INCLUDE

EVIDENCE SYNTHESIS

# (EM)POWERING THE FUTURE

## OPPORTUNITIES FOR YOUTH IN A JUST TRANSITION IN AFRICA

# Executive summary

Climate change is one of the most pressing issues of our time and is seen as a 'threat multiplier' that exacerbates existing inequalities, especially those of vulnerable communities in the Global South. Despite having contributed the least to global warming, Africa remains the most vulnerable continent to climate change impacts. Africa is also the youngest continent, and it is estimated that by 2040 the continent will have the largest youth workforce in the world. A shortage of decent employment opportunities for Africa's youth comes with great risks for stability and inclusive development and approaches to stimulate youth employment in Africa have as such become a priority in policy and practice. So far, Africa has been struggling with creating a sufficient number of jobs for its growing workforce, especially jobs that can be labelled as decent. The "greening" of economies through a process of low carbon transition (LCT) is seen as a hopeful solution to the multiplex challenges of climate change, poverty alleviation and inequality reduction, while also enabling African countries to create decent jobs and accomplish an inclusive economic transformation, but much is still unknown.

By adopting an inclusive development lens and the just transition framework, this review takes a critical look at the current debates on the (just) LCT in Africa, the African energy sector and decent job creation, particularly for Africa's youth and women in the context of the future of work. The adopted inclusive development framework also points towards important considerations of local realities when designing just energy transition pathways, for instance both formal and informal energy supply and demand, as well as the dynamic nature and 'blurred' lines between these aspects of the economy. The just transition framework considers the three core elements of justice: distributive, procedural and recognition justice. Ensuring equitable representation and meaningful participation in decision-making processes of youth and women are equally important, especially in the frame of complicated African political economy dynamics.

The objective of the paper is therefore to holistically present the African energy sector and its complexities in order to understand where opportunities for youth employment are most pronounced and what systemic barriers need to be addressed to create an enabling environment for youth to thrive and drive a green transition. As such, the paper presents an important contribution to the debate, shedding light on both supply and demand side of the labour market, as well as the often less visible aspects of the low carbon transition in the Global South. Building on the latest insights from academic and grey literature on youth employment and low-carbon development in Africa, this evidence review highlights the main insights and identify key knowledge gaps that will serve as a base to develop an inclusive research agenda. It is also a call for urgent action to assure that the process of low-carbon transition is just and inclusive, especially for the youth, women and other marginalised groups on the African continent.

## Key messages

### Low carbon transition in Africa should be contextualised

The first key observation of the paper is that the current broadly used conceptualisation of LCT is not fit for purpose, as Africa has a radically different energy landscape and social and political context. The discussion about African LCT is dominated by the quantitative energy supply predictions and 'Northern perspective'. African vision and voices are in minority, although the trend is slowly changing. Much theorising and assessment of LCT has been focused on high-income countries in the Global North which are predominantly geared towards changes in power production, redesigning grids and increased efficiency of consumption towards net-zero pathways. However, Africa's energy supply landscape differs substantially from the rest of the world. Over 50 per cent of the continent's population (about

600 million people) still do not have access to electricity. Moreover, although Africa is often characterised as a continent already in a state of carbon neutrality, the reality paints a more complicated picture. African energy supply is the result of a complicated mix of formal on-grid and off-grid-energy coupled with 'traditional' and informal energy sources. There is a high dependency on (unsustainable) biomass burning, mainly used for cooking, and only a very small share of other 'modern' renewable energy (RE) sources in the mix.

Low-carbon transition in Africa should promote the development of LCT pathways that are grounded in contextual-realities and are based on different structures within industries, workforce composition, social and dynamic political economy factors. Importantly, considering the loosely defined state of carbon neutrality on the African continent, as well as current energy supply and demand landscape, a LCT will have to focus on the cleanest electricity generation possible, the sustainable use of biomass and providing equitable access to clean energy without adding to energy poverty. In this regard, a phased approach will be needed to balance the goals of reducing emissions and a more sustainable energy mix, while at the same time increasing access to electricity, especially for marginalised communities. Considering that Africa is a vast and highly divers continent, a one-size-fits-all approach for LCT in Africa simply won't do.

**Low carbon transition in Africa should be mindful of political economy dynamics**

Secondly, low carbon transitions do not take place in a social and political vacuum and it increasingly recognized that the pathway to low carbon development is disruptive by nature, transforming the materiality of energy production and land-use systems while undermining entrenched economic interests and political institutions along the way. While many African countries have embarked on an ambitious and transformative transition agenda, many energy projects classified as "clean" have economic, environmental, and social implications that jeopardize the wellbeing of those already vulnerable to the impacts of climate change. Impact of new (especially large-scale) RE investments and energy infrastructure has capacity to disrupt the communities and generate conflict, while jobs created are often not benefitting local communities directly and sustainably due the temporary nature and a skills mismatch. In addition to these local political economy dimensions, interest structures and power dynamics on a national and international level are also at play and influence the way LCT pathways take shape and the extent to which LCT policies and programmes can be successfully implemented. A just LCT for Africa, therefore, needs to consider these political economy dimensions in the design of LCT programmes and policies.

**Low carbon transition in Africa should be inclusive**

The third key observation is that **there is lack of attention to inclusive development in both processes and outcomes of LCT**. For instance, a lack of representation of women and youth in decision-making processes programmes in Africa leads to male-dominated and non-youth-specific energy transition policies and projects. While there is an observed positive trend in enabling youth to participate in the climate discourse within multilateral organisations like the UN and AU, it is unclear what the effectiveness of this involvement is.

In order to achieve inclusive and equitable low-carbon development pathway, climate change and socio-economic development challenges should be addressed simultaneously. **The concept of a 'just' transition is in this respect emerging as a more appropriate term for Africa's LCT pathways** as it includes the quality of newly created jobs, the need for meaningful youth and women's engagement, social protection, environmental justice, while taking the local context and political economy as mediating factors into account. This also means ensuring that marginalized groups and vulnerable individuals are not negatively

impacted by the transition and that their needs and perspectives are taken into account in the planning and implementation of clean energy projects.

