Chapter 2
Energy Access in Sub-Saharan Africa: General Context

The objective of this chapter is to provide the reader with an overall view of the current situation regarding clean energy access in sub-Saharan Africa, as well as to compare it with other developing and emerging economies. It focuses on the role played by energy in our daily lives and the financing gaps in the power and clean cooking sectors in the subcontinent. This section aims at setting the scene and giving more information about the dramatic energy challenges the region is currently facing.

The chapter starts by presenting the importance of energy access for living conditions, socioeconomic development as well as economic and industrial sectors, considering the various sub-Saharan African contexts and complexities such as low population density and poverty. In addition, it explains what are the root causes of energy poverty, as well as the negative social and environmental consequences generated by a lack of access to clean energy.

The second part of the present chapter focuses on the financing of clean energy access in the region. It aims at presenting key numbers, including the financing gaps associated with access to modern energy solutions and a comparison with current investment trends in the power and clean cooking sectors across the subcontinent. On top of that, it explores the involvement of key stakeholders in the financing of the access to clean energy in the region, encompassing public and private capital providers, both at domestic and international level.

Energy is a key economic factor worldwide and plays an important role in many aspects of our daily lives. Nowadays, energy is consumed in a broad range of end-use sectors, including industry, transport, residential and services, and Africa is no exception.

However, energy access remains a major challenge for the African continent (Fig. 2.1). According to recent estimates, out of a total population of 1.1 billion in sub-Saharan Africa, close to 580 million people (52%) lack access to electricity and

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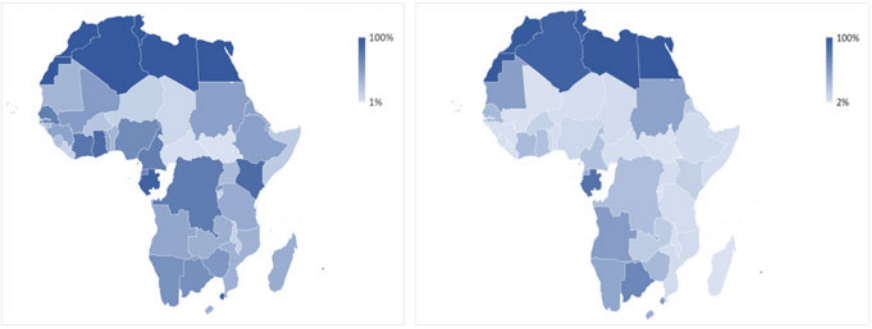

Fig. 2.1 Energy access in Africa, population with access to electricity in 2019 (left) and with access to clean cooking in 2018 (right) (Numbers for each African country are available in Annex 12.2). *Source* Authors' elaboration, based on IEA (2020a)

over 900 million (85%) cook with inefficient and polluting stoves (IEA, 2020a). This current status is in stark contrast to the large availability of clean energy resources in the region. Apart from the negative consequences on the populations and the environment, said situation deprives many African citizens of an essential input for the enhancement of socioeconomic conditions and a necessary prerequisite for poverty alleviation. Similarly, it impacts several development indicators related to health, education, food security and gender equality.

Even though efforts to promote access to clean energy are gaining momentum in Africa, they barely outpaced population growth. Indeed, cities are rapidly growing with insufficient urban planning, while rural zones are scattered over vast areas with little or no infrastructural connection.

Africa is currently the region with the fastest-growing population worldwide. With half of global demographic growth expected to occur in the continent in the next decades (UN, 2019a), it is estimated that around 530 million African inhabitants will still lack electricity and 1 billion won't have access to clean cooking systems[1] in 2030 (IEA, 2019). Under these circumstances, achieving universal access to clean energy in the region becomes a real race against time. Moreover, historical data show that progress regarding energy access has been made mainly in other parts of the globe (see Tables 2.1 and 2.2 for detailed numbers by region).

2.1 The Importance of Energy

Energy consumption constantly influences our wellbeing and living conditions. It also benefits vital domains of the economy and presents interesting opportunities in many industries, such as health, agriculture and telecommunications to name a

[1]This book considers four different options for clean cooking: (i) electrical cooking systems, (ii) LPG tanks, (iii) improved cookstoves for biomass combustion and (iv) biogas digesters.

Table 2.1 Electricity access by region[a],[b]

Electricity access, summary by region								
	Proportion of the population with access to electricity							Population without access (million)
	National					Urban	Rural	
	2000 (%)	2005 (%)	2010 (%)	2015 (%)	2019 (%)	2019 (%)	2019 (%)	2019
WORLD	**73**	**77**	**80**	**85**	**90**	**96**	**85**	**771**
Africa	**36**	**40**	**44**	**49**	**56**	**81**	**37**	**579**
North Africa	91	97	> 99	> 99	> 99	> 99	> 99	< 1
Sub-Saharan Africa	24	28	33	40	48	76	29	578
Developing Asia	**67**	**74**	**79**	**87**	**96**	**99**	**94**	**155**
China	99	> 99	> 99	> 99	> 99	> 99	> 99	< 1
India	43	58	68	79	> 99	> 99	> 99	6
Indonesia	53	56	67	88	> 99	> 99	99	2
Other Southeast Asia	65	75	79	85	91	98	85	36
Other Developing Asia	38	46	58	73	79	88	74	112
Central and South America	**87**	**91**	**94**	**96**	**97**	**99**	**87**	**16**
Middle East	**91**	**90**	**91**	**92**	**92**	**98**	**77**	**19**

[a]For detailed numbers about African countries and electricity access, please see Annex 12.2
[b]Other Southeast Asia countries are: Brunei, Cambodia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam
Other Developing Asia countries are: Bangladesh, DPR Korea, Mongolia, Nepal, Pakistan and Sri Lanka

few. Simultaneously, it seriously impacts the climate and the planet we are living in. Therefore, energy is of utmost importance for the society as a whole.

