advantage, particularly where output meets technical standards and quality specifications. Establishing training and validation systems can help local manufacturers scale up and gain a larger share of domestic markets. Moreover, establishing laboratories and standards that can help certify stoves and fuels would create high-skilled jobs, while at the same time facilitating licensing and verification processes.

The shift to clean cooking will also affect existing informal labour systems, especially those built around the provision of traditional biomass fuels (Box 4.4). In the ACCESS, global use of fuelwood and charcoal is projected to fall significantly by 2040, with reductions in sub-Saharan Africa accounting for a large portion of the decline. This shift will have direct employment impacts, particularly in urban areas where charcoal markets are most developed.

Box 4.4 ▹ Informal employment in traditional biomass and charcoal value chains

Africa faces a challenge in both generating employment, and ensuring these jobs offer decent wages sufficient to provide a viable route out of poverty. In many sub-Saharan countries, underemployment, informal work, and weak social protection systems are prevalent. Currently, nearly 90% of the workforce in sub-Saharan Africa is informally employed, often earning low wages and lacking job security (ILO, 2025).

In the ACCESS, the transition to clean cooking is projected to cut the use of firewood and charcoal almost entirely in sub-Saharan Africa by 2040. The sharpest reductions are anticipated in urban areas, where the charcoal market is most prevalent. This transition must be handled carefully to prevent widespread job losses, as many people rely on the charcoal and firewood supply chains for informal employment. Although exact figures are uncertain, some estimates suggest several million people are currently dependent on this sector (GIZ, 2015).

Addressing the job losses faced by communities that rely on the charcoal industry is crucial for a successful transition to clean cooking. A fair, just and inclusive shift will require policymakers to provide clear strategies, including support for retraining workers so they can secure more stable, long-term jobs – possibly within the clean cooking sector where their current distribution networks could be an advantage for companies looking to expand clean cooking solutions into new markets. These efforts can align with broader government initiatives aimed at upskilling the general workforce. Special focus could be given to empowering women, maximising the time-saving advantages of clean cooking and enhancing their involvement in the labour market.

Expanding clean cooking access can generate employment far beyond its industry, by driving economic activity within communities as they gain access. The resulting job creation could significantly surpass that within the clean cooking sector alone. To maximise these opportunities and strengthen supply chain resilience, governments should invest in workforce development and build the necessary infrastructure to support local manufacturing and assembly.

Several segments of the clean cooking value chain are particularly well suited for local development. Expanding LPG value chains is expected to create 280 000 jobs in sub-Saharan Africa in distribution, aftermarket services and manufacturing. Further job creation would result from bringing additional refining, cylinder manufacturing and appliance production onshore. These activities also require skilled operators for LPG terminals, storage and refilling stations and delivery infrastructure.

Agricultural waste offers an opportunity for pellet production that can take place nearby consumers. This would create jobs, improve security of supply, and lower transportation costs. Moreover, the adequate management of waste biomass for pellet production can also prevent environmental degradation by stopping harmful pollutants from entering water supplies or filtering into the soil.

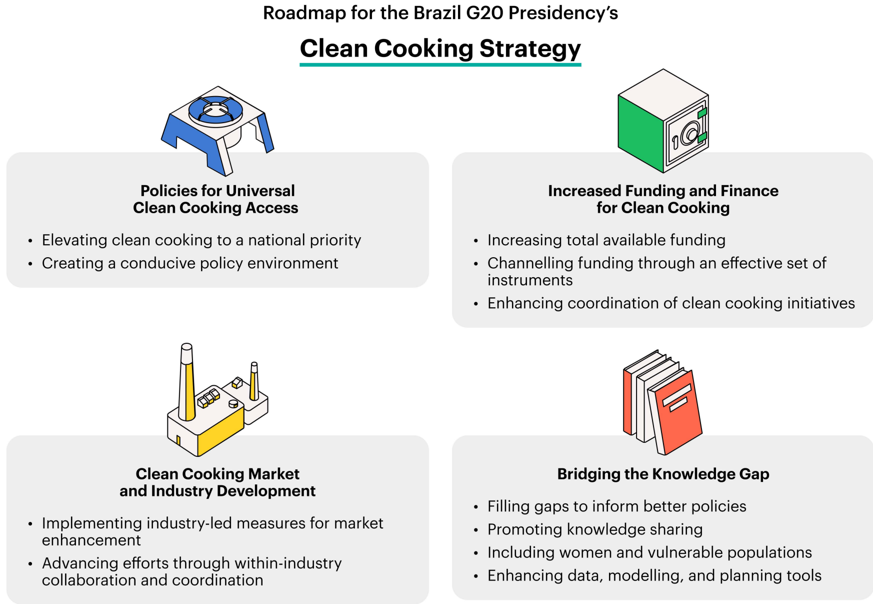
Biogas systems offer another source of local employment for production, installation, and maintenance of biodigesters. These roles require more specialised training but can provide valuable rural employment where other job opportunities are limited. Similarly, expanding electricity access under the ACCESS will create jobs in power infrastructure and may also support the distribution of bundled electric cooking solutions, sold through mini-grid operators or appliance retailers.

The long-term success of clean cooking transitions will depend not only on fuels and technologies, but on workforce development. Prioritising the right parts of the value chain for domestic job creation, managing the displacement of informal labour from the traditional fuel sector, and supportive aftermarket industries – such as stove repair and fuel supply, will be critical to delivering inclusive, resilient, and sustainable clean cooking systems across Africa. Moreover, clean cooking can boost productivity by helping free-up time for consumers, typically women, that would otherwise have to spend hours collecting wood and cooking with an inefficient stove for longer than they would with a modern clean cooking device. Jobs in sales, marketing and related roles can help create awareness about the benefits of clean cooking to consumers, while offering roles that are well suited to women as the primary users of home appliances.

4.7 Making universal clean cooking a reality

In 2024, the IEA's Summit on Clean Cooking in Africa led to the adoption of the Clean Cooking Declaration. The declaration identified three crucial themes for accelerating progress: financing, policies, and partnerships. Building on this framework, the *Roadmap for the Clean Cooking Strategy* was launched under Brazil's G20 Presidency (IEA et al., 2024) (Figure 4.10). It split out the partnerships pillar to include separate action areas for industry and knowledge recognising their respective roles in reaching universal clean cooking access. These pillars expand on the priorities set out in the Clean Cooking Declaration, offering a more comprehensive framework for implementation (IEA, 2024).

Figure 4.10 ▷ Visualisation of the key action areas of the Roadmap for the Brazil G20 Presidency's Clean Cooking Strategy



Brazil's G20 Presidency highlighted four key action areas to accelerate efforts on clean cooking: policy, finance, industry, and technical assistance

The Roadmap is now being used to guide specific clean cooking actions. Under South Africa's G20 Presidency, the roadmap is being adopted to define concrete steps and drive measurable progress in collaboration with other key clean cooking stakeholders.

- The **policy pillar** focuses on elevating clean cooking as a national priority and integrating it into broader energy access and development strategies.
- The **finance pillar** seeks to scale up funding and improve co-ordination among global clean cooking initiatives, ensuring resources are effectively allocated through the right instruments.
- The **industry pillar** supports market development by promoting industry-led initiatives and co-operation across the clean cooking value chain.
- The **knowledge pillar** aims to close data and evidence gaps, strengthen planning tools and ensure inclusive engagement, particularly of women and vulnerable populations.

Integrating clean cooking efforts within broader global initiatives such as the Brazil G20 Roadmap helps support co-ordinated implementation. For Africa to align with the ACCESS pathway, cross-cutting actions must be prioritised. These include scaling up infrastructure, supporting local manufacturing, enhancing affordability and improving co-ordination across public, private, and development actors.

To translate the four pillars into tangible outcomes, it is essential to move from broad objectives to concrete, actionable steps. For each specific pillar outlined, the following table serves as a practical guide to propose tailored actions that different entities can undertake to help make clean cooking more affordable.

These actions are not meant to be exhaustive, but rather indicative of the types of interventions that can drive impact. Governments, industry stakeholders, development partners and development finance institutions all have distinct yet complementary roles to play. Clearly setting out roles and aligning responsibilities with the respective mandates and capacities, can enable a co-ordinated and strategic push towards accelerating access to affordable and inclusive clean cooking solutions.

Table 4.4 ▹ Suggested actions for the international community to support clean cooking in sub-Saharan Africa

African governments	
Policy	Define clear targets for each clean cooking fuel solution, along with corresponding timelines for achievement to accelerate implementation. Embed these targets in the broader national development programs such as energy access masterplan, NDC roadmaps or JETPs.
Finance	Develop and implement carbon credit legislation with clear permitting process and regulations on monitoring, reporting, and verification.
Industry development	Undertake feasibility studies to assess the potential for regional clean cooking infrastructure clusters (e.g. ports, stove manufacturing facilities, filling facilities, etc.).
Knowledge	Implement awareness campaigns - work with humanitarian efforts to include clean cooking support to displaced people and informal settlements, with a focus on women and youth.
Donor governments	
Policy	Push for clean cooking to be prominently represented in multilateral forums, such as the G20, G7, COP, and international development banks. This includes advocating for a co-ordinated international approach to align funding, technical assistance and policy support.
Finance	Commit additional development support, including from other portions of the inter-related development agenda. Establish bilateral agreements with African governments for the purchase of high-quality carbon credits within the context of Article 6 of the Paris Agreement.
Industry development	Develop a fund that is accessible to smaller philanthropies and companies to channel contributions towards clean cooking projects and pilot initiatives that reflect donors' specifications.
Knowledge	Lending expertise and resources to support capacity building efforts in the clean cooking sector, helping to strengthen institutional frameworks, enhance technical knowledge, and develop sustainable local value chains for fuels, technologies, and services.