**A low carbon transition creates opportunities for decent jobs for youth**

One of the main premises of a just low-carbon transition is that it can provide employment opportunities for Africa's youth. However, the evidence about the energy job market is still very thin and even where data is available, it does not pay enough attention to the diversity of impacts according to different social groups and contextual realities, nor does it take the blurred lines between formal and informal jobs into account. What is known, is that LCT will bring new opportunities for youth and women that can be direct, indirect and induced.

**Direct (formal) job** creation potential in traditional and renewable energy production and supply, including operations and maintenance, grid connections, mini-grid connections, and manufacturing and installation of solar home systems is currently limited but expected to grow exponentially. That projections include creation of new jobs that did not exist before, as well as 'greening' of existing jobs. Among **the indirect jobs in the energy usage**, the development of micro, small, and medium-size enterprises in the renewable energy sector and its value chain is seen as a priority for youth employment strategies. Access to electricity is correlated with increased productivity, competitiveness, and labour demand in various sectors, thus it will have an important ripple effect on job creation, specifically through the creation of **induced jobs**. The job potential associated with renewable energies extends across various sectors, with a focus on basic manufacturing, agriculture, engineering, transport, utilities, construction, and their supply chains, as well as service sector (i.e. healthcare, sanitation, [sustainable] tourism, and hospitality). In agriculture, for instance, lack of electricity hinders the adoption of machinery and irrigation systems, leading to avoidable losses and preventing the creation of millions of additional jobs in rural areas. The prevalence of part-time, temporary, and informal work creates 'blurred lines' on the African energy labour market, making it impossible to obtain reliable statistics and discuss the decency of many of these jobs. Overall, addressing energy access and reliability is crucial for job creation and entrepreneurship in the low carbon transition.

**The informal sector**, although often ignored in discussions on LCT, is an important part the puzzle, as it is this sector that drives the realities of Africa's economies. A significant part of the job creation in the LCT is also envisioned to be in the informal sector, particularly in sectors that require low-skilled labour such as the commercial collection and sale of biomass. Due to the often informal and temporary nature of the jobs created in the process of low-carbon transition, there is an important question about their quality and the sustainability. Job decency should therefore be at the centre of a just LCT in Africa.

**A low carbon transition presents the same systemic barriers for decent jobs creation as in other sectors**

The first major barrier is **the skills mismatch** that exists between the needs of the private sector in a changing labour market, and the educational background and skill-set of youth and women. As the skills required in the energy sector are often on the higher and technical end, there is a risk of creating a new level of exclusion of youth and women and other vulnerable groups who do not have access to quality education or (up- and re-) skilling programmes.

Another barrier is **the gender divide**. While women are well-positioned to take up green jobs in many sectors, they are currently concentrated in sectors that create more low-end jobs. The majority of projected job opportunities in the LCT are in male-dominated manufacturing, construction and energy sectors. Moreover, social norms and child care responsibilities often mean that women find themselves at a disadvantage. Having a gender sensitive approach and providing access to skills development and funding will be crucial in ensuring an inclusive LCT.

To ensure the LCT is inclusive, challenges like access to finance, lack of technical knowledge, and limited business management experience need to be addressed to support entrepreneurs, particularly women and youth. Without proper support, many young entrepreneurs remain in the informal economy or in a hybrid of formal and informal sectors. Nevertheless, these social groups will also have to overcome a number of challenges to benefit from a LCT transition, which are by and large the same systemic barriers typical for employment in other sectors of the African labour market.

Finally, designing just LCT pathways, one also has to consider important **social and spatial inequities**. As a majority of people in rural Africa live below the poverty line and rely heavily on firewood and charcoal to meet their energy needs, they cannot easily shift from traditional biomass to (modern and renewable based) electricity or gas unless these sources of energy are made affordable. While people in urban areas generally already largely rely on electricity and gas, with rapid urbanisation, provisions have to be made to ensure that pressure on the grid is relieved and access to energy preserved. Powering productive industries in rural areas, modernising agriculture; and an overall improvement of living conditions are as such critical elements to a just LCT in Africa.

**Towards an inclusive research agenda and action on just and inclusive low carbon transition in Africa**

Based on a synthesis of existing research, the paper highlights a number of knowledge gaps in the literature on LCT and provides a starting point for further exploration and research. This report is also a call to action as the transition process remains at its initial stage. The youth of today are facing the same challenges and barriers on the labour market that have existed for generations. It is high time to actively address the disparities and hurdles that hinder their progress. It is the responsibility of (national) policies and strategies, as well as the global community all together to assure that the transition would be just, inclusive, youth-centred and gender responsive along the way. To support these conversations, this report conceptualizes a just and inclusive LCT in Africa; one that is rooted in African realities, addressing systemic barriers and taking advantage of Africa's potential:

> *“A just low-carbon transition in Africa provides pathways for scaling up clean energy supply and creating decent employment opportunities, while at the same time, improving access to affordable and reliable electricity and ensuring that no-one is left behind in the process. Recognising the diversity of contextual realities, (systemic and infrastructural) barriers and drivers of LCT, programmes and policies focussing on LCT in Africa have to consider the unique technical, social, economic, and political contexts as well as national needs for development. For Africa’s young men and women, a just transition requires investing in skills, gender equality and meaningful engagement in decision-making processes to ensure they are not only ready to embrace current employment opportunities, but can also shape the future of work in the low-carbon economy.”*

The definition of a just LCT in Africa that is proposed above, coupled with a number of identified knowledge gaps, is intended to be a starting point for the conversation on how to assure that decent jobs for youth and women are created in an inclusive way. To this end, more research is particularly needed into key justice elements of a low carbon transition in Africa to understand the broader implications of the process and outcomes and its impact on vulnerable groups in societies.