In sub-Saharan African, lack of access to clean energy is a significant threat for its inhabitants and its economic and industrial sectors. Energy poverty implies that the region struggles to meet its development objectives. It should thus remain of paramount concern for future global prospects, especially in the context of a growing population.

By being at the core of a strategy that facilitates and extends opportunities as well as fosters socioeconomic prosperity, clean energy access may raise hopes for hundreds of millions of people across the region. Indeed, ensuring universal access to affordable, reliable and modern energy services (Sustainable Development Goal 7) is an essential requisite to create a brighter future, avoid extreme inconveniences and achieve many other objectives set by the United Nations.

Table 2.2 Access to clean cooking by region[a,b]

Access to clean cooking, summary by region							
	Proportion of the population with access to clean cooking					Population without access (million)	Population relying on traditional use of biomass (million)
	2000 (%)	2005 (%)	2010 (%)	2015 (%)	2018 (%)	2018	2018
WORLD	**52**	**55**	**58**	**63**	**65**	**2651**	**2374**
Developing Countries	**37**	**41**	**45**	**53**	**56**	**2651**	**2374**
Africa	**23**	**25**	**26**	**28**	**29**	**910**	**853**
North Africa	87	93	96	98	98	4	4
Sub-Saharan Africa	10	11	13	15	17	905	848
Developing Asia	**33**	**37**	**43**	**53**	**57**	**1674**	**1460**
China	47	51	55	67	72	399	242
India	22	28	34	44	49	688	681
Indonesia	12	18	40	68	68	85	55
Other Southeast Asia	36	42	48	54	58	164	163
Other Developing Asia	22	26	27	33	35	337	318
Central and South America	**78**	**82**	**85**	**88**	**89**	**57**	**53**
Middle East	**84**	**91**	**95**	**96**	**96**	**10**	**9**

Source IEA (2020a)

[a]For detailed numbers about African countries and electricity access, please see Annex 12.2

[b]Other Southeast Asia countries are: Brunei, Cambodia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam

Other Developing Asia countries are: Bangladesh, DPR Korea, Mongolia, Nepal, Pakistan and Sri Lanka

2.1.1 The Root Causes of Energy Poverty

Lack of access to energy arises from different factors, even though energy poverty is mostly related to economic issues in sub-Saharan Africa. This document focuses on various solutions to address the diverse barriers hindering clean energy access in the region, using a holistic approach to tackle all the root causes associated with this challenge.

First, lack of access to energy may be attributed to physical considerations. Indeed, some individuals live in remote locations where commercial energy provisioning and utilisation are complex. Second, unreliable infrastructures combined with supply shortage do not fully satisfy energy demand and prevent proper domestic and productive uses. According to the World Bank, sub-Saharan African countries have power outages ranging from 50 to 4600 h per year,[2] causing frequent disruptions for households and firms (WB, 2016). Finally, financial constraints represent a major hurdle to overcome, as many African citizens face difficulties in covering energy-related costs, either upfront and/or consumption costs.

2.1.2 Energy, Welfare and Economic Development

Energy is used for domestic and community needs (i.e. lightening, cooking, water supply, heating, cooling, food conservation), as well as for business purposes and income generating activities. It is a powerful tool to escape persistent poverty. Indeed, the positive relationship between energy consumption and gross domestic product (GDP) per capita[3] indicates that energy poverty is an important barrier to socioeconomic development (Fig. 2.2). Even though Africa has experienced notable economic

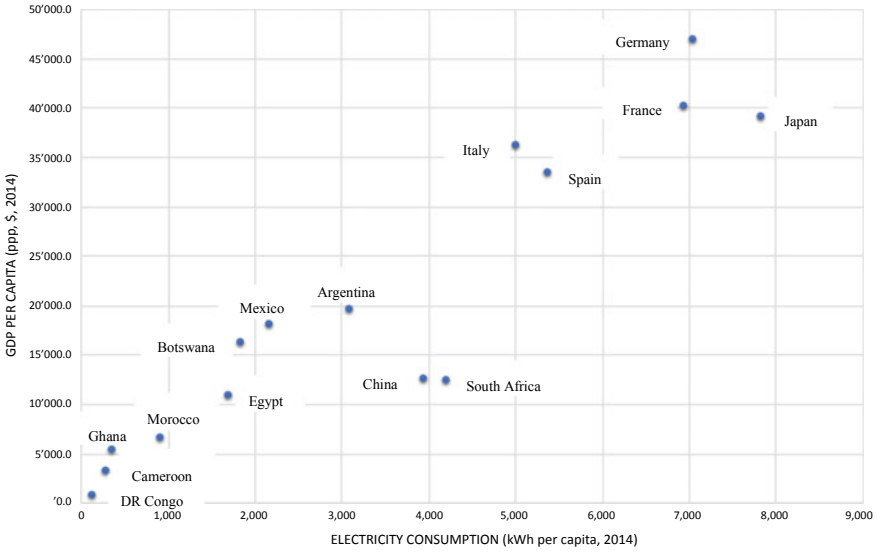

Fig. 2.2 Relationship between electricity consumption per capita and GDP per capita (PPP), 2014. *Source* Authors' elaboration, based on IEA (2014)

[2]For detailed numbers about sub-Saharan African countries, see Table 2.4.

[3]Some exceptions exist, mainly in countries with rich natural-resource endowments. However, social and economic inequalities remain often an important issue in those territories.