Table 4.4 ▹ Suggested actions for the international community to support clean cooking in sub-Saharan Africa (continued…)

Industry stakeholders	
Policy	Establish industry-led standards and regulations bodies that suggest consistent policy across regions that mutually benefits all parts of the clean cooking industry and establish periodic engagement forums for industry to engage with policymakers and regulators.
Finance	Work to mobilise more industry commitments, whether through direct investments, carbon credit purchases, philanthropic arms, capitalising specialised investment funds, or in-kind support like filling fuel storage with generous financing terms.
Industry development	Adopting industry-wide positions on items such as promoting cylinder recirculation models, implementing a fuel-grade bioethanol standard, aligning on sensible regulations for partial refilling, free provision of replacement defective stoves and damaged cylinders submitted for inspection.
Knowledge	Establish industry reporting protocols for companies and create standardised forms for tracking key performance indicators such as production volumes, sales, fuel consumption, emissions reductions and user satisfaction.
Development assistance / technical assistance	
Policy	Develop draft legislation that establishes simplified procedures and clearly defined maximum processing timelines for permits, licences and land acquisition (e.g. no more than 90 days from submission).
Finance	Conduct a comprehensive study on the fiscal implications of removing VAT and other taxes on clean cooking fuels, appliances, and components, alongside an analysis of the broader impact on the supply chain.
Industry development	Provide worker training focused on youth and women for occupations needed in the clean cooking value chain, from stove manufacturing and installation, to fuel production, distribution, maintenance and customer service.
Knowledge	Sponsor seconded experts within the government to provide capacity building and training to government officials on clean cooking energy planning, including use of software tools to enhance infrastructure planning, decision making and ownership.
Development finance institutions	
Policy	Offer political risk insurance to protect investors and enterprises from sudden policy shifts (subsidy removal, import restrictions) that could destabilise clean cooking markets.
Finance	Prioritise mass procurement of clean cooking equipment that reaches minimum ticket size requirements of various institutions or identify other pipeline projects of high impact initiatives.
Industry development	Offer guarantees to cover defaults either for large individual projects or for aggregated vehicles of smaller clean cooking companies and blend with concessional finance mechanisms.
Knowledge	Support local banks to allow them to lend at lower rates and understand clean cooking projects and how to finance them.

Achieving universal access to clean cooking requires more than commitments, it demands co-ordinated, concrete action across all levels. By identifying practical steps under each pillar and assigning clear responsibilities to the relevant actors with relevant timelines, the groundwork is laid out for measurable and lasting outcomes.


ANNEXES

Commitment tracking

A.1 Introduction to tracking exercise

The IEA's *Summit on Clean Cooking in Africa* in 2024 delivered USD 2.2 billion in public and private sector commitments to support efforts to reach universal access to clean cooking. Additionally, twelve African governments – Côte d'Ivoire, Ghana, Kenya, Madagascar, Malawi, Mozambique, Senegal, Sierra Leone, Tanzania, Togo, Uganda, Zambia – signed the Summit's *High-level Declaration on Making Clean Cooking a Priority,* committing to implementing proven clean cooking policies. To ensure accountability and transparency, the IEA is tracking the disbursement of the financial commitments and the implementation of policies in countries with commitments. This annex provides detailed reporting on implementation of individual pledges as of 1 July 2025. The IEA will continue to monitor progress on the Summit commitments annually through 2030.

A.2 Financial commitments made at the Summit

The commitments are based on the Summit Outcome Document and Action Plan (IEA, 2024). Data on implementation has been self-reported to the IEA by governments and organisations that made investment commitments. The IEA reviewed and analysed the data, consulting reporting entities as needed to ensure consistency with other data sources and accurate reflection of activities. These were cross-checked against other public records, including the OECD's Development Assistance Committee. Final reporting data was shared with governments and organisations for review prior to publication.

Table A.1 reports on financial commitments made by governments at the Summit. Two countries have fulfilled their commitments, Ireland and the United States. Table A.2 reports the investment data for the private sector. Each table reflects the financial commitment made, the disbursements since 2024, and what remains to fulfil the commitment by 2030. Separate columns report which portion of that commitment and disbursements was new and directed toward clean cooking in Africa. The sum of the portions of these commitments going to clean cooking in Africa in these two tables accounts for the USD 2.2 billion. Where necessary, explanatory notes clarifying the commitment or disbursements are included in the notes following each table. Following the tables is a list of corresponding commitments as worded by the organisation in the Summit Outcome Document and Action Plan. Some of these organisations have made commitments to clean cooking in Africa outside of the context of the Summit and these are not reflected in this reporting.

In addition to the tracking of the USD 2.2 billion in commitments, other entities that are important to the clean cooking financing ecosystem have submitted reporting. This includes intermediary funds that may receive some of their funding through the commitments above. This reporting is tracked in Table A.3 and Table A.4.

Table A.1 ▷ Reporting on public sector Summit commitments (million USD)

	Commitments on clean cooking			Of which are linked to new commitments for Africa made at the Summit		
	Committed amount	Progress since 2024	Implied progress to fulfil	Committed amount	Progress since 2024	Implied progress to fulfil
Denmark[1]	75	15	60	75	15	60
European Commission[2]	175	No data[3]	No data	13.6	0.5	13.1
France[2]	108	6	102	108	6	102
Ireland[2]	0.8	0.8	0	0.8	0.8	0
Netherlands[2]	5	3	2	5	3	2
Norway[4]	50	14	16	30	14	16
United Kingdom[5]	9	3	6	9	3	6
United States	40	40	0	40	40	0

[1] DKK/USD exchange rate of 0.15 in 2024 and 0.14 in 2025. Progress amount in Danish Krone (DKK) is 70 million.

[2] Based on EUR/USD exchange rate of 1.08 for 2024 and 2025.

[3] EU's original Summit commitment included clean cooking disbursements made prior to 14 May 2024 as part of the AEGEI project. Data on disbursement on the EU investments in AEGEI was not reported.

[4] Norway's commitment at the Summit includes, in part, funding allocated to clean cooking initiatives prior to 14 May 2024. These earlier disbursements, made under the same agreements and to the same partners as subsequent allocations, are credited in accordance with the agreed-upon framework to reflect Norway's progress toward fulfilling its stated pledge.

[5] GBP/USD exchange rate of 1.3 used for 2024 and 2025.

Commitment statements

Denmark: Denmark will provide at least DKK 500 million (Danish kroner; USD 70-75 million) over the coming years, starting with USD 20 million new funding for the World Bank Clean Cooking Fund.

European Commission: The European Union (EU) / Team Europe is currently implementing under AEGEI, the Africa Europe Green Energy Initiative, actions on clean cooking amounting to more than EUR 400 million, with an EU contribution of EUR 150 million. The EU / Team Europe will soon launch a new initiative, the Regional Clean Cooking Action for West Africa – RECCAWA, with an EU contribution of EUR 12 million, co-financed by the Netherlands with EUR 5 million.

France: France pledges to invest EUR 100 million over five years in clean cooking methods and will mobilise even more through the Paris Pact for People and the Planet and Finance in Common. Agence Française de Développement (AFD) commits to implement the roadmap dedicated to clean cooking that was developed as a deliverable of the Summit in order to mainstream and scale up Clean Cooking in its operations.

Ireland: In May 2024, Ireland disbursed EUR 750 000 to the Clean Cooking Alliance (CCA) for the Delivery Units Network in Africa. The Delivery Units will be located within the President's offices – first countries to establish units include Sierra Leone and Kenya. With Ireland's funding, CCA plans to provide a range of network services to the Clean Cooking Delivery Units Network, through the CCA Delivery Units Network Secretariat. These services include: technical assistance to national governments; resource mobilisation support; catalytic funding for special projects; leadership training and professional development for Delivery Unit staff; and a peer-to-peer action network to accelerate knowledge transfer and regional coalition-building.

Netherlands: The EU and The Netherlands have jointly mobilised EUR 10.5 million to support clean cooking in West Africa. The Netherlands' contribution amounts to EUR 5 million to the Regional Clean Cooking Action in West Africa, which will be implemented by RVO and AECID.

Norway: Norway has committed to provide about USD 50 million in support for clean cooking.

United Kingdom: The United Kingdom (UK) announced the delivery of GBP 8.5 million on Modern Energy Cooking Services (MECS) programme from 2024 – 2026 in two African countries. The United Kingdom is committed to expanding accelerator programmes; our demonstrators in Uganda and Tanzania which we announced at this Summit are doing just this, and the United Kingdom will continue to drive this agenda forward. Since 2016 our Transforming Energy Access programme has been delivering GBP 265 million of UK support through effective partnerships and collaboration with country institutions, academics, and small businesses to support incubation, acceleration, and scaling of innovative solutions to long term financing challenges.

United States: The United States announced it is increasing its ambitions in the field of clean cooking through policy or programmatic support totalling some USD 40 million, which will encompass complementary and wide-ranging activities across the White House, EPA, USAID, DOE, NIH, Agriculture, and other agencies. The United States announced that the Clean Cooking and Climate Consortium, which it helped launch and support, will release their draft Cooking and Carbon methodology for public comment this summer. This methodology is designed to cover all cooking transition scenarios, incentivise best practices, and incorporate latest science on key parameters. The methodology will set a level playing field for project developers and standards bodies and will build certainty, confidence, consistency, and transparency in the cooking and carbon market, which the United States believes will attract more investment to the clean cooking sector and result in proper credit for each ton of carbon offset.