# Table of Contents

# 1 Introduction

Climate change is one of the most pressing issues of our time and is seen as a 'threat multiplier' that exacerbates existing inequalities, especially those of vulnerable communities in the Global South. Despite having contributed the least to global warming, Africa remains the most vulnerable continent to climate change impacts. Africa is also the youngest continent, and it is estimated that by 2040 the continent will have the largest youth workforce in the world. A shortage of decent employment opportunities for Africa's youth comes with great risks for stability and inclusive development and approaches to stimulate youth employment in Africa have as such become a priority in policy and practice. So far, Africa has been struggling with creating sufficient number of jobs for its growing workforce, especially jobs that can be labelled as decent. The "greening" of economies through a process of low carbon transition (LCT) is seen as a hopeful solution to the multiplex challenges of climate change, poverty alleviation and inequality reduction, while also enabling African countries to create decent jobs and accomplish an inclusive economic transformation, but much is still unknown (Mwaura & Glover, 2021).

With a transition to low-carbon economies, access to energy is crucial, not only for unlocking economic potential and employment creation, but also for the attainment of health and education outcomes. Africa has almost unlimited solar potential and ample hydro, wind and geothermal energy sources (United Nations Environment Programme & African Development Bank, 2017). Moreover, it possesses abundant mineral resources essential to the production of electric batteries, wind turbines, and other low-carbon technologies to support the global transition while creating local value (IRENA; IEA; SE4A, 2022). Another exciting opportunity was identified with the production of green hydrogen. However, it's true potential remains unexplored: a large youth workforce that can be the driving force behind the low carbon transition.

At the same time, there are important barriers that needs to be urgently addressed. Africa was and remains the most energy-poor region in the world (IEA, 2022a). Its energy use per capita is around one-third of the world's average. Recent data show that over 50 per cent of the continent's population (about 600 million people) have no access to electricity (IEA, 2022a). Insufficient energy access manifests itself in hundreds of thousands of deaths annually due to the use of wood-burning stoves for cooking; hinders the operation of hospitals and emergency services; compromises educational attainment; and drives up the cost of doing business. Energy access for all is therefore an imperative for inclusive development and growth as it creates opportunities for women, youths, children both in urban and rural areas, as well as in formal and informal sector (United Nations Environment Programme & African Development Bank, 2017).

In addition to the need to address the energy poverty in Africa, there is enormous pressure to create decent jobs[1] in the face of a rising population and widespread un(der)employment. With around 10-12 million people joining the labour force each year and only 3 million new jobs created, African economies are not able to absorb all of newcomers on the labour market (AfDB, 2016). The situation has worsened everywhere as a result of the Covid-19 pandemic, with around 30 million jobs lost in 2020 due to disruptions to economic activities (IEA, 2022a). Young women are even more negatively affected than men and across the continent, 35 per cent of female youth are not in employment, education, or training (NEET), compared to only 20 per cent of men (African Development Bank Group, n.d.).

[1] According to the ILO definition, work is considered decent when (i) it pays a fair income; (ii) it guarantees a secure form of employment and safe working conditions; (iii) it ensures equal opportunities and treatment for all; (iv) it includes social protection for the workers and their families; (v) it offers prospects for personal development and encourages social integration (vi) workers are free to express their concerns and to organise (ILO, n.d.-a).

There is broad agreement that a low-carbon transition is key to achieving global goals including the Sustainable Development Goals (SDGs), realize the objectives of the African Union Agenda 2063, and mitigating the threat of climate change (Chapman, Shigetomi, Ohno, McLellan, & Shinozaki, 2021). Thereby providing opportunities for Africa's youth not only in the current economy, but also in regards to the future of work.

However, the current conceptualisation of low carbon transitions is heavily informed by a Northern perspective that doesn't align with Africa's energy landscape and everyday realities, as well as the continent's sustainable development aspirations. The need for an Africa-specific LCT definition that focuses not only on the transition to clean energy, but also on energy justice is therefore imperative. Furthermore, a more nuanced understanding of the potential impact of low carbon transition pathways on African societies is equally needed that takes into account both positive developments and potential negative externalities in the form of hidden costs, conflict, destruction of existing jobs, or the loss of biodiversity. There is widespread agreement in the literature that there is no blueprint for a just energy transition as needs will vary based on structures within different industries, workforce composition, local social factors and political economy dynamics. Moreover, rather than a linear approach focused on a rapid transformation from fossil fuel-based economies to clean and renewable energies, low carbon transition in Africa is also about providing access to affordable and reliable energy, especially for marginalised communities, thereby closing the gap of energy poverty and economic development objectives.

By adopting an inclusive development lens, this review takes a critical look at the current debates on (just) LCT, the African energy sector and decent job creation, particularly for Africa's youth and women in the context of the future of work. The adopted inclusive development framework also points towards important considerations of local realities when designing just energy transition pathways, such as ensuring equitable representation and meaningful participation in decision-making processes, thoroughly assessing social, economic and environmental impacts, and adequately coordinating across different actors and the local, provincial, national, regional and global levels.

The objective of the paper is to holistically present the African energy sector and its complexities in order to understand where opportunities for youth employment are most pronounced and what systemic barriers need to be addressed to create an enabling environment for youth to thrive and drive a green transition. As such, the paper presents an important contribution to the debate, bringing to the attention the often less visible aspects of the low carbon transition in the Global South. For instance, it will be one of the first publications that brings together both formal and informal energy supply and demand, as well as highlight the more dynamic nature and 'blurred' lines between these aspects of the economy. Similar 'blurred lines' are observed in the construction of young people's livelihoods that takes place at the intersection of formal and informal jobs (Vale, Finestone, Magadla, & Strugnell, 2022).

Finally, the paper also sheds light on the unique energy landscape in Africa, which is in many analyses overlooked. Reviewing the evidence, this paper highlights that Africa – although 'praised' to already use many RE resources for energy supply, is in fact running predominantly on firewood, charcoal and generators which is ultimately environmentally unsustainable and causes serious health implications for its population, mostly for women and children. In the long run, continued reliance on fossil fuels and traditional biomass traps African nations, particularly the poorest and most marginalised communities in rural areas, in a continuous cycle of energy poverty. Programmes that aim to spur the transition to low carbon economies in Africa must therefore carefully consider these dynamics and design context-appropriate approaches and interventions. Considering the size of this aspect of African economies, and the fact that they are largely informal, (meaning no reliable data exists), these are important spaces jobs could be at risk of being lost during a process of transition. Such transition will predominantly touch the already marginalised groups, such as

the poor, women and youth, who will need alternative LCT pathways. Highlighting once again, the need for an Africa-specific just and inclusive low-carbon transition strategy.