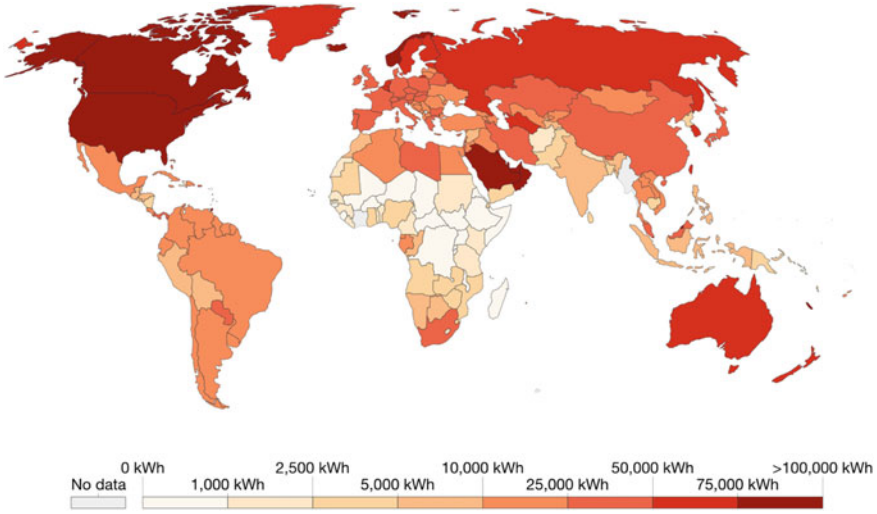

Fig. 2.3 Energy demand (Energy demand refers here to primary energy, namely the energy input before the transformation to forms of energy for end-uses such as electricity or petroleum products for transport and other uses) per capita, 2019. *Source* Our World in Data (based on BP and Shift Data Portal), 2019

growth over the last decades, poverty levels are still extremely high, especially in sub-Saharan Africa (AfDB, 2020). The region's gross domestic product (GDP) is equivalent to 11.3% of the European Union's GDP, even though its population is 2.5 times bigger (WB, 2019b). Accordingly, energy consumption per capita is very low across the region (Fig. 2.3).

Furthermore, Africa is characterised by a low population density, with many rural settings deprived of access to energy. Populations living in those zones are generally poor and face major hindrances in developing income generating activities. Currently, only 30% of the sub-Saharan African inhabitants living outside urban centres have access to electricity (Table 2.3) (SEforAll, 2020). The vast majority cook with inefficient systems relying on unmanaged and unsustainable biomass sources, causing indoor pollution and forest degradation (IEA, 2020a). Therefore, decentralised solutions as well as grid expansion (where technically feasible and economically rational) may bring considerable benefits and opportunities for rural dwellers to thrive.

Moreover, energy access and energy security are also important for Africa's industrial and economic sectors. Indeed, chronic power shortages and frequent blackouts enforce many enterprises to have recourse to backup power, incurring significant additional operational costs (Table 2.4). In Nigeria, the estimated loss for the national economy caused by inadequate electricity supply is estimated to exceed $28 billion per year, equivalent to 2% of its GDP (WB, 2020). Poor system reliability combined with high electricity tariffs in certain countries hamper economic and industrial development (AfDB, 2013). Hence, reliable and affordable energy for shops, plants and factories would provide the basis for transformative change for the whole region.

Table 2.3 Electricity access—comparison between urban and rural areas, 2019[a]

Region	Proportion of the population with access to electricity in urban areas (%)	Proportion of the population with access to electricity in rural areas (%)
Africa	81	37
Sub-Saharan Africa	76	29
Central Africa	44	6
East Africa	79	35
West Africa	87	28
Southern Africa (except South Africa)	67	20

Source Authors' elaboration, based on SEforAll (2020)
[a]Numbers for each African country are available in Annex 12.2

Table 2.4 Average outage hours (per year), 2014

Country	Average outage hours per year	Installed capacity of the national grid (GW)	Backup generator availability (% of grid capacity) (%)
Angola	760	1.7	8
Cameroon	790	1.6	1
Côte d'Ivoire	230	1.8	6
DR Congo	830	2.6	46
Ethiopia	570	2.4	1
Ghana	790	2.8	12
Kenya	420	2.2	7
Mozambique	80	2.6	1
Niger	1400	0.18	20
Nigeria	4600	10.5	22
Senegal	130	0.96	1
South Africa	50	46	2.5
Tanzania	670	1.2	12
Zambia	180	2.3	3
Zimbabwe	280	2.1	5

Source Authors' elaboration, based on Farquharson et al. (2018)

It may reinforce productivity and competitiveness, boost the continent's industrialisation, expand service markets and potentially create decent jobs for many African citizens.

2.1.3 Climate Change and Price Volatility

As previously mentioned, lack of access to energy hinders sub-Saharan Africa's socioeconomic prosperity and should thus be a priority concern. Yet, depending on how efforts are underway, universal energy access could result in another negative implication for the region and the planet as a whole. Indeed, climate change is a reality and will increase over time. Its impacts could even undermine development efforts. Even though Africa is a minor emitter of greenhouse gases (GHG) at a global level,[4] the continent remains in the front line of the consequences of a changing climate and air pollution (IEA, 2019), besides potentially incurring important expenses (Beat, 2019).

Some countries could be tempted to extract and use their ample fossil fuel endowments, thus not focusing their efforts on cleaner energy sources to meet their needs despite the huge potential of the continent. A substantial part of Africa's energy mix currently relies on fossil fuels (Fig. 2.4). In addition, the massive use of biomass across the region, often coming from unsustainable sources, causes environmental degradation and destruction of vital natural areas, as many African households depend on this resource notably for cooking purposes (IRENA et al., 2018).

While proving significant incomes to exporting countries, the current fossil fuel dependency exposes African economies to price volatility and the unpredictability of global energy markets. Accordingly, such a situation may result in high costs to ensure energy security for the entire population.