Table A.2 ▹ Reporting on private Sector Summit commitments (million USD)

	Commitments on clean cooking			Of which are linked to new commitments for Africa made at the Summit		
	Committed amount	Progress since 2024	Implied progress to fulfil	Committed amount	Progress since 2024	Implied progress to fulfil
Africa50[1]	150	0	150	150	0	150
BioLite	60	23	37	60	23	37
BURN	275	18	257	275	18	257
Circle Gas ltd.	75	48	27	75	48	27
Eni[2]	20 million beneficiaries	1.2 million beneficiaries	18.5 million beneficiaries	19.7 million beneficiaries	1.2 million beneficiaries	18.5 million beneficiaries
Oryx Energies	50	5	45	50	5	45
Shell[3]	200	200	0	85	85	0
Sistema.bio	20	3	17	20	3	17
TotalEnergies[4]	400	90	310	355	82	273
Vitol/Vivo Energy	550	101	449	550	101	449

[1] Africa50's commitment of USD 150 million reflects the expected contribution from Africa50's balance sheet, intended to leverage additional public and private funding to reach the overall USD 500 million target included in their written commitment.

[2] Eni's official commitment made at the Summit is based on numbers of beneficiaries, although they provided an estimate for the total value of the Commitment at USD 300 million. Eni's commitment at the Summit includes, in part, funding allocated to clean cooking initiatives prior to 14 May 2024. These earlier disbursements are credited in accordance with the agreed-upon framework to reflect Eni's progress toward fulfilling its stated pledge. IEA estimated associated financial outlays with the commitment at around USD 23 million in 2024. These are based on IEA estimates for the equivalent investment value based on number of beneficiaries and technology type and are only provided for a harmonized comparison of tracking against the Summit commitments and do not reflect investment data reported from Eni.

[3] Shell has disbursed its commitment to the Energy Access Fund, which will make future investments. The IEA has made an assessment regarding Shell's Energy Access Fund commitment that will be for clean cooking in Africa. This is only intended as an estimate.

[4] TotalEnergies' commitment of USD 400 million includes investments in both sub-Saharan Africa and India, of which USD 355 million are intended in Africa.

Commitment statements

Africa50: will mobilise up to USD 500 million in blended finance, project development funding, equity and debt investments to support LPG infrastructure and value chain expansion in several African countries.

BioLite: commits to expanding our distribution partnerships and carbon credits program to deliver clean cookstoves to an additional three million households in sub-Saharan Africa by 2030. BioLite plans to deploy USD 60 million to deliver this scale of energy access.

BURN Manufacturing: plans to deploy over USD 275 million of project financing for stove subsidies by 2030.

Circle Gas ltd.: has launched MGas Resources in Tanzania and will be investing USD 75 million to expand its total customer base in East Africa from current 350 000 to 750 000 by the end of 2025, in both Kenya and Tanzania. By doing so, Circle Gas investments in Clean Cooking will increase to over USD 230 million. Circle Gas Limited has launched their latest generation LPG Pay As you Go smart meter the “PX”, which is being manufactured in Italy by their subsidiary Circle Manufacturing Italia Srl. The production of the new generation PX meter has enabled improved durability, prolonged battery life and substantial enhanced user interface.

Eni: voluntarily launched its Clean Cooking Program in 2018 and has already involved about 500 thousand beneficiaries located in Côte d'Ivoire, Mozambique, Rwanda, Angola and the Republic of Congo. Our plan is to provide access to clean cooking to more than 10 million beneficiaries in sub–Saharan Africa by 2027. Fostering the shift from improved to clean cooking solutions, Eni’s ambition is to reach 20 million beneficiaries by 2030, associated to an estimated spending of USD 300 million, and even more in the following years.

Oryx Energies: Since 2015, Oryx Energies has invested approximately USD 100 million, in Tanzanian LPG market, through its local affiliate Oryx Gas Tanzania Ltd “OGTL”. OGTL, pioneer of Clean Cooking in Tanzania, is committed to converting a further 6 million Tanzanian households from charcoal and firewood to LPG by the year 2032. This pledge implies OGTL will continue to invest in the necessary infrastructure to reach this goal at an approximate value of USD 50 million by 2030.

Shell: recognises the importance of closing energy access gaps. Shell is pleased to share today at the Summit hosted by IEA, AFDB, Tanzania and Norway governments that it has pledged USD 200 million as part of a broader initiative to help people get access to energy in the near and medium terms. The initiative will focus on several regions including sub-Saharan Africa and aims to help millions of people in underserved communities get access to electricity and improved cooking conditions (as defined by the World Bank Multi-Tier Framework).

Sistema.bio: is proud to announce it has launched a program to provide renewable energy cooking solutions through biogas to more than 1 million people in 200 000 households. This creates health, gender, climate and agriculture outcomes across 10 countries in sub-Saharan Africa. Sistema.bio will bring over USD 20 million in outside financing to discount the investment by family farmers in rural areas. Sistema.bio will provide unprecedented transparency and integrity in reporting through a fully digital measurement, reporting and verification (MRV) structure for its carbon credits.

TotalEnergies: To increase clean cooking access, TotalEnergies announced at the Summit on Clean Cooking hosted by the IEA, AFDB and governments of Tanzania and Norway, its ambition to impact 100 million people by investing over USD 400 million in LPG for Clean Cooking in Africa and in India, focused on investing in additional assets (storage, filling, bottles). In addition, the company will partner to develop pay-as-you-cook technologies in order to increase access to clean cooking.

Vitol/Vivo Energy: Vitol, and its daughter company, Vivo Energy, announced today at the Summit hosted by the IEA, AFDB and governments of Tanzania and Norway, their intention to invest more than USD 550 million by 2030 in the infrastructure required to facilitate cleaner cooking solutions in Africa. This pan-African investment comprises both LPG infrastructure, from marine terminals to the high-quality cylinders required for the safe distribution of LPG, and investment in clean cooking carbon projects.

A.3 Policy commitments made at the Summit

Twelve African governments signed the Declaration, which committed to make clean cooking a national priority and to implement proven policy measures to drive progress. The Declaration also called on other African governments to follow their lead. Progress is being tracked against eight key policy indicators.

Table A.5 ▷ Policy tracking of African governments that signed the Declaration

		Framework		Financial support			Regulations		
Country	Target	National strategy	NDC provisions	Designated authority	Tax incentives	Domestic Manufacturing	Carbon market	Government monitoring	Cookstoves standards
Côte d'Ivoire	50% by 2030	○	◍	◍	●	–	–	–	–
Ghana	50% by 2030*	○	◍	◍	–	◍	●	◍	●
Kenya	100% by 2028	●	●	◍	●	●	●	◍	◍
Madagascar	50% by 2030	○	◍	◍	◍	–	–	◍	–
Malawi	75% by 2030	●	◍	◍	–	–	○	◍	◍
Mozambique	–	○	◍	◍	◍	◍	–	◍	–
Senegal	100% by 2035	●	◍	◍	◍	–	–	●	–
Sierra Leone	100% by 2030	◍	◍	◍	–	–	–	◍	–
Tanzania	80% by 2034	●	◍	◍	●	●	●	●	○
Togo	100% by 2030	◍	◍	◍	–	–	◍	◍	–
Uganda	50% by 2030	◍	◍	◍	●	–	●	◍	–
Zambia	40% by 2030	○	●	◍	–	–	◍	◍	–

Notes: ● = regulation change since the start of 2024; ○ = announced/forthcoming policy change; ◍ = regulation enforced before 2024; – = no known policy; *target focus on LPG fuel. Target = national goal set to increase access to clean cooking solutions; National strategy = official government plan outlining the path to scale up clean cooking; NDC (Nationally Determined Contribution) provision = clean cooking is included in the NDC; Tax incentives = fiscal exemptions or reductions for clean cooking fuels or appliances; Domestic manufacturing = policies supporting local supply of clean cooking technologies; Carbon market = legal framework on carbon market; Cookstoves standards = regulation requiring the use or sale of certain clean cooking technologies. The policy landscape in 25 selected countries in sub-Saharan Africa are included. Congo = Republic of the Congo; DR Congo = Democratic Republic of the Congo; Tanzania = United Republic of Tanzania.

Definitions

This annex provides general information on terminology used in this report including units and general conversion factors; definitions of fuels, processes and sectors; regional and country groupings; and abbreviations and acronyms.