By building on the latest insights from academic and grey literature on youth employment and low-carbon development in Africa, this evidence review aims to explore these dynamics and knowledge gaps thereby strengthening the evidence base on low carbon transition in the Global South. This synthesis, combined with the case studies of Nigeria and South Africa will ultimately contribute to the development of a research agenda on the theme of youth employment and low carbon transition for the Sustainable Inclusive Economies (SIE) division of the Canadian International Development Research Centre (IDRC).

# 2 Methodology

Theoretical framework: this review applies an inclusive development lens as the main frame to approach this topic. Inclusive development is about ensuring that more people benefit from economic growth and development and ensuring that “no-one is left behind”. Its aim is to reduce poverty and inequality, in both income and non-income dimensions, assuring meaningful participation of and benefits for vulnerable groups in development processes (INCLUDE, 2023). Inclusive development is as such key to advancing the SDG Agenda. Decent jobs for youth and women, meaningful youth engagement, social protection, environmental justice, local context, as well as political economy aspects are considered key pillars of inclusive development (Pouw & Awortwi, 2023). Moreover, a distinction between inclusive development processes (how decisions are made and who is included in that process) and outcomes (how prosperity is distributed and shared among a population and why) must be made (INCLUDE, 2013; Islam, 2019; Rocha Menocal, 2017).

Method: this literature review employs a convenient sampling technique, which involves selecting readily available literature sources based on their accessibility, ease of retrieval, and relevance to the research topic. The focus is on readily available sources such as academic journal articles, books, online databases, and reputable websites. The sources were identified by using search engines, academic databases, and citation networks to locate key literature. As the objective of the synthesis is to review the latest evidence, the year 2013 was chosen as a cut-off date for the search (with some exceptions). This synthesis paper is aware of the fact that the convenient sampling method that was adapted may not provide an exhaustive overview of the literature on the topic, however using it for the purpose of a scoping exercise this method can yield valuable insights and will serve as a starting point for further exploration.

Trends in the publications and limitations: generally, there have been an increased number of publications on the topic since 2020. The peak in this trend is observed in 2022, ahead of the United Nations Climate Change Conference (COP 27) in Sharm el-Sheikh, Egypt – often referred to as ‘the African COP’, where the notion of a ‘just low-carbon transition in Africa’ gained momentum. The following key issues can be distinguished in the global debate: (i) strategies/models and financing the African LCT; (ii) a need for an Africa pathway to (just) LCT; and (iii) linking energy transition with socio-economic development, including (decent) jobs creation for youth and women. The majority of the literature is focused on the transition from unsustainable resources in the energy-mix and generation point of view (including financing), with less evidence on the broader socio-economical and inclusive development aspects of the transition, as well as the global political economy processes on the continental, regional and national levels (Apfel, Haag, & Herbes, 2021). As this review applies an inclusive development lens, the paper will focus predominantly on synthesising and highlighting the gaps within points (ii) and (iii), leaving out the more technical debate (i) as it is considered beyond the scope of this review.

# 3 Conceptualising low carbon transition in Africa

'Low Carbon Transition' (LCT) is most frequently defined as a process by which a country changes from using both high carbon energy and low carbon energy to just using low carbon energy (Wu et al., 2020). LCT necessitates a fundamental redesign of our energy supply systems, economies and societies towards more sustainable ways of production and life that are not dependent on fossil fuels. Fundamentally, this means moving away from unsustainable energy sources while increasing the share of renewable energy[2] (RE) in the energy mix. This conceptualization of LCT, while comprehensive, is heavily informed by a 'Northern' perspective and proves less relevant for Africa due to its very different development trajectory and energy landscape.

Energy supply on the African continent is already dominated by renewable energy sources, but the Africa-specific challenge relates to ensuring that more people have access to reliable and affordable electricity and sustainable energy sources, while considering how a green transition can create more and decent jobs for the continent's growing youth population. Recent data show that over 50 per cent of the continent's population (about 600 million people) have no access to electricity (IEA, 2022a) and even when there is access to electricity, it is often intermittent, and not sufficient to serve everyone (UNCTAD, 2023).

Despite major progress and expansion in the last years in energy access, it is clear that renewable energy sources would not be able to fully cover the continent's energy needs to develop and industrialise (Logan, 2021). In this context, the discourse of a "net-zero pathway", which is commonly used to describe LCT in the Global North is less applicable in the Global South and has been replaced by the "low-carbon transition pathways", which allow for a more phased approach towards green economic transition. For Africa, this would mean that the continent would continue its exploration and use of fossil fuels in the transition period, while simultaneously adding more clean energy to the mix. This position was consolidated by the African Union Commission (AUC) in a common African political vision on energy access and LCT (Box 1) and it is against this backdrop, that the concept of a 'Just low-carbon transition' has taken root in Africa.

**Box 1. A common African vision on LCT**

In 2022, the African Union Commission (AUC) adopted the African Common Position on Energy Access and Just Energy Transition, which stipulates that Africa will continue to deploy all forms of its abundant energy resources including renewable and non-renewable energy to address energy demands. Natural gas, green- and low carbon hydrogen and nuclear energy will therefore be expected to still play a role in expanding modern energy access in the short to medium term, while enhancing the uptake of renewables in the long term for a low carbon and climate-resilient trajectory (African Union, 2022).

[2] According to the official definition, renewable energy (RE) is energy derived from natural sources that are replenished at a higher rate than they are consumed. It includes hydropower, wind, solar (panels and thermal plants), geothermal as well as biofuels (firewood, charcoal, biogas, agro-residues and waste and other biomass) (IEA, 2023b). Although biofuels are considered as RE, they have negative environmental and health impacts, which render them unsustainable. They generate greenhouse gas emissions (although at lower levels than burning fossil fuels like coal, oil or gas), indoor pollution that affects mostly women and children, as well as lead to deforestation and land-use change (IEA, 2023b; Rowe, 2022; UNCTAD, 2023). In Africa, 22 countries depend mostly on RE (out of which, five depend nearly uniquely on RE) in their energy consumption (Chandler, 2022).