Primary energy supply varies across the continent and related challenges and opportunities widely differ. However, the region's natural resources coupled with

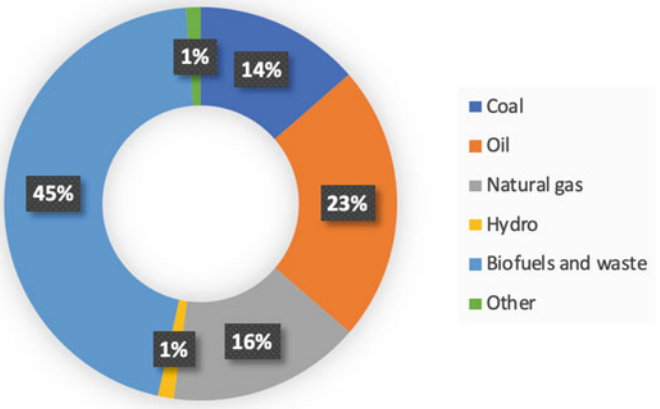

Fig. 2.4 Total primary energy supply by fuel in Africa, 2018. *Source* Authors' elaboration, based on IEA (2020b)

[4] Around 2% of cumulative energy-related CO_2 emissions globally.

technology improvements offer the possibility to develop low-carbon-intensive economic and industrial models. Providing universal energy access is crucial to allow every African to strive, yet environmental concerns need to be taken in consideration to limit the impacts on climate change, provide relief to deforestation and protect the continent's natural environment. For this reason, the use of clean energy resources in a responsible manner must be a key component of the overall action plan for the continent's energy transition, as it can significantly contribute to global climate change mitigation efforts.

2.1.4 Health and Gender Considerations

In addition to the socioeconomic and environmental considerations raised by clean energy access, health as well as gender concerns linked to the consequences of energy consumption must also be underlined (Hafner et al., 2018).

Even though the quantification of repercussions on people's health may be challenging, premature death caused by outdoor air pollution are estimated at 780,000 per year in the African continent (Bourzac, 2019). Should this trend continue in the years to come, it would lead the region to an important health crisis. On top of that, indoor air pollution coming from inefficient cooking facilities is responsible for the death of close to 490,000 persons each year in sub-Saharan Africa, with women and children being particularly impacted because of longer exposure (IEA, 2020a).

Furthermore, women and girls are frequently negatively affected by activities related to fuel gathering. Apart from the above-mentioned health concerns, they have to face the dangers posed by less secure environments when collecting fuelwood (WB, 2019a). Simultaneously, those time-consuming tasks make school enrolment very difficult and limit other productive activities, consequently constraining the building of a brighter future for women.

Moreover, energy plays a vital role in the health industry. Providing access to electricity to health centres is crucial, as it is used to power medical devices as well as for vaccine and medicine storage. An on-gong reliable and stable electricity supply is therefore critical to offer high-quality medical services in rural and urban areas.

2.2 The Financing Gaps

Technical solutions exist to achieve the first target of Sustainable Development Goal 7 (SDG 7.1.1) in sub-Saharan Africa, namely ensuring by 2030 universal access to affordable, reliable and modern energy services (UN, 2015). In addition, there is a massive abundance of clean energy resources across the region. However, substantial additional investments in low-carbon technologies compared to current and planned funding will be required to achieve access to clean energy for all in the continent.

Despite increasing international financial flows to developing countries in support of clean and renewable energy development, higher levels of ambition are needed (UN, 2019b). Indeed, universal electrification of sub-Saharan Africa needs an estimated $27 billion per year (2018–2030), which represents at least double the current levels of financing (Corfee-Morlot et al., 2018). The financing gap is also considerable for clean cooking, being valued at $1.8 billion per year by 2030 (ibid.). Compared to the $28 million dedicated to this sector in 2017, investments will need to increase significantly to allow the provision of clean cooking systems to every African household by 2030.

Public finance alone will not be able to bridge this funding gap (Natural Resources Defence Council et al., 2016). First because of limited financial resources and second to avoid increasing and unsustainable debt to gross domestic product (GDP) ratios. Therefore, private financing is absolutely necessary to reach this crucial objective.

The overall $350 and $23 billion (total estimated financing needs of sub-Saharan Africa for the 2018–2030 period) needed to finance, respectively, universal provision of low-carbon power and clean cooking systems in sub-Saharan Africa seems enormous. Yet when compared with the global wealth estimated at $360 trillion at the end of 2019 (CS, 2019), it shows that there is no shortage of capital, but rather a necessity to crowd in private investments, by creating enabling business climates and attractive investment opportunities. Financing energy access in sub-Saharan Africa should represent an exciting market opportunity for global investors, allowing them to advance sustainability objectives and changing the lives of millions while potentially generating attractive financial returns.

As presented in Table 2.5, total investment needs in both sectors, electricity and clean cooking, appear to be within reach. When reported to an average investment need per capita, considering the entire population or people without access to energy, the amount seems realistic. Similarly, the total investment needs represented as a percentage of gross domestic product (GDP) reinforce the impression that the financing gaps can be bridged, in case proper actions are taken as well as close and solidary collaboration prevails.

Table 2.5 Sub-Saharan African funding needs for universal access to energy in perspective

	Electricity	Clean cooking
Total investment needs, 2018–2030, billion (US $)	350	23
Average investment needs per year, billion (US $)	27	1.8
Average investment needs per year, $ per capita (entire population)	$25.05	$1.67
Average investment per year, $ per capita (population without access)	$46.55	$2.00
Investment as a share of PPP GDP in 2018 (sub-Saharan Africa, %)	0.65%	0.04%

Source Authors' elaboration, based on WB (2019b), Hafner et al. (2019)

However, the African continent is currently receiving less attention than other emerging and developing economies regarding clean energy investments. As an example, between 2009 and 2018, only 2% of the global new installed power generation capacity using renewable energies were located in Africa (Res4Africa, 2020), while the continent is home to around 17% of the world population (UN, 2019a).