Units

Area	ha	hectare
Coal	Mtce	million tonnes of coal equivalent (equals 0.7 Mtoe)
Emissions	ppm	parts per million (by volume)
	t CO_2	tonnes of carbon dioxide
	kg CO_2-eq	kilogrammes of carbon-dioxide equivalent
	Mt CO_2-eq	million tonnes of carbon-dioxide equivalent
	Gt CO_2-eq	gigatonnes of carbon-dioxide equivalent (using 100-year global warming potentials for different greenhouse gases)
Energy	EJ	exajoule (1 joule x 10^{18})
	PJ	petajoule (1 joule x 10^{15})
	TJ	terajoule (1 joule x 10^{12})
	GJ	gigajoule (1 joule x 10^{9})
	MJ	megajoule (1 joule x 10^{6})
	boe	barrel of oil equivalent
	toe	tonne of oil equivalent
	ktoe	thousand tonnes of oil equivalent
	Mtoe	million tonnes of oil equivalent
	bcme	billion cubic metres of natural gas equivalent
	kWh	kilowatt-hour
	MWh	megawatt-hour
	GWh	gigawatt-hour
	TWh	terawatt-hour
Gases	bcm	billion cubic metres
	tcm	trillion cubic metres
Liquids	kbd	thousand barrels per day
	mbd	million barrels per day
	mboe/d	million barrels of oil equivalent per day
	mlpd	million litres per day
Mass	kg	kilogramme
	t	tonne (1 tonne = 1 000 kg)
	kt	kilotonnes (1 tonne x 10^{3})
	Mt	million tonnes (1 tonne x 10^{6})
	Gt	gigatonnes (1 tonne x 10^{9})
Monetary	USD million	1 US dollar x 10^{6}
	USD billion	1 US dollar x 10^{9}
	USD trillion	1 US dollar x 10^{12}
	USD/t CO_2	US dollars per tonne of carbon dioxide

Power	W	watt (1 joule per second)
	kW	kilowatt (1 watt x 10^3)
	MW	megawatt (1 watt x 10^6)
	GW	gigawatt (1 watt x 10^9)
	TW	terawatt (1 watt x 10^{12})

General conversion factors for energy

		Multiplier to convert to:					
		EJ	**Gcal**	**Mtoe**	**MBtu**	**bcme**	**GWh**
Convert from:	**EJ**	1	2.388 x 10^8	23.88	9.478 x 10^8	27.78	2.778 x 10^5
	Gcal	4.1868 x 10^{-9}	1	10^{-7}	3.968	1.163 x 10^{-7}	1.163 x 10^{-3}
	Mtoe	4.1868 x 10^{-2}	10^7	1	3.968 x 10^7	1.163	11 630
	MBtu	1.0551 x 10^{-9}	0.252	2.52 x 10^{-8}	1	2.932 x 10^{-8}	2.931 x 10^{-4}
	bcme	0.036	8.60 x 10^6	0.86	3.41 x 10^7	1	9 999
	GWh	3.6 x 10^{-6}	860	8.6 x 10^{-5}	3 412	1 x 10^{-4}	1

Note: There is no generally accepted definition of boe; typically, the conversion factors used vary from 7.15 to 7.40 boe per toe. Natural gas is attributed a low heating value of 1 MJ per 44.1 kg. Conversions to and from billion cubic metres of natural gas equivalent (bcme) are given as representative multipliers but may differ from the average values obtained by converting natural gas volumes between IEA balances due to the use of country-specific energy densities. Lower heating values (LHV) are used throughout.

Currency conversions

Exchange rates *(2024 annual average)*	**1 US dollar (USD) equals:**
British Pound	0.78
Chinese Yuan Renminbi	7.20
Euro	0.92
Indian Rupee	83.67
Japanese Yen	151.37
Korean Won	1 363.38

Source: World Bank Data: Official exchange rate (Local Currency Units per USD, period average), https://data.worldbank.org/indicator/PA.NUS.FCRF, accessed July 2025.

Definitions

Access to clean cooking: When a household has the equipment and reliable access to the fuels that allow cooking to be carried out primarily in a fashion which ascribes to the World Health Organization's (WHO) performance criteria for Tier 4 and above in terms of key indoor air pollutants. This excludes traditional cooking options that make use of solid biomass (such as a three-stone fire), coal or kerosene. It includes clean advanced biomass cook stoves, biogas/biodigester systems, electric stoves, liquefied petroleum gas, natural gas and ethanol stoves.

Advanced biomass stove: Stoves that burn solid biomass, such as wood, charcoal, or pellets and employ a forced draft (fan-assisted combustion) or gasification to achieve significantly higher thermal efficiency and much lower emissions – WHO standards for Tier 3 to 5 for emissions and thermal efficiency. This is part of the broader classification of improved biomass cookstoves.

Affordability: In this report, affordability is assessed as the share of households' disposable income spent on upfront costs, namely capital expenditure for clean cooking equipment plus one year of operating expenses. A clean cooking solution is considered affordable if related expenditure is below 10% of household income.

Balance sheet finance: Involves the explicit financing of assets on a company's balance sheet using retained earnings from business activities, including those with regulated revenues, as well as corporate debt and equity issuance in capital markets. To some extent, it measures the degree to which a company self-finances its assets, though balance sheets also serve as intermediaries for raising capital from external sources. This report also refers to 'Corporate finance' when describing balance sheet financing.

Basic biomass cookstoves: Describes the simplest forms of solid fuel stoves, often artisanal or locally produced from clay, metal, or a combination of materials. These stoves provide small improvements over an open fire in terms of fuel efficiency or emissions reduction. They fall within ISO Tiers 0 to 2 and are considered polluting under WHO guidelines.

Battery storage: Energy storage technology that uses reversible chemical reactions to absorb and release electricity on demand.

Biodigester: A biodigester breaks down organic material (such as animal manure, agriculture residues, food waste) to produce biogas (see definition below). This can be a source of energy for clean cooking solutions.

Bioenergy: Energy content in solid, liquid and gaseous products derived from biomass feedstocks and biogas. It includes solid bioenergy, liquid biofuels and biogases.

Biogas: A mixture of methane, CO_2 and small quantities of other gases produced by anaerobic digestion of organic matter in an oxygen-free environment.

Biogases: Include both biogas and biomethane.

Biomethane: Biomethane is a near-pure source of methane produced either by "upgrading" biogas (a process that removes any carbon dioxide and other contaminants present in the biogas) or through the gasification of solid biomass followed by methanation. It is also known as renewable natural gas.

Blended finance: A broad category of development finance arrangements that blend relatively small amounts of concessional donor funds into investments, in order to mitigate specific investment risks. This can catalyse important investments that would otherwise be unable to proceed under conventional commercial terms. These arrangements can be structured as debt, equity, risk-sharing or guarantee products. Specific terms of these arrangements, such as interest rates, tenor, security or rank, can vary across scenarios.

Carbon credit: A tradable certificate that allows buyers to claim the reduction or removal of one tonne of CO_2 or its equivalent in other greenhouse gasses. The carbon credits are generated by projects that reduce or remove emissions against a counterfactual baseline.

Carbon dioxide (CO_2)**:** Is a gas consisting of one part carbon and two parts oxygen. It is an important greenhouse (heat-trapping) gas.

Clean bioenergy: Includes biogas, bioethanol and advanced biomass stoves (ABS) of Tier 4 or greater.

Clean cooking systems: Methods for cooking food that meet the WHO performance criteria for Tier 4 and above in terms of key indoor air pollutants. This excludes traditional cooking options that make use of solid biomass (such as a three-stone fire, coal or kerosene). It includes clean advanced biomass cook stoves, biogas/biodigester systems, electric stoves, liquefied petroleum gas, natural gas and ethanol stoves.

Coal: Includes both primary coal, i.e. lignite, coking and steam coal, and derived fuels, e.g. patent fuel, brown-coal briquettes, coke-oven coke, gas coke, gas works gas, coke-oven gas, blast furnace gas and oxygen steel furnace gas. Peat is also included.

Concessional financing: Resources extended at terms more favourable than those available in the market. This can be achieved through one or a combination of the following factors: interest rates below those available on the market; maturity, grace period, security, rank or back-weighted repayment profile that would not be accepted/extended by a commercial financial institution; and/or by providing financing to the recipient otherwise not served by commercial financing.

Cost of capital: The expected financial return, or the minimum required rate of return, to justify an investment in a company or a project.

Electric cooking or e-cooking: Stoves powered by electricity including resistance and induction stoves and hotplates. The broader term electric cooking devices includes all devices that use electricity to produce heat for food preparation which beyond stoves, also includes appliances like kettles, electric pressure cookers, and counter-top ovens.

Ethanol: Refers to bioethanol only. Ethanol is produced from fermenting any biomass high in carbohydrates. Currently, ethanol is made from starches and sugars, but second-generation technologies will allow it to be made from cellulose and hemicellulose, the fibrous material that makes up the bulk of most plant matter. Bioethanol cookstoves are considered a clean cooking solution.

Fossil fuels: Include coal, natural gas and oil.

Geospatial analysis: Process of gathering, interpreting, and analysing data that is associated with specific locations on the Earth's surface. It involves using spatial information—such as coordinates, addresses, or regions—to uncover patterns, relationships, and trends. The IEA GIS modelling approach combines the most recent available country-level data with high resolution spatial data to determine clean cooking solutions. It uses the OnStove modelling framework[1] to build a geospatial dataset of socio-economic inputs to derive the clean cooking technology shares in the ACCESS. Geospatial data complement the analysis using energy resource potential, access to functional infrastructure, socio-economic characteristics as well as estimating the current status of access at a settlement level using a combination of the above. Based on the available data, the analysis derives clean cooking solutions for over 1 billion people in 44 countries in sub-Saharan Africa.

Improved biomass cookstoves (ICS)**:** Delineated between intermediate improved biomass cookstoves (ICS) and advanced biomass cookstoves (ABS), the latter being a subset of ICS. ICS encompass stoves that use engineered enhancements and standardised manufacturing to improve thermal efficiency and reduce emissions. ICS include both intermediate designs (typically ISO Tier 3, considered transitional solutions) and advanced biomass cookstoves (ABS), which integrate technologies such as fans or gasifiers to achieve higher efficiency and lower emissions (ISO Tier 3 to 5, with the highest tiers classified as clean cooking solutions under WHO guidelines).

Informal employment: Comprises workers whose main or secondary jobs are associated with informal sector enterprises, workers whose production is exclusively for final use by their own household, and workers whose employment relationship is not subject to national labour legislation, social protection, income taxation and/or employment benefits.

Investment: Capital expenditure for any physical kit, including energy supply, infrastructure and end-use. End-use investment includes the purchase of equipment for clean cooking, namely cookstoves and cylinders (and piping in the case of biogas as cooking fuel). Data and projections reflect spending over the lifetime of projects and are presented in real terms in 2023 US dollars unless otherwise stated. Total investment reported for a year reflects the amount spent in that year.