## 3.1 A Just energy transition

There is no consensus on what constitutes a 'just' transition (Heffron, 2017). However, generally, it implies that the transition towards a low-carbon economy should result in an equitable society in which costs and benefits are equally distributed among the population (Carley & Konisky, 2020). The concept of a 'Just low-carbon transition' thereby goes beyond a focus on natural resources and includes broader societal goals as highlighted in the Sustainable Development Goals (SDGs) (McCauley and Heffron, 2018). In the literature, there are three dimensions of justice central to the low carbon transition (Boateng, Bloomer, & Morrissey, 2023):

1. Distributive justice—equal access to energy systems, which can take three forms:
   a. A spatial dimension—where people's location determines the gravity of the benefits;
   b. A temporal dimension – ensuring energy systems not only enable people to access energy now, but also in the future;
   c. A social dimension – where access to energy services depend on the class or group individuals find themselves belonging to. For instance, economically privileged communities tend to have a lot more access to energy services than marginalized and economically deprived households.
2. Procedural justice—equal voice in the decision-making process, including meaningful participation of youth and women.
3. Recognition justice—fair representation of different perspectives in the energy discourse.

Assuring decent work for all (i.e. social dialogue, social protection, rights at work and employment) (ILO, n.d.-a) constitutes another core element of a just low-carbon transition, ensuring that both the process and outcomes are more inclusive (Awortwi & Dietz, 2019). While this transition provides opportunities for employment creation, it will also inevitably involve the destruction of other jobs and rather than a smooth process, this is bound to be disruptive. In some cases, such as coal mining, which has a long history in certain regions, the loss would not only be that of employment but of whole cultures – festivals, language, etc. (Malik, Bertram, Kriegler, & Luderer, 2021). For this purpose, the ILO (2015) has developed seven principles for just transitions that are widely cited in the literature and have been translated into national and regional policies (see Box 2).

**Box 2. Seven principles for just low-carbon transitions**

1. Adequate, informed social dialogue among all relevant stakeholders.
2. Respect, promotion and realisation of fundamental principles and rights at work.
3. Specific gender policies to promote equitable outcomes.
4. Coherent policies need to provide an enabling environment for enterprises, workers, investors and consumers to embrace and drive the transition.
5. The creation of more decent jobs, including as appropriate: anticipating impacts on employment, adequate and sustainable social protection, skills development and social dialogue, including the effective exercise of the right to organize and bargain collectively.
6. Policies need to be designed in line with the specific conditions of countries.
7. International cooperation among countries should be fostered.

*Source: (ILO 2015)*

As this chapter has shown, justice is the keystone of an Africa-centred definition of low carbon transition. In order to systematically review the available literature on LCT in Africa, this paper will build on the just transition framework as presented in this chapter, analysing

trends, opportunities and barriers on the basis of the three core elements of justice; distributive, procedural and recognition justice.

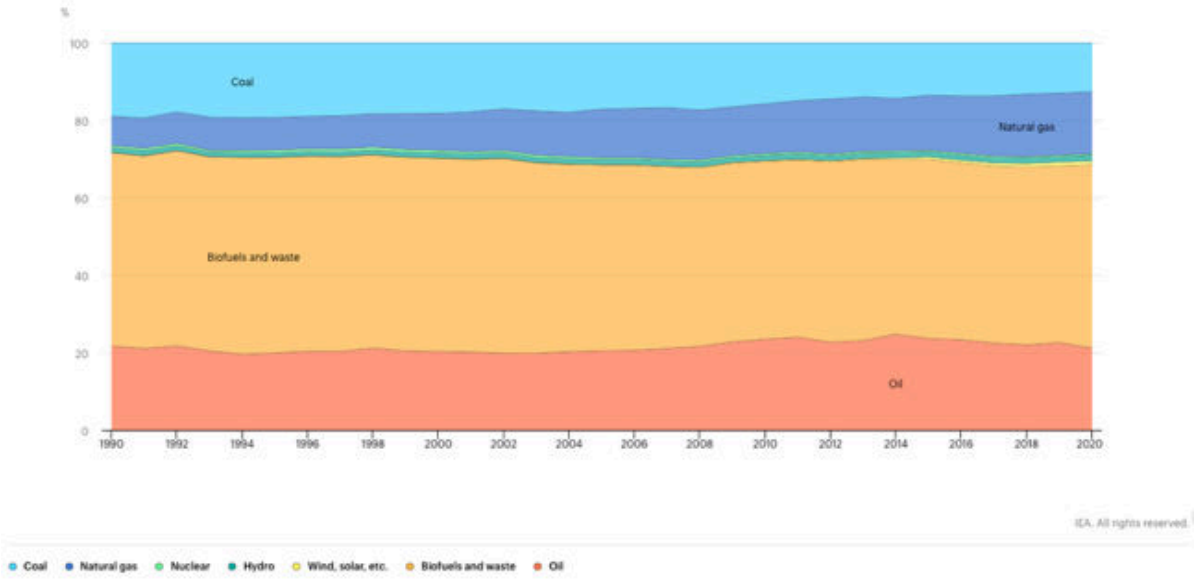
# 4 An overview of Africa's energy landscape[3]

Africa has almost unlimited solar potential (10 TW) and abundant hydro (350 GW), wind (59 TW) and geothermal energy sources (15 GW) (United Nations Environment Programme & African Development Bank, 2017). It also possesses key mineral resources essential to the production of electric batteries, wind turbines, and other low-carbon technologies (i.e. clean hydrogen) to support the global transition while creating local value (IRENA; IEA; SE4A, 2022). However, Africa's energy supply[4] landscape differs substantially from the rest of the world as it is a result of a complicated mix of formal on-grid and off-grid-energy coupled with 'traditional' and informal energy sources.