Consequently, only 48% of the African citizens have access to electricity (WHO, 2020) and 15% cook with clean systems (IEA, 2020a). Moreover, considering the evolution observed over the last years, the sub-Saharan region is not on track to achieve universal energy access by 2030 (ibid).

This alarming situation may come from the predominant perception that most African countries are difficult and risky environments for businesses and investments. Therefore, capital providers tend to be reticent to invest in the continent. Accordingly, the next chapter of the present book aims at analysing the risk environment associated with the region and clean energy initiatives.

2.3 Current Investment Trends

Before exploring investment opportunities and barriers to financing in clean energy access in sub-Saharan Africa, it is useful to provide an overview of current investment trends focusing on energy poverty at a global level.

This subsection emphasises on finance commitments in the clean cooking and electricity[5] sectors in the twenty countries with the largest share of the population without energy access worldwide (high impact countries—HICs[6]), covering 70% and 87% of the total population without access to power and clean cooking systems, respectively (SEforAll, 2019).

This general overview is broad as data collection regarding financing flows is usually challenging. In particular, the coverage of domestic finance (mainly private investments) and carbon finance is limited as this information may sometimes be confidential. Nevertheless, it intends to identify sources of capital and financial actors currently involved in the energy poverty issue, as well as geographic concentration and technological focuses.

[5] It includes renewable energy resources, fossil fuels, transmission and distribution, energy efficiency as well as market support.

[6] Regarding electricity access, those countries are Afghanistan, Angola, Bangladesh, Burkina Faso, DR Congo, Ethiopia, India, Kenya, DPR Korea, Madagascar, Malawi, Mozambique, Myanmar, Niger, Nigeria, the Philippines, Sudan, Tanzania, Uganda and Yemen.

For the access to clean cooking solutions, the concerned countries are Afghanistan, Bangladesh, China, DR Congo, Ethiopia, India, Indonesia, Kenya, DPR Korea, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, the Philippines, Sudan, Tanzania, Uganda and Vietnam.

2.3.1 Electricity Access

Even though average annual investments targeting the electricity sector are on the rise in the above-mentioned high impact countries (HICs), they are still short compared to the estimated needs. Indeed, they increased from around $30 billion in 2015 and 2016 to $36 billion in 2017 (Fig. 2.5), while $51 billion are required each year until 2030 (SEforAll, 2019). In addition, emphasis is generally put on urban and peri-urban areas, while remote and rural communities are less represented in most territories.

In the electricity sector, sources of financing (Fig. 2.6) are mostly international and public, with public export credit agencies from China (mainly) and India playing a big role especially in large power generation projects (SEforAll, 2019). However, financial commitments of certain industrialised countries have recently decreased, in particular in Japan and the USA (ibid).

Development finance institutions (DFIs), national and multilateral, are another important component of public money, devoting around 60% of their investing activities in the power sector to transmission and distribution, and 20% to on-grid renewable energy resources (ibid). Off-grid solutions, namely stand-alone and mini-grid systems, reach so far only 2% of finance commitments of DFIs (ibid).

Regarding private investments, project developers represent an important source of capital in the power sector, meaning that private external financing was still low in 2017. Furthermore, domestic private finance is significantly present only in few countries (Nigeria, Uganda, India, Bangladesh and the Philippines), partly explained by more enabling policy and regulatory frameworks (ibid).

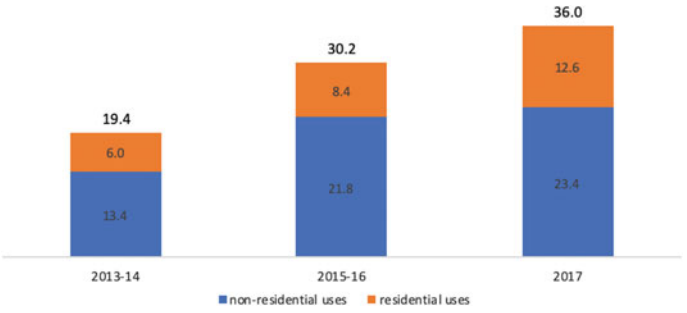

Fig. 2.5 Total yearly committed finance for the electricity sector across the 20 HICs[7], USD billion/year. *Source* Authors' elaboration, based on SEforAll (2019)

[7]Regarding electricity access, those countries are Afghanistan, Angola, Bangladesh, Burkina Faso, DR Congo, Ethiopia, India, Kenya, DPR Korea, Madagascar, Malawi, Mozambique, Myanmar, Niger, Nigeria, the Philippines, Sudan, Tanzania, Uganda and Yemen. For the access to clean cooking solutions, the concerned countries are Afghanistan, Bangladesh, China, DR Congo, Ethiopia, India, Indonesia, Kenya, DPR Korea, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, the Philippines, Sudan, Tanzania, Uganda and Vietnam.

India and Bangladesh accounted for around two-thirds of total committed financing in the electricity sector in 2017, while Nigeria was also a main recipient thanks to a $5 billion hydro-power plant financed by the Ex-Im Bank of China, the Chinese public export credit agency (SEforAll, 2019). Other sub-Saharan African countries received less attention, even though the share of their populations without access to electricity is significantly high (Fig. 2.7).

In 2017, around $20 billion was targeting privately owned initiatives across the 20 HICs, while publicly managed ones accounted for nearly $12 billion and public–private partnerships $4 billion (ibid).