Kerosene: Liquid mix of hydrocarbons that is used to produce jet fuel as well as for heating, cooking, and lighting. Kerosene used for cooking is not considered a clean cooking solution.

Liquefied petroleum gas (LPG)**:** A stable, clean burning gas consisting of propane, butane, or a mixture of the two. LPG used for cooking is considered a clean cooking solution.

Liquid biofuels: Liquid fuels derived from biomass or waste feedstock, e.g. bioethanol, biodiesel and biojet fuels. They can be classified as conventional and advanced biofuels according to the combination of feedstock and technologies used to produce them and their respective maturity. Unless otherwise stated, biofuels are expressed in energy-equivalent volumes of gasoline, diesel and kerosene.

Modern energy: Modern energy includes LPG, electricity, biogas, ethanol, and modern biomass burned in advanced biomass stoves (ABS).

B

[1] Khavari, B., Ramirez, C., Jeuland, M. *et al.* A geospatial approach to understanding clean cooking challenges in sub-Saharan Africa. *Nat Sustain* 6, 447–457 (2023). https://doi.org/10.1038/s41893-022-01039-8

Mini-grids: Small electric grid systems comprised of generation unit(s) and distribution lines, not connected to main electricity networks that link a number of households and/or other consumers. Mini-grids can eventually be connected to a main grid.

Modern liquid bioenergy: Includes biogasoline, biodiesel, biojet kerosene and other liquid biofuels.

Modern renewables: Include all uses of renewable energy with the exception of traditional use of solid biomass.

Modern solid bioenergy: Includes all solid bioenergy products (see solid bioenergy definition) except the traditional use of biomass. It also includes the use of solid bioenergy in intermediate and advanced improved biomass cook stoves (ISO Tier ≥ 3).

Natural gas: Includes gas occurring in deposits, whether liquefied or gaseous, consisting mainly of methane. It includes both non-associated gas originating from fields producing hydrocarbons only in gaseous form, and associated gas produced in association with crude oil production as well as methane recovered from coal mines (colliery gas). Natural gas liquids, manufactured gas (produced from municipal or industrial waste, or sewage) and quantities vented or flared are not included. Gas data in cubic metres are expressed on a gross calorific value basis and are measured at 15 °C and at 760 mm Hg (Standard Conditions). Gas data expressed in tonnes of oil equivalent, mainly for comparison reasons with other fuels, are on a net calorific basis. The difference between the net and the gross calorific value is the latent heat of vaporisation of the water vapour produced during combustion of the fuel (for gas the net calorific value is 10% lower than the gross calorific value). Natural gas used for cooking is considered a clean cooking solution.

Off-grid systems: Mini-grids and stand-alone systems for individual households or groups of consumers not connected to a main grid.

Oil: Includes both conventional and unconventional oil production. Petroleum products include refinery gas, ethane, liquid petroleum gas, aviation gasoline, motor gasoline, jet fuels, kerosene, gas/diesel oil, heavy fuel oil, naphtha, white spirits, lubricants, bitumen, paraffin, waxes and petroleum coke.

Pay-as-you-go (PAYG): Involves a pricing model where customers are billed based on their actual usage or consumption of a product or service, rather than paying for a fixed charge upfront.

People gaining access: Is not the same as the change in people with clean cooking access, but rather an estimate of the number of people gaining clean cooking access due to new connections, excluding those born into households already with clean cooking access.

Project finance: Involves external lenders – including commercial banks, development banks and infrastructure funds – sharing risks with the sponsor of the project. It can also involve fundraising from the debt capital markets with asset-backed project bonds. They often involve non-recourse or limited-recourse loans where lenders provide funding on a project's future cash flow and have no or limited recourse to liability of the project parent companies.

Residential: Energy used by households including space heating and cooling, water heating, lighting, appliances, electronic devices and cooking.

Services: Energy used in commercial facilities, e.g., offices, shops, hotels, restaurants, and in institutional buildings, e.g., schools, hospitals, public offices. Energy use in services includes space heating and cooling, water heating, lighting, appliances, cooking and desalination.

Skill level: Indicates whether a high, medium or low level of education and training is required for carrying out a job, as classified by the International Standard Classification of Occupations 08 (ISCO-08).

Solar home systems (SHS)**:** Small-scale photovoltaic and battery stand-alone systems (with capacity higher than 10 watt peak (Wp)) supplying electricity for single households or small businesses. They are most often used off-grid but also where grid supply is not reliable. Access to electricity in the IEA's definition considers solar home systems from 25 Wp in rural areas and 50 Wp in urban areas. It excludes smaller solar lighting systems, for example solar lanterns of less than 11 Wp.

Solar photovoltaics (PV)**:** Electricity produced from solar photovoltaic cells.

Solid bioenergy: Includes charcoal, fuel-wood, animal waste, agricultural residues, wood waste and other solid wastes.

Stand-alone systems: Small-scale autonomous electricity supply for households or small businesses. They are generally used off-grid but also where grid supply is not reliable. Stand-alone systems include solar home systems, small wind or hydro generators, diesel or gasoline generators, etc. The difference compared with mini-grids is in scale and that stand-alone systems do not have a distribution network serving multiple consumers.

Total final consumption (TFC)**:** Is the sum of consumption by the various end-use sectors. TFC is broken down into energy demand in the following sectors: industry (including manufacturing, mining, chemicals production, blast furnaces and coke ovens), transport, buildings (including residential and services) and other (including agriculture and other non-energy use). It excludes international marine and aviation bunkers, except at world level where it is included in the transport sector.

Total final energy consumption (TFEC)**:** Is a variable defined primarily for tracking progress towards target 7.2 of the United Nations Sustainable Development Goals (SDG). It incorporates total final consumption by end-use sectors but excludes non-energy use. It excludes international marine and aviation bunkers, except at world level. Typically, this is used in the context of calculating the renewable energy share in total final energy consumption (indicator SDG 7.2.1), where TFEC is the denominator.

Traditional use of biomass (TUOB)**:** Refers to the use of solid biomass with basic cooking technologies, such as a three-stone fire or basic improved cook stoves (ISO Tier 0 to 2), often with no or poorly operating chimneys. Forms of biomass used include wood, wood waste, charcoal, agricultural residues and other bio-sourced fuels such as animal waste.

Three-stone fire: Traditional cooking set-up where the cooking vessel is placed near an open flame to limit heat loss.

Useful energy: Refers to the energy available to end-users to satisfy their needs. This is also referred to as energy services demand. As a result of transformation losses at the point of use, the amount of useful energy is lower than the corresponding final energy demand for most technologies. Equipment using electricity often has higher conversion efficiency than equipment using other fuels, meaning that for the one unit of energy consumed, electricity can provide more energy services.

Unsustainable harvesting: Refers to the use of forestry resources for cooking needs that leads to a decrease in forest areas. This happens when the harvesting is faster than the natural growth (or replanting) of the forest resources.

Regional and country groupings

Advanced economies: OECD regional grouping and Bulgaria, Croatia, Cyprus[1,2], Malta and Romania.

Africa: North Africa and sub-Saharan Africa regional groupings.

Asia Pacific: Southeast Asia regional grouping and Australia, Bangladesh, Democratic People's Republic of Korea (North Korea), India, Japan, Korea, Mongolia, Nepal, New Zealand, Pakistan, People's Republic of China (China), Sri Lanka, Chinese Taipei, and other Asia Pacific countries and territories.[3]

Caspian: Armenia, Azerbaijan, Georgia, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan.

Central Africa: Cameroon, Central African Republic, Chad, Republic of the Congo (Congo), Democratic Republic of the Congo (DR Congo), Equatorial Guinea, Gabon and São Tomé and Príncipe.

Central and South America: Argentina, Plurinational State of Bolivia (Bolivia), Brazil, Chile, Colombia, Costa Rica, Cuba, Curaçao, Dominican Republic, Ecuador, El Salvador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua, Panama, Paraguay, Peru, Suriname, Trinidad and Tobago, Uruguay, Bolivarian Republic of Venezuela (Venezuela), and other Central and South American countries and territories.[4]

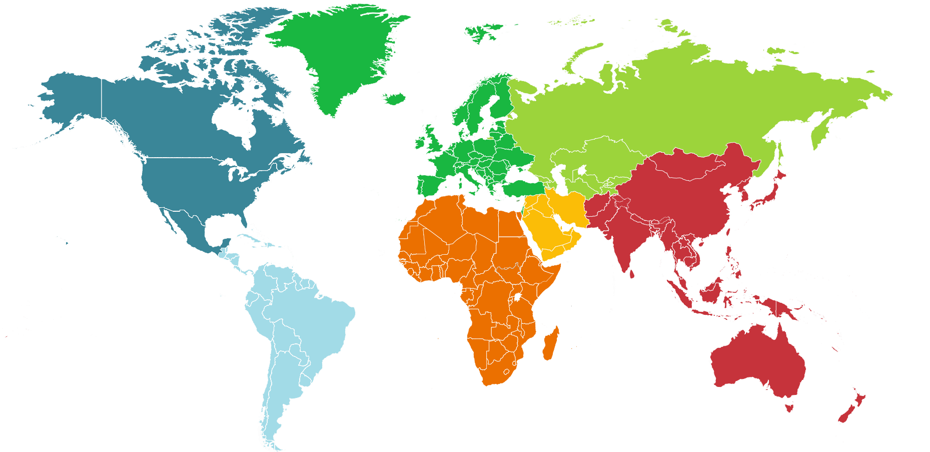
China: Includes the People's Republic of China and Hong Kong.

Developing Asia: Asia Pacific regional grouping excluding Australia, Japan, Korea and New Zealand.