## 4.1 On-grid power systems and formal energy supply

Fossil fuels (coal, natural gas, and petroleum) account for half of the energy supply in Africa (13%, 16% and 21% respectively; see Figure 1). The other half of the energy supply comes from vastly defined RE sources: biofuels and waste incineration (47%), hydropower (1.5%), wind, solar, geothermal (1%) and nuclear (0.3%) (IEA, 2023b). Considering this energy mix, it is often presented that Africa is already in a state of carbon neutrality, however with a high dependency on (unsustainable) biomass burning, mainly used for cooking, and a very small share of other RE energy sources in the mix, the reality paints a more complicated picture.

**Figure 1. Total energy supply by source, Africa 1990-2020**



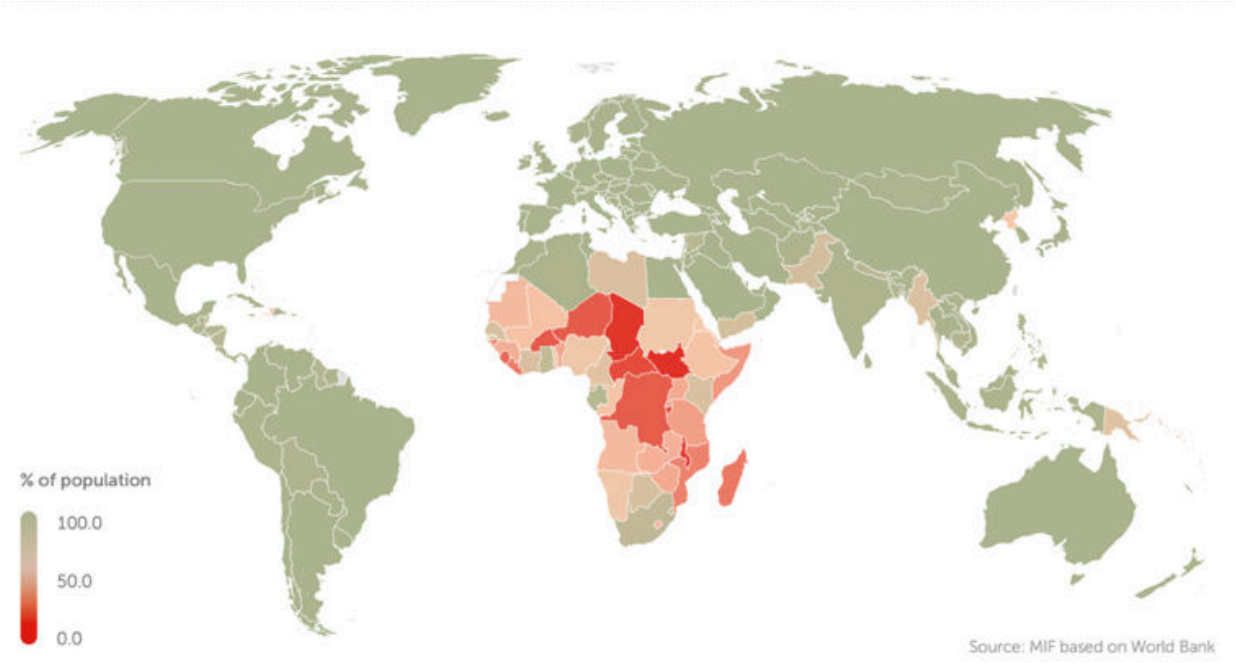

*Source: (IEA, 2023b)*

[3] It should be noted that there is general lack of complete and credible data on energy use in Africa, which remains one of the key challenges hampering the development and transformation of Africa's energy sector. The information in this chapter is based on available data and other resources.

[4] The energy supply accounts for all fuels and technologies used for generating electricity, powering industry, transport, and infrastructure, as well as domestic cooking and heating among other uses (Chandler, 2022).

Access to electricity poses a major challenge in Africa. Recent data show that over 50 per cent of the continent's population (about 600 million people) has no access to electricity (See Figure 2) (SEforALL, 2020). Even when there is access to electricity, it is often intermittent and not enough for everyone[5] (UNCTAD, 2023). In terms of electricity generation,[6] there are three major categories of energy: fossil fuels, nuclear energy, and renewable energy sources. In Africa, fossil fuels accounted for over two-third of the electricity generated in 2020. The role of RE sources is limited to 22.5 per cent, and the only nuclear power plant on the continent placed in South Africa brings in 1.2 per cent of electricity into the mix (IEA, 2023b). There is a gradual decrease of oil and coal used, with an exponential increase in the use of natural gas within the last decade (Figure 3) (IEA, 2023b). Natural gas is currently responsible for the generation of 41 per cent of the electricity on the continent, ahead of coal (29%), hydro (18%) and oil (6%). Therefore, as the continent's energy supply is considered to be dominated by renewable energy sources, the electricity that is used on the continent is still mainly coming from fossil fuels. The installed power capacity on the continent is still very low[7] and on the current trajectory, it will take until 2080 to reach universal access to electricity across the African continent – and move beyond fuel from solid biomass (Winkler, 2018).