In 2017, more than 60% of total committed financing was targeting grid-connected renewable energy resources, mostly solar PV (around 45%) due mainly to decreased technological costs, effective supply chains and manufacturing processes, as well as

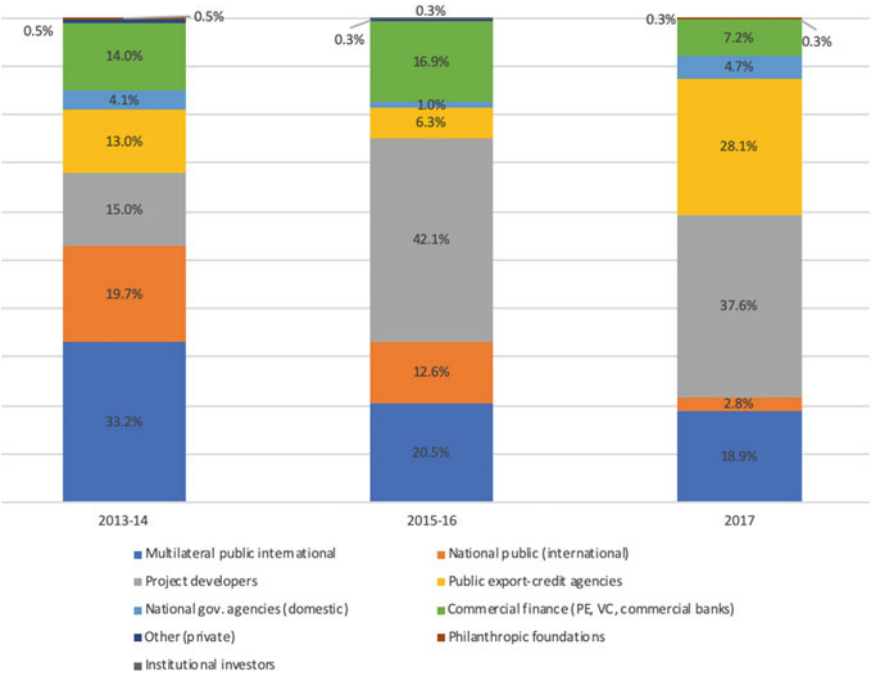

Fig. 2.6 Sources of finance for the electricity sector across the 20 HICs[8], share. *Source* Authors' elaboration, based on SEforAll (2019)

[8]Regarding electricity access, those countries are Afghanistan, Angola, Bangladesh, Burkina Faso, DR Congo, Ethiopia, India, Kenya, DPR Korea, Madagascar, Malawi, Mozambique, Myanmar, Niger, Nigeria, the Philippines, Sudan, Tanzania, Uganda and Yemen. For the access to clean cooking solutions, the concerned countries are Afghanistan, Bangladesh, China, DR Congo, Ethiopia, India, Indonesia, Kenya, DPR Korea, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, the Philippines, Sudan, Tanzania, Uganda and Vietnam.

public tendering procedures (Fig. 2.8) (SEforAll, 2019). Nevertheless, around 30% of grid-connected energy investments was dedicated to fossil fuels, with coal being strongly represented (ibid).

Investments in off-grid solutions stagnated between 2013 and 2017 and focused mostly on stand-alone systems and some East African countries (Kenya, Uganda and Tanzania), using predominantly international financing sources (public and private) (ibid). According to recent estimates, close to 75% of all off-grid energy financing between January 2019 and August 2020 was committed to only three international companies, meaning that local solar entrepreneurs are still barely considered and are thus a negligible market factor (GOGLA, 2020). Hence, it remains clear that the industry has failed to build and establish a viable SME sector, important for the development of sustainable economies and to lessen unfavourable market concentration.

Even though investments in transmission and distribution of electricity increased in the selected countries, it declined by $400 million in sub-Saharan Africa compared to 2015 and 2016, and reached $1.1 billion in 2017 (SEforAll, 2019). Furthermore, final uses are quite different in the region compared to other frontier markets, with

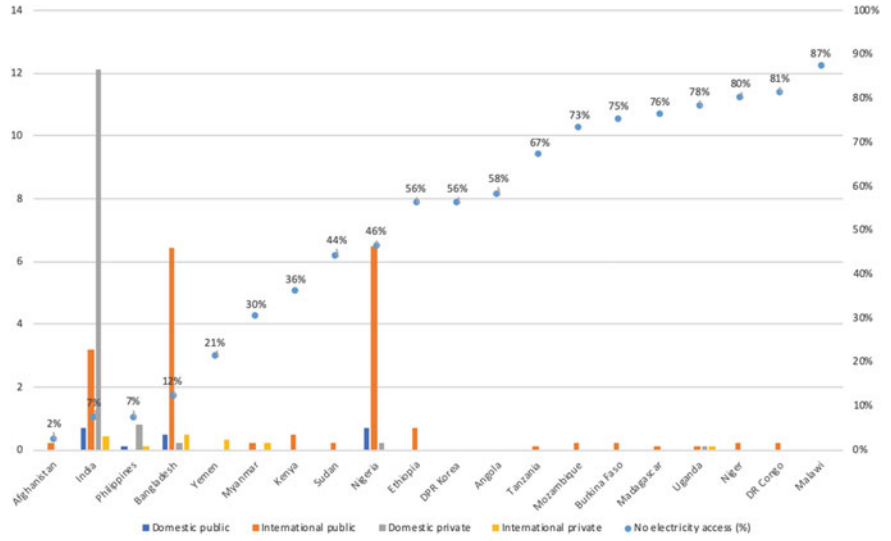

Fig. 2.7 Destination of finance for the electricity sector across the 20 HICs[9] in 2017, USD billion. *Source* Authors' elaboration, based on SEforAll (2019)

[9]Regarding electricity access, those countries are Afghanistan, Angola, Bangladesh, Burkina Faso, DR Congo, Ethiopia, India, Kenya, DPR Korea, Madagascar, Malawi, Mozambique, Myanmar, Niger, Nigeria, the Philippines, Sudan, Tanzania, Uganda and Yemen. For the access to clean cooking solutions, the concerned countries are Afghanistan, Bangladesh, China, DR Congo, Ethiopia, India, Indonesia, Kenya, DPR Korea, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, the Philippines, Sudan, Tanzania, Uganda and Vietnam.