East Africa: Burundi, Comoros, Djibouti, Eritrea, Ethiopia, Kenya, Madagascar, Malawi, Mauritius, Mozambique, Rwanda, Seychelles, Somalia, South Sudan, Sudan, United Republic of Tanzania, Uganda, Zambia and Zimbabwe.

East Africa Community: Burundi, Kenya, Rwanda, South Sudan, United Republic of Tanzania, and Uganda.

Figure C.1 ▷ Main country groupings



Note: This map is without prejudice to the status of or sovereignty over any territory, to the delimitation of international frontiers and boundaries and to the name of any territory, city or area.

Economic Community of West African States (ECOWAS)**:** Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, The Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

Emerging market and developing economies (EMDE)**:** All other countries not included in the advanced economies regional grouping.

Eurasia: Caspian regional grouping and the Russian Federation (Russia).

Europe: European Union regional grouping and Albania, Belarus, Bosnia and Herzegovina, North Macedonia, Gibraltar, Iceland, Israel[5], Kosovo, Montenegro, Norway, Serbia, Switzerland, Republic of Moldova, Republic of Türkiye (Türkiye), Ukraine and United Kingdom.

European Union: Austria, Belgium, Bulgaria, Croatia, Cyprus[1,2], Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Poland, Portugal, Romania, Slovak Republic, Slovenia, Spain and Sweden.

IEA (International Energy Agency)**:** OECD regional grouping excluding Chile, Colombia, Costa Rica, Iceland, Israel, and Slovenia.

Latin America: Central and South America regional grouping and Mexico.

Middle East: Bahrain, Islamic Republic of Iran (Iran), Iraq, Jordan, Kuwait, Lebanon, Oman, Qatar, Saudi Arabia, Syrian Arab Republic (Syria), United Arab Emirates and Yemen.

Non-OECD: All other countries not included in the OECD regional grouping.

Non-OPEC: All other countries not included in the OPEC regional grouping.

North Africa: Algeria, Egypt, Libya, Morocco and Tunisia.

North America: Canada, Mexico and United States.

OECD (Organisation for Economic Co-operation and Development)**:** Australia, Austria, Belgium, Canada, Chile, Czech Republic, Colombia, Costa Rica, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Israel[5], Italy, Japan, Korea, Latvia, Lithuania, Luxembourg, Mexico, Netherlands, New Zealand, Norway, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Switzerland, Türkiye, United Kingdom and United States.

OPEC (Organisation of the Petroleum Exporting Countries)**:** Algeria, Angola, Congo, Equatorial Guinea, Gabon, the Islamic Republic of Iran (Iran), Iraq, Kuwait, Libya, Nigeria, Saudi Arabia, United Arab Emirates and Bolivarian Republic of Venezuela (Venezuela).

Southern Africa: Angola, Botswana, Kingdom of Eswatini (Eswatini), Lesotho, Namibia, and South Africa.

Southeast Asia: Brunei Darussalam, Cambodia, Indonesia, Lao People's Democratic Republic (Lao PDR), Malaysia, Myanmar, Philippines, Singapore, Thailand and Viet Nam. These countries are all members of the Association of Southeast Asian Nations (ASEAN).

Southern African Development Community: Angola, Botswana, Comoros, DR Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, United Republic of Tanzania, Zambia and Zimbabwe.

Sub-Saharan Africa: Angola, Benin, Botswana, Burkina Faso, Burundi, Cabo Verde, Cameroon, Central African Republic, Chad, Comoros, Congo, Côte d'Ivoire, DR Congo, Djibouti, Eritrea, Kingdom of Eswatini (Eswatini), Ethiopia, Gabon, Gambia, Ghana, Guinea, Guinea-Bissau, Kenya, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mauritius, Mozambique, Namibia, Niger, Nigeria, Rwanda, São Tomé and Príncipe, Senegal, Sierra Leone, Somalia, South Africa, South Sudan, Sudan, Uganda, United Republic of Tanzania (Tanzania), Togo, Zambia, Zimbabwe and other African countries and territories.[6]

West Africa: Benin, Burkina Faso, Cabo Verde, Côte d'Ivoire, Gambia, Ghana, Guinea, Guinea-Bissau, Liberia, Mali, Mauritania, Niger, Nigeria, Senegal, Sierra Leone, and Togo.

Country notes

[1] Note by Republic of Türkiye: The information in this document with reference to "Cyprus" relates to the southern part of the island. There is no single authority representing both Turkish and Greek Cypriot people on the island. Türkiye recognises the Turkish Republic of Northern Cyprus (TRNC). Until a lasting and equitable solution is found within the context of the United Nations, Türkiye shall preserve its position concerning the "Cyprus issue".

[2] Note by all the European Union Member States of the OECD and the European Union: The Republic of Cyprus is recognised by all members of the United Nations with the exception of Türkiye. The information in this document relates to the area under the effective control of the Government of the Republic of Cyprus.

[3] Individual data are not available and are estimated in aggregate for: Afghanistan, Bhutan, Cook Islands, Fiji, French Polynesia, Kiribati, Macau (China), Maldives, New Caledonia, Palau, Papua New Guinea, Samoa, Solomon Islands, Timor-Leste and Tonga and Vanuatu.

[4] Individual data are not available and are estimated in aggregate for: Anguilla, Antigua and Barbuda, Aruba, Bahamas, Barbados, Belize, Bermuda, Bonaire, British Virgin Islands, Cayman Islands, Dominica, Falkland Islands (Malvinas), French Guiana, Grenada, Guadeloupe, Guyana, Martinique, Montserrat, Saba, Saint Eustatius, Saint Kitts and Nevis, Saint Lucia, Saint Pierre and Miquelon, Saint Vincent and Grenadines, Saint Maarten, Turks and Caicos Islands.

[5] The statistical data for Israel are supplied by and under the responsibility of the relevant Israeli authorities. The use of such data by the OECD and/or the IEA is without prejudice to the status of the Golan Heights, East Jerusalem and Israeli settlements in the West Bank under the terms of international law.

[6] Individual data are not available and are estimated in aggregate for: Réunion and Seychelles.

Abbreviations and acronyms

ACCESS	Accelerating Clean Cooking and Electricity Services Scenario
AfDB	African Development Bank Group
ABC	African Biodigester Component
ABS	advanced biomass stove
BCRM	branded cylinder recirculation model
CBM	conventional buoy mooring
CCA	Clean Cooking Alliance
CCCM	customer-controlled cylinder model
CCUS	carbon capture, utilisation and storage
CH_4	methane
CNG	compressed natural gas
CO	carbon monoxide
CO_2	carbon dioxide
CO_2-eq	carbon-dioxide equivalent
COP	Conference of the Parties (UNFCCC)
DAC	development assistance committee
DFI	development finance institutions
DRC	Democratic Republic of the Congo
ECOWAS	Economic Community of West African States
EMDE	emerging market and developing economies
EPC	electric pressure cooker
EU	European Union
FDI	foreign direct investment
fNRB	fraction of non-renewable biomass
GEC	global energy and climate (IEA model)
GDP	gross domestic product
GHG	greenhouse gases
HDPE	high-density polyethylene
ICS	improved biomass cookstove
IDP	internally displaced person
IEA	International Energy Agency
IIASA	International Institute for Applied Systems Analysis
IPCC	Intergovernmental Panel on Climate Change

B

ISO VPT	International Organization for Standardisation Voluntary Performance Targets
JETP	Just Energy Transition Partnerships
KTH	Kungliga Tekniska Hogskolan (KTH Royal Institute of Technology)
LCA	life cycle assessment
LGCs	large gas carriers
LNG	liquefied natural gas
LPG	liquefied petroleum gas
MBM	multi-buoy mooring
MCFA	Modern Cooking Facility for Africa
MDB	multilateral development bank
MGCs	medium gas carriers
MRV	measurement, reporting and verification
MTF	multi-tier framework
NDC	Nationally Determined Contribution
NGLs	natural gas liquids
NOC	national oil company
OECD	Organisation for Economic Co-operation and Development
OPEC	Organisation of the Petroleum Exporting Countries
PAYG	pay-as-you-go
$PM_{2.5}$	particulate matter 2.5
PMUY	Pradhan Mantri Ujjwala Yojana
PPA	power purchase agreement
PPP	purchasing power parity
PV	photovoltaic
PVC	polyvinyl chloride
RBF	results-based finance
R&D	research and development
SDG	Sustainable Development Goal (United Nations)
SHS	solar home system
SPM	single point mooring
SSA	sub-Saharan Africa
TFC	total final consumption
TFEC	total final energy consumption
TUOB	traditional use of biomass
UN	United Nations
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	United States Dollar
VAT	value added tax
VLGCs	very large gas carriers
WACC	weighted average cost of capital
WEO	World Energy Outlook
WHO	World Health Organization

References

Chapter 1: Clean Cooking: State of Play and Recent Progress

Carbon Pulse (2024), Malawi gives go-ahead to project to distribute 2 mln clean cooking stoves, https://carbon-pulse.com/292580/

CCA (Clean Cooking Alliance) (2025), 2024 Clean Cooking Industry Snapshot, https://cleancooking.org/industry-snapshot/

endev (Energising Development) (2024), Progress Report 2023, https://endev.info/downloads/

GNA (Ghana News Agency) (2024), Government to distribute million efficient cookstoves nationwide. Retrieved from https://gna.org.gh/2024/07/government-to-distribute-million-efficient-cookstoves-nationwide/

Gold Standard (2025), Carbon Market Regulations Tracker, https://www.goldstandard.org/carbon-market-regulations-tracker

MSCI (2025), As of ©2025, MSCI data: Certain information ©2025 MSCI, Reproduced by permission; no further distribution of MSCI data permitted[1], https:/www.msci.com/notice-and-disclaimer-for-reporting-licenses