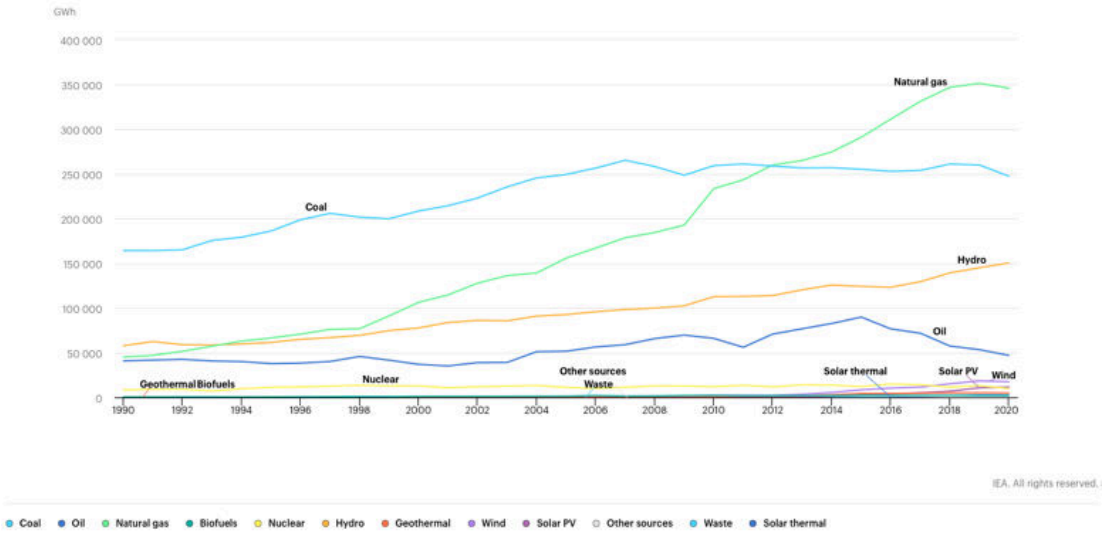
**Figure 2. World countries: access to electricity (2019)**




*Source: (Chandler, 2022)*

[5] 160 million (14%) grid-connected people have access less than 12 hours/day (Anglivie et al., 2021).
[6] Electricity accounts for around one fifth of all energy consumed globally. It does not account for other forms of energy such as petrol and diesel fuels frequently used in transport, or biomass and charcoal which are frequently used domestically for cooking and heating (Chandler, 2022).
[7] In 2020, the total power capacity in Africa amounts to was 239.2 GW, with Sub-Saharan Africa (excluding South Africa) estimated at 69 GW, South Africa alone with an installed capacity of 63 GW and North Africa with a capacity of 107.2 GW. To put it in the perspective, at the end of 2021, Germany's installed capacity was 228 GW (Enerdata, 2022; UNCTAD, 2022).

**Figure 3. Electricity generation by source, Africa 1990-2020 (linear)**

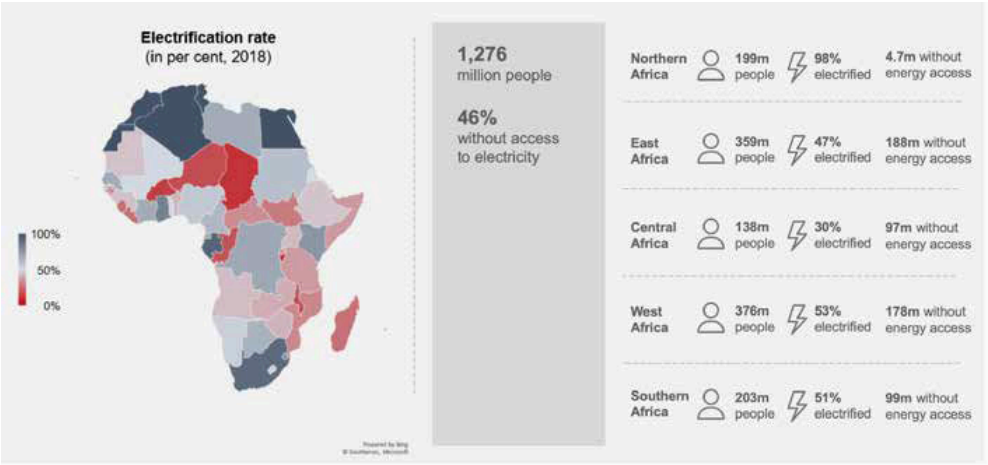



*Source: (IEA, 2023b)*

Africa was and remains the most energy-poor region in the world (IEA, 2022a; SEforALL, 2020). Africa also has the world's lowest per capita energy consumption: with 17 per cent of the world's population, it consumes about 3.4 per cent of global primary energy (Logan, 2021). Moreover, the access to energy is not equally distributed as major spatial and social inequalities exist:

- Between African regions: while 98 per cent of North Africa is electrified, West, East and South Africa all being electrified at around 50 per cent and only 30 per cent of Central Africa is connected to the grid (see Figure 4) (IEA, 2023a).
- Between rural and urban communities: in Sub-Saharan Africa (SSA), only 20 per cent of the rural population has access to electricity compared to 78 per cent of the urban population (IEA, 2022a).
- Between men and women: in Africa – as across the world – more women than men suffer from energy poverty, as they are the main users and producers of household energy (Rowe, 2022).

**Figure 4. Electrification rate in Africa per region (2018)**




*Source: (IRENA, 2020)*

One of the biggest impediments for energy supply is the lack of sufficient generation capacity, combined with poor transmission and distribution infrastructure (Arlet, Ereshcenko, & Lopez Rocha, 2019). Up to a quarter of installed capacity is unavailable because of aging plants. The best on-grid renewable power solution for most African countries is utility solar, which is the cheapest, most abundant source of electricity by most measures. Africa has 40 per cent of the world's solar potential but just 1 per cent of installed solar photovoltaic (PV) capacity (Ghantous, 2022). Significant on-grid solar is on the way, with the current pipeline of projects set to triple capacity across the African continent over the next decade. However, with only 0.6 per cent of global renewable energy investment flowing to Africa (in 2021) this increase is far below what is required to provide electricity access to all, let alone power new industrial growth (RES4AFRICA Foundation, 2023). This situation calls for a stable and continued financing of RE projects.