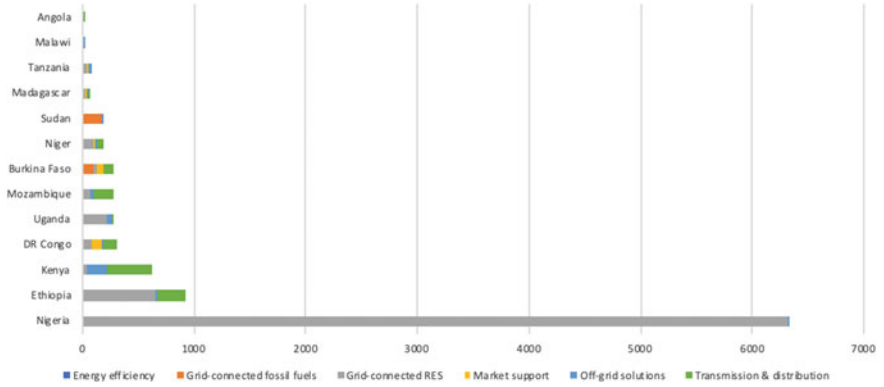

Fig. 2.8 Sub-sectors financed in the electricity sector in Africa in 2017, USD million. *Source* Authors' elaboration, based on SEforAll (2019)

a significant part of investment activities focusing off-grid solutions, driven by a massive utilisation of mobile money and pay-as-you-go (PAYGO) systems (ibid).

Finally, around 1% of total finance committed in 2017 was for capacity building programs, technical assistance and institutional support (i.e. energy reforms, policies and regulations) (SEforAll, 2019). The absolute number has declined to $350 million, from $870 million on annual average in 2015 and 2016 (ibid).

Regarding on-grid systems, the majority (around 65%) of investments targeted commercial and industrial uses, as well as public institutions (schools and hospitals) and community activities such as street lighting in 2017 (SEforAll, 2019). The rest focused on the residential sector. This trend is reversed when looking at off-grid systems, with 87% of financing dedicated to residential uses. Finally, investors are generally favouring Tiers 3 and 4[10] access when providing electricity to households (ibid).

2.3.2 Clean Cooking

Financial commitments for residential clean cooking systems significantly decreased from $117 million on annual average in 2015 and 2016 to $32 million in 2017 (SEforAll, 2019). This decline can be explained in part by large projects located in China and financed by the World Bank in 2015. Nevertheless, financing has been historically low in this sector, causing a continued and serious gap for this pressing development concern (Fig. 2.9).

[10]For a complete definition of Tiers, please refer to Annex 12.1.

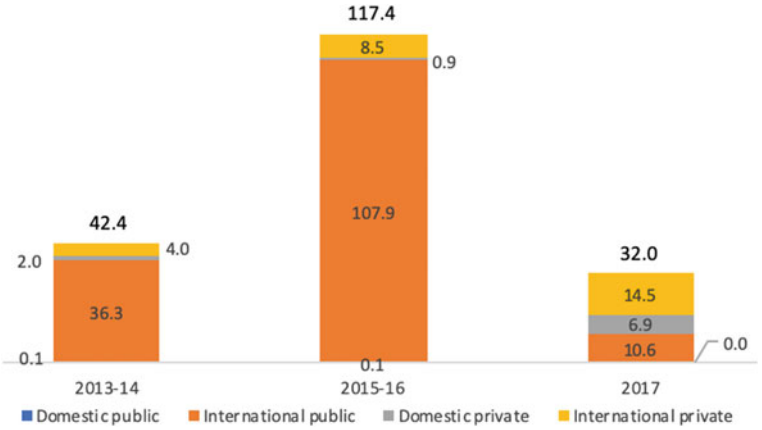

Fig. 2.9 Sources of finance for residential clean cooking systems across the 20 HICs[11], USD million/year. *Source* Authors' elaboration, based on SEforAll (2019)

Until 2016, investments were mainly coming from international public sources, including national governments, DFIs and climate funds (SEforAll, 2019). This trend changed in 2017, with financing emanating mostly from commercially oriented actors such as private equity funds, venture capitalists and institutional investors, as well as philanthropic foundations (ibid). It is interesting to note that international and domestic private capital providers are increasingly demonstrating appetite for clean cooking business models (Fig. 2.10).

Sub-Saharan Africa is the main recipient (86%) of committed financial flows associated with clean cooking solutions, with Kenya accounting for around 65% of total commitments thanks to a favouring investment climate (Fig. 2.11) (SEforAll, 2019).

[11] Regarding electricity access, those countries are Afghanistan, Angola, Bangladesh, Burkina Faso, DR Congo, Ethiopia, India, Kenya, DPR Korea, Madagascar, Malawi, Mozambique, Myanmar, Niger, Nigeria, the Philippines, Sudan, Tanzania, Uganda and Yemen. For the access to clean cooking solutions, the concerned countries are Afghanistan, Bangladesh, China, DR Congo, Ethiopia, India, Indonesia, Kenya, DPR Korea, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, the Philippines, Sudan, Tanzania, Uganda and Vietnam.