OECD (Organisation for Economic Cooperation and Development) (2025), Development Assistance Committee Database, accessed February 2025, https://www.oecd.org/en/about/committees/development-assistance-committee.html

Quantum Commodity Intelligence (2025), ITMOs issued from Ghana cookstoves project under Art. 6, https://www.qcintel.com/carbon/article/itmos-issued-from-ghana-cookstoves-project-under-art-6-44256.html

USAID (United States Agency for International Development) (2022), DHS Program, https://dhsprogram.com/

[1] Certain information contained herein (the "Information") is sourced from/copyright of MSCI Inc., MSCI ESG Research LLC, or their affiliates ("MSCI"), or information providers (together the "MSCI Parties") and may have been used to calculate scores, signals, or other indicators. The Information is for internal use only and may not be reproduced or disseminated in whole or part without prior written permission. The Information may not be used for, nor does it constitute, an offer to buy or sell, or a promotion or recommendation of, any security, financial instrument or product, trading strategy, or index, nor should it be taken as an indication or guarantee of any future performance. Some funds may be based on or linked to MSCI indexes, and MSCI may be compensated based on the fund's assets under management or other measures. MSCI has established an information barrier between index research and certain Information. None of the Information in and of itself can be used to determine which securities to buy or sell or when to buy or sell them. The Information is provided "as is" and the user assumes the entire risk of any use it may make or permit to be made of the Information. No MSCI Party warrants or guarantees the originality, accuracy and/or completeness of the Information and each expressly disclaims all express or implied warranties. No MSCI Party shall have any liability for any errors or omissions in connection with any Information herein, or any liability for any direct, indirect, special, punitive, consequential or any other damages (including lost profits) even if notified of the possibility of such damages.

WHO (World Health Organisation) (2025a), WHO Mortality Database accessed June 2025, https://www.who.int/data/data-collection-tools/who-mortality-database

WHO (2025b), Database: Cooking fuels and technologies (by specific fuel category), accessed June 2025, https://www.who.int/data/gho/data/themes/air-pollution/cooking-fuel-and-technology-database-by-fuel-category

WHO (2019), Household air pollution attributable deaths (database) accessed June 2025, https://www.who.int/data/gho/data/indicators/indicator-details/GHO/household-air-pollution-attributable-deaths

WHO (2014), WHO Guidelines for indoor air quality: Household fuel combustion, https://www.who.int/publications/i/item/9789241548885

World Bank (2020), The State of Access to Modern Energy Cooking Services, https://www.worldbank.org/en/topic/energy/publication/the-state-of-access-to-modern-energy-cooking-services

Chapter 2: Outlook for Clean Cooking in Africa

Argus Media group. All rights reserved. (2025) Prices and data (database) accessed April 2025, https://myaccount.argusmedia.com/login?ReturnUrl=https:%2F%2Fdirect.argusmedia.com%2Fmarkets%2Flpg%2Fpropane-butane-key-price-snapshot

Argus Media group. All rights reserved. (2024), Statistical review of global LPG, https://www.argusmedia.com/en/solutions/products/argus-statistical-review-of-global-lpg

CEEW (Council on Energy, Environment and Water) (2021), State of Clean Cooking Energy Access in India, https://www.ceew.in/publications/state-of-clean-cooking-energy-access-in-india-ires-2020-report

Das I., Jeuland M. and Plutshack V. (2022), The Role of Taxes and Subsidies in the Clean Cooking Transition: A Review of Relevant Theoretical and Empirical Insights, https://energyaccess.duke.edu/publication/the-role-of-taxes-and-subsidies-in-the-clean-cooking-transition-a-review-of-relevant-theoretical-and-empirical-insights/

FAO (Food and Agriculture Organization) (2022), The State of World's Forest 2022, https://openknowledge.fao.org/server/api/core/bitstreams/8f599970-661d-45f5-a598-2ea46ca1605f/content/src/html/deforestation-land-degradation.html

Gaikwad et al. (2025),Socio-economic factors on choice of cooking fuel: understanding the antecedents and consequences of PMUY In India, Discov Sustain, vol. 6, no. 507, https://link.springer.com/article/10.1007/s43621-025-01376-6

Harvard. (n.d.), The Atlas of Economic Complexity, https://atlas.hks.harvard.edu/explore/productspace

IEA (International Energy Agency) (2025), Outlook for Biogas and Biomethane, https://www.iea.org/reports/outlook-for-biogas-and-biomethane

IEA (2024a), Global Energy and Climate Model, https://www.iea.org/reports/global-energy-and-climate-model

IEA (2024b), Renewables 2023, https://www.iea.org/reports/renewables-2023

Khavari et al. (2023), A geospatial approach to understanding clean cooking challenges in sub-Saharan Africa, https://www.nature.com/articles/s41893-022-01039-8

kpler.com, (database) accessed May 2025, https://www.kpler.com/

MSCI (2025), As of ©2025, MSCI data: Certain information ©2025 MSCI, Reproduced by permission; no further distribution of MSCI data permitted[2], https:/www.msci.com/notice-and-disclaimer-for-reporting-licenses

Meta (n.d.), Relative Welath Index, https://dataforgood.facebook.com/dfg/tools/relative-wealth-index

SEforALL (Sustainable Energy for All) (2020), Energy Safety Nets: India Case Study, https://www.seforall.org/system/files/2020-02/ESN-India_SEforALL.pdf

Shupler et al. (2021), Modelling of supply and demand-side determinants of liquefied petroleum gas consumption in peri-urban Cameroon, Ghana and Kenya, Nature Energy, vol. 6, pp. 1198-1210, https://www.nature.com/articles/s41560-021-00933-3

WHO (World Health Organization) (2025), Database: Cooking fuels and technologies (by specific fuel category) accessed June 2025, https://www.who.int/data/gho/data/themes/air-pollution/cooking-fuel-and-technology-database-by-fuel-category

World bank (2021), Subsidizing Bottled Gas: Approaches and Effects on Household Use, https://openknowledge.worldbank.org/entities/publication/3530e762-60a3-5473-b83b-a677b5535cbd

World Bioenergy Association (2024), 11th Edition Global Bioenergy Statistics Report 2024: Summary, https://www.worldbioenergy.org/global-bioenergy-statistics/

Chapter 3: Clean Cooking Infrastructure

AfDB (African Development Bank) (2025), African Development Bank approves $8.79 million to boost clean cooking in Uganda, https://www.afdb.org/en/news-and-events/press-releases/african-development-bank-approves-879-million-boost-clean-cooking-uganda-83448

AFREC (African Energy Commission((2024), Sustainable Scaling: Meeting the Clean Cooking Challenge in Africa, https://au-afrec.org/sustainable-scaling-meeting-clean-cooking-challenge-africa

C

[2] See footnote 1.

Argus Media group. All rights reserved. (2025) Prices and data (database) accessed April 2025, https://myaccount.argusmedia.com/login?ReturnUrl=https:%2F%2Fdirect.argusmedia.com%2Fmarkets%2Flpg%2Fpropane-butane-key-price-snapshot

CEPII (2025), BACI, (database) accessed February 2025, https://www.cepii.fr/CEPII/en/bdd_modele/bdd_modele_item.asp?id=37

Chidumayo E. and Gumbo D. (2013), The environmental impacts of charcoal production in tropical ecosystems of the world: A synthesis, Energy for Sustainable Development, vol. 17, no. 2, pp. 86-94 https://doi.org/10.1016/j.esd.2012.07.004

Clemens H. et al. (2018), Africa Biogas Partnership Program: A review of clean cooking implementation through market development in East Africa, Energy for Sustainable Development, vol. 46, pp. 23-31, https://doi.org/10.1016/j.esd.2018.05.012

de Jong P. et al. (2023), Socio-economic and environmental aspects of bio-LPG and bio-dimethyl ether (Bio-DME) production and usage in developing countries: The case of Brazil, Cleaner and Circular Bioeconomy, vol. 6, https://www.sciencedirect.com/science/article/pii/S2772801323000209

Diouf B. and Miezan E. (2019), The Biogas Initiative in Developing Countries, from Technical Potential to Failure: The Case Study of Senegal, Renewable and Sustainable Energy Reviews, vol. 101, pp. 248-254, https://doi.org/10.1016/j.rser.2018.11.011

EIB (European Investment Bank) (2024), Is it trash or a hidden gem?, https://www.eib.org/en/stories/kenya-biogas-waste-recycling

FAO (Food and Agricualture Organziation) (2024), Crop Production, Yield, Harvested Area and Processed (Global - National - Annual) – FAOSTAT (database) accessed May 2025, https://data.apps.fao.org/catalog/dataset/crop-production-yield-harvested-area-and-processed-global-national-annual-faostat

FAO (2023), Sustainable bioenergy potential from crop, livestock and woody residues in Rwanda: An integrated bioenergy and food security approach, https://openknowledge.fao.org/items/70127653-84b6-402b-9232-9668c9aa33a3

Global Energy Monitor (2025), Global Oil and Gas Extraction Tracker, https://globalenergymonitor.org/projects/global-oil-gas-extraction-tracker/

HREA (High Resolution Electricity Access) (2020), (database) accessed May 2025, https://hrea.isr.umich.edu/data.html

HydroSHEDS (2022), HydroWASTE (database) accessed May 2025, https://www.hydrosheds.org/products/hydrowaste

IEA (International Energy Agency) (2025), Outlook for Biogas and Biomethane, https://www.iea.org/reports/outlook-for-biogas-and-biomethane

IEA (2024a), World Energy Outlook, https://www.iea.org/reports/world-energy-outlook-2024