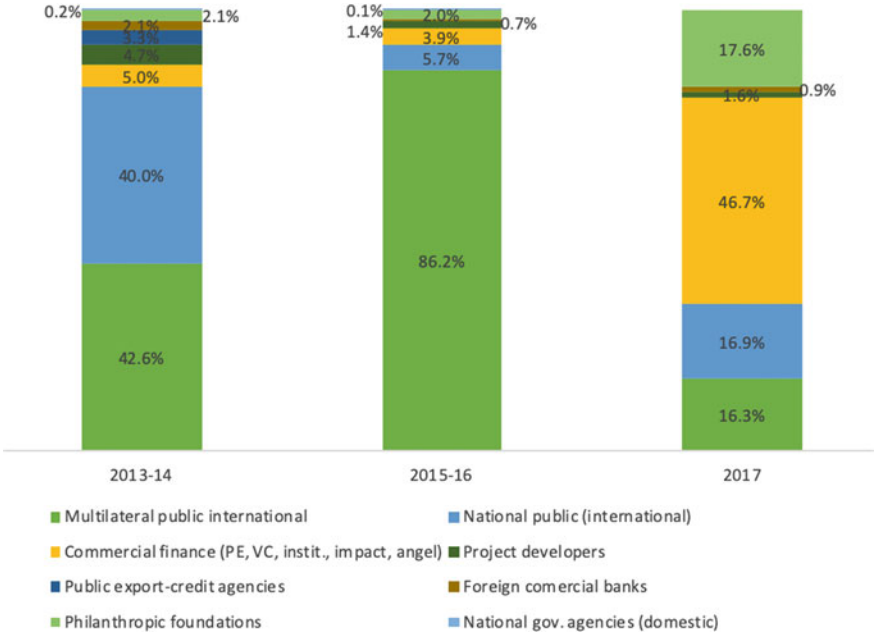

Fig. 2.10 Sources of finance for the clean cooking sector across the 20 HICs[12], share. *Source* Authors' elaboration, based on SEforAll (2019)

Regarding technological focus and end-uses, committed financing is mostly targeting improved cookstoves for biomass combustion and biogas digesters, providing clean cooking systems mainly to the residential sector (Fig. 2.12).

[12]Regarding electricity access, those countries are Afghanistan, Angola, Bangladesh, Burkina Faso, DR Congo, Ethiopia, India, Kenya, DPR Korea, Madagascar, Malawi, Mozambique, Myanmar, Niger, Nigeria, the Philippines, Sudan, Tanzania, Uganda and Yemen. For the access to clean cooking solutions, the concerned countries are Afghanistan, Bangladesh, China, DR Congo, Ethiopia, India, Indonesia, Kenya, DPR Korea, Madagascar, Mozambique, Myanmar, Nepal, Nigeria, Pakistan, the Philippines, Sudan, Tanzania, Uganda and Vietnam.

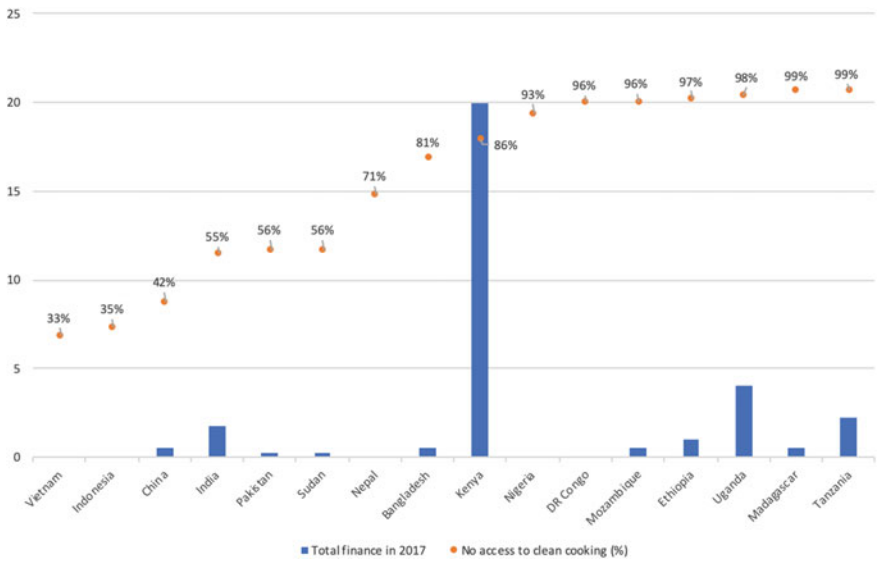

Fig. 2.11 Distribution of finance for the clean cooking sector across the 20 HICs in 2017, USD million. *Source* Authors' elaboration, based on SEforAll (2019)

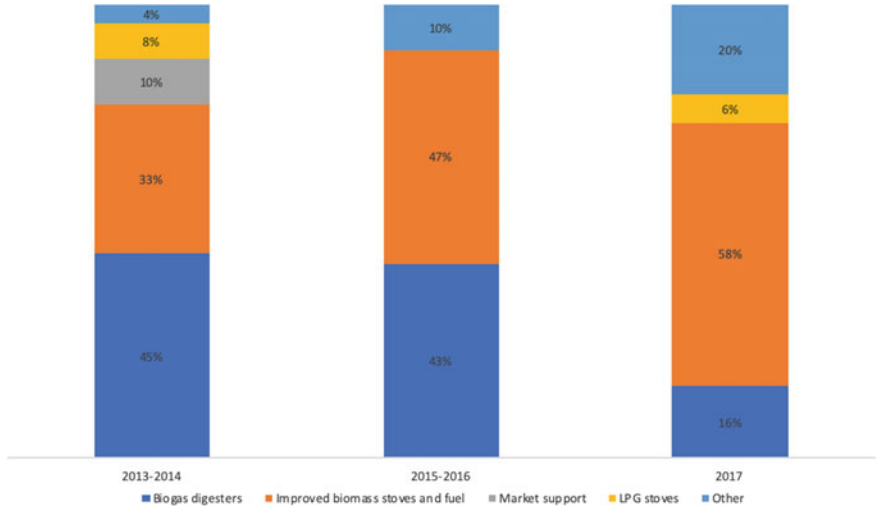

Fig. 2.12 Committed finance in the clean cooking sector, by end-uses (2017), share. *Source* Authors' elaboration, based on SEforAll (2019)

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