IEA (2024b), Energy Technology Perspectives 2024, https://www.iea.org/reports/energy-technology-perspectives-2024

IRENA (International Renewable Energy Agency) (2024), Off-grid Renewable Energy Statistics 2024, https://www.irena.org/Publications/2024/Dec/Off-grid-Renewable-Energy-Statistics-2024

Kenya's Ministry of Energy (2021), Kenya Ethanol Cooking Fuel Masterplan, https://southsouthnorth.org/wp-content/uploads/2021/07/ECF-Kenya-Masterplan-cover.pdf

Klintenberg P. et al. (2024), Is small-scale biogas production a viable source of electricity in rural Sub-Saharan Africa?, https://www.researchgate.net/publication/379514139_Is_small-scale_biogas_production_a_viable_source_of_electricity_in_rural_Sub-Saharan_Africa

KOKO Networks (2023), One million cookers sold!, https://manufacturing.kokonetworks.com/news/one-million-cookers-sold

kpler.com, (database) accessed May 2025, https://www.kpler.com/

MCFA (Modern Cooking Facility for Africa) (2025), New portfolio company in Tanzania scaling up access to clean cooking through biogas solutions, https://www.moderncooking.africa/new-portfolio-company-in-tanzania-scaling-up-access-to-clean-cooking-through-biogas-solutions/

MECS (Modern Energy Cooking Services) (2024a), The gas to electric cooking transition, in the OECD, https://mecs.org.uk/blog/the-gas-to-electric-cooking-transition-in-the-oecd/

MECS (2024b), Cooking Support on Mini-grids (COSMO): Synthesis report, https://mecs.org.uk/wp-content/uploads/2024/04/Cooking-Support-on-Mini-Grids-COSMO-Phase-1-Synthesis-Report.pdf

Meyer E. et al. (2021), Financial and economic feasibility of bio-digesters for rural residential demand-side management and sustainable development, Energy Reports, vol. 7, pp. 1728-1741, https://doi.org/10.1016/j.egyr.2021.03.013

Mission 300 (2025), MISSION 300 Africa Energy Summit, https://mission300africa.org/energysummit/

NIH (National Institutes of Health) (2025), Comparing the financial, energy and time costs of different food and stove combinations in Nairobi using controlled cooking tests and longitudinal fuel price data, https://pmc.ncbi.nlm.nih.gov/articles/PMC11966389/

S&P Global (2022), Africa's largest refinery, Nigeria's Dangote, to start operations in H2 2022: officials, https://www.spglobal.com/commodity-insights/en/news-research/latest-news/crude-oil/012422-africas-largest-refinery-nigerias-dangote-to-start-operations-in-h2-2022-officials

WLGA (World Liquid Gas Association) (2024), Petredec and Transnet Freight Rail Enter Agreement to Enhance LPG Distribution in South Africa, https://www.worldliquidgas.org/news/petredec-and-transnet-freight-rail-enter-agreement-to-enhance-lpg-distribution-in-south-africa/

WorldPop (2020), Population Counts, https://hub.worldpop.org/geodata/listing?id=74

WRI (World Resources Institute) (2024). Spatial Database of Planted Trees (SDPT Version 2.0), https://www.wri.org/research/spatial-database-planted-trees-sdpt-version-2

Chapter 4: Implications and Policy Considerations

CCA (Clean Cooking Alliance) (2017), Modern Kitchen – Bangladesh, https://cleancooking.org/bcc-resources/modern-kitchen-bangladesh/

CCA (2015), Understanding Impacts of Women's Engagement in the Improved Cookstove Value Chain in Kenya, https://cleancooking.org/reports-and-tools/understanding-impacts-of-womens-engagement-in-the-improved-cookstove-value-chain-in-kenya/

Chatham House (2022), Scaling sustainable energy services for displaced people and their hosts, https://www.chathamhouse.org/2022/10/scaling-sustainable-energy-services-displaced-people-and-their-hosts/03-observing-common

Chatham House (2015), Heat, Light and Power for Refugees Saving Lives, Reducing Costs, https://www.chathamhouse.org/sites/default/files/publications/research/2015-11-17-heat-light-power-refugees-lahn-grafham-final.pdf

Endev (Energising Development) (2022), Increasing biodigester functionality for clean cooking in Kenya, https://endev.info/increasing-biodigester-functionality-for-clean-cooking-in-kenya/

eni (2024), Improved cooking systems for sustainable and inclusive development, https://www.eni.com/en-IT/media/stories/clean-cooking.html

GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit/ German Agency For International Cooperation) and GBEP (Global Bioenergy Partnership) (2015), Towards sustainable modern wood energy development: stocktaking paper on successful initiatives in developing countries in the field of wood energy development, https://www.fao.org/wood-energy/search/detail/en/c/1307395/

GPA (Global Platform for Action) (2022), Renewable Energy for Refugees (RE4R) End of Project Learning Events, https://www.humanitarianenergy.org/news/latest/renewable-energy-for-refugees-re4r-end-of-project-learning-events

GPA (n.d.), SOLCO, https://www.humanitarianenergy.org/thematic-working-areas/the-solar-electric-cooking-partnership-for-displacement-contexts/

IEA (International Energy Agency) (2024), The Clean Cooking Declaration, https://www.iea.org/news/the-clean-cooking-declaration-making-2024-the-pivotal-year-for-clean-cooking

IEA et al. (2024), Brasil's G20 presidency: Roadmap for the Brazil G20 Presidency's Clean Cooking Strategy, https://iea.blob.core.windows.net/assets/4c133acd-54d5-4b3a-8180-29c98a39d5c7/RoadmapfortheBrazilG20PresidencysCleanCookingStrategy_WEB.pdf

ILO (International Labour Organisation) (2025), SDG indicator 8.3.1 - Proportion of informal employment in total employment by sex and sector (%) (database) accessed May 2025, https://ilostat.ilo.org/data/snapshots/informal-employment-rate/

Indian Oil Corporation (2023), Brochure For Unified Guidelines For Selection Of LPG Distributorships, https://iocl.com/uploads/Brochure_for_Unified_Guidelines_for_Selection_for_LPG_Distributorships_22_08_2024.pdf

MECS (Modern Energy Cooking Services)(2024),Clean cooking workforce skills in India enhanced through Training of Trainer (ToT) Programme on Clean Cookstove Sales and Maintenance Executive, https://mecs.org.uk/clean-cooking-workforce-skills-in-india-enhanced-through-training-of-trainer-tot-programme-on-clean-cookstove-sales-and-maintenance-executive

MECS (n.d.), eCookbooks, https://mecs.org.uk/ecookbooks/

Meta (n.d.), Relative Welath Index, https://dataforgood.facebook.com/dfg/tools/relative-wealth-index

Perros et al. (2024), Stakeholder perspectives on the future of clean cooking in sub-Saharan Africa and the role of pay-as-you-go LPG in expanding access, Energy Research & Social Science, vol. 112, https://doi.org/10.1016/j.erss.2024.103494

SEforALL (Sustainable Energy for All) (2021), Women in Clean Cooking (WiCC) mentorship programme, https://www.seforall.org/programmes/gender-and-Youth/Wicc

Shankar et al. (2021), Everybody stacks: Lessons from household energy case studies to inform design principles for clean energy transitions, Energy Policy, vol. 141, https://doi.org/10.1016/j.enpol.2020.111468

Shupler, et al. (2021), Modelling of supply and demand-side determinants of liquefied petroleum gas consumption in peri-urban Cameroon, Ghana and Kenya, Nature Energy, vol. 6, pp. 1198-1210, https://www.nature.com/articles/s41560-021-00933-3

UNHCR (United Nations High Commissioner for Refugees) (2024), Global Trends, https://www.unhcr.org/global-trends

Annex A: Commitment tracking

IEA (International Energy Agency) (2024), Summit Outcome Document and Action Plan, https://iea.blob.core.windows.net/assets/2c187a66-2381-414a-bc0b-06534f99b14f/SummitonCleanCookinginAfrica-OutcomeDocumentandActionPlan.pdf

IEA Publications
International Energy Agency
Website: www.iea.org
Contact information: www.iea.org/contact

Typeset in France by IEA - July 2025
Cover design: IEA
Photo credits: © Shutterstock

Revised version, July 2025
Information notice found at:
www.iea.org/corrections

Universal Access to Clean Cooking in Africa

World Energy Outlook Special Report

Clean cooking access is a defining challenge for Africa's prosperity. While the number of people without access to clean cooking has halved globally since 2010, the number in sub-Saharan Africa continues to rise. This harms health, economic development, and the environment – contributing to 815 000 premature deaths annually and significant deforestation.

In a new report, *Universal Access to Clean Cooking in Africa: Progress update and roadmap to implementation*, the International Energy Agency (IEA) provides an updated picture of where things stand today, where efforts are gaining ground, and where urgent action is still needed. This includes tracking the implementation of the USD 2.2 billion in public and private commitments made at the 2024 Summit on Clean Cooking for Africa, which the IEA co-hosted with the President of the United Republic of Tanzania, the Prime Minister of Norway, and the President of the African Development Bank Group.

The report introduces a new scenario – the Accelerating Clean Cooking and Electricity Services Scenario (ACCESS) – which charts a pathway for all African countries to accelerate efforts by replicating the best historic rates of progress seen in other leading countries globally. This country-by-country analysis builds on the first-ever mapping of clean cooking infrastructure across Africa, as well as an assessment of clean cooking fuel availability and affordability in each region.

The report is the latest entry in the IEA's 25-year history of tracking progress on energy access and promoting clean cooking as a crucial part of the global energy agenda. The tracking in this report will continue to be updated in the future.