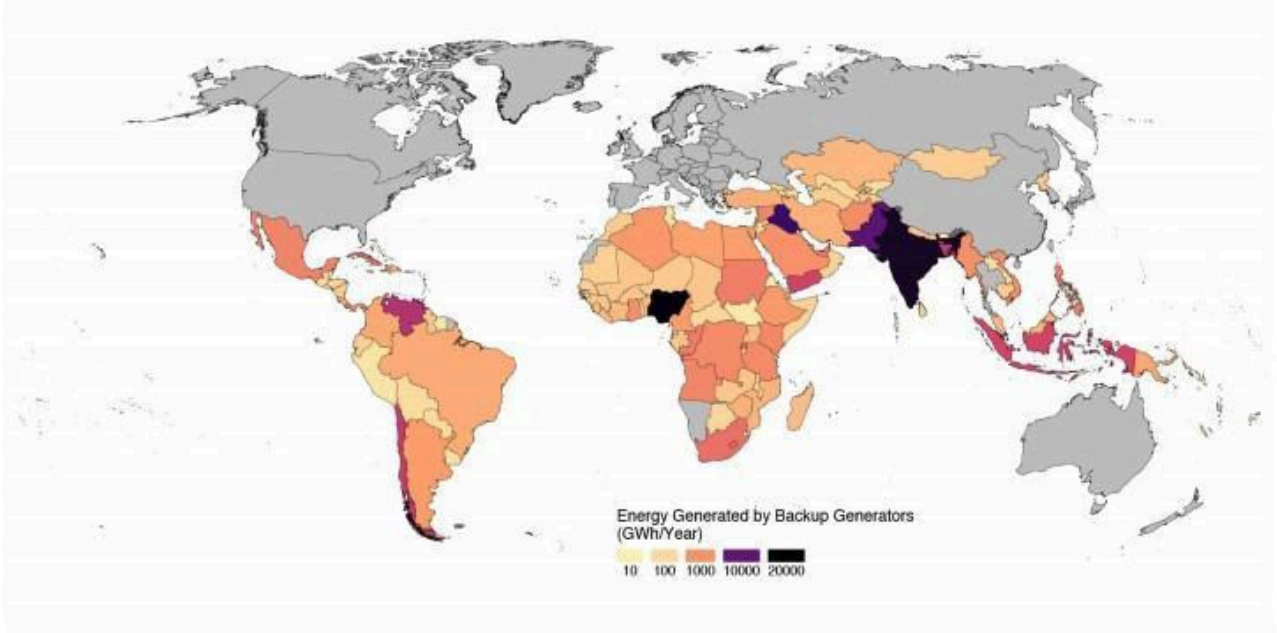
There are also major challenges on the demand-side. The share of households that live near the electric grid but that are not connected to it is high (±60%) but varies across and within the countries. The urban-rural divide is particularly deep. In most African countries, connecting an additional household to the grid is not financially viable or technically impossible. The tariff and connection charges in some Sub-Saharan Africa countries are among the highest in the world. This makes electricity unaffordable to some segments of the population, especially those from poor communities in urban areas, rural households and small businesses. Even for the population who can afford these costs, some are simply not willing to pay (Blimpo & Cosgrove-Davies, 2019). This shows that improving the infrastructure alone may not be sufficient to achieve an inclusive transition. Low energy supply, complete with shortages, high costs and poor access, provide space for alternative (informal) grid access channels (especially in urban setting) and off-grid systems (in both urban and rural setting).

## 4.2 Off-grid power systems and informal energy supply

To make up for the lack of access to the grid, decentralized energy sources are already wildly used on the continent. Such solutions are considered as the best option to electrify rural and remote areas in Africa where the grid infrastructure is unavailable or non-existent due to technical or financial considerations (Nyarko, Whale, & Urmee, 2023). However, in practice, it has been mostly stand-alone fossil-fuelled (diesel) generators that are used to either generate energy in rural and remote areas or complement the energy supply in case of power cuts, which is more often the case in urban settings. The continuous use of diesel generators is not only expensive, but also contributes adversely to environmental impacts such as global warming and resource depletion (IFC, 2019).

There are now 17 countries that have more off-grid diesel generator capacity than on-grid power generation capacity (see Figure 5). Researchers estimate that there are roughly 100 GW of operational diesel power across 39 African countries, with 6.5 million generators deployed in Sub-Saharan Africa alone. With about 3 million generators, Nigeria has the highest total electricity generated by back-up generators in Sub-Saharan Africa. Consequently, as a region, West Africa has the highest share of power generated from back-up generators at 40 per cent of annual consumption—four times the share of back-up generators in East Africa. Overall, spending on generator fuel in Sub-Saharan Africa is higher than on the entire power grid, highlighting the dependence of African communities on back-up power (IFC, 2019).

**Figure 5. Energy generation by back-up generators across Africa**




*Source: (IFC, 2019)*

There is an opportunity for these generators to be replaced by off-grid hybrid power systems (OGPS) with renewable energy as the primary resource (the off-grid solar and mini-grids[8]). Off-grid solar is currently the fastest and cheapest solution for many of the 600 million people in Africa living without clean energy access. The sales of OGS products have increased by 10 per cent year-on-year in recent years, while more than 2.000 mini-grids are in operation (Anglivie, Betz, Manhart, Sahni, & Soomro, 2021). The off-grid electricity generation not only connects low-income populations to clean, renewable sources of power, they also connect people to a mobile financial infrastructure for consumer credit and debt (Cross & Neumark, 2021). The private sector plays a critical role in sales and operation of off-grid solutions (Cross & Neumark, 2021). In the future, RE-based OGPS have the capacity to unlock the transition to low-carbon African economies while increasing energy access. However, in the short term these solutions need to be installed with battery systems, and even then, do not offer the same advantages as a grid-connected power system. Therefore, in practice, people would still need to turn to other, at times informal, sources of energy supply.

Informal energy supply is a rather overlooked topic in the LCT debate. For residents of informal communities who cannot afford the connection fee or provide required tenancy documents (among other barriers), the only viable alternative is to connect to the grid informally through a local electrician[9] (Kersey, 2022). Often these connections do not adhere to the security standards, causing a serious fire hazard for the residents of the household and its surroundings. Moreover, such phenomena bring huge losses in revenues to the national Electricity Distribution Companies and negatively influences the efficiency of the grid

[8] The off-grid solar system is usually a stand-alone 'home system', consisting of a rooftop mounted solar panel, battery, controller and light bulbs. The financing model used include an initial down payment on a system, followed by regular payments over a period of years (often using mobile payment system), after which the customer owns the system outright. The solar-powered microgrids are in practice decentralized power plants that generate electricity off-grid but distributing power to households and businesses via lines and cables. Customers pay only for the electricity they use through smart meters connected to mobile payment systems (Cross & Neumark, 2021).

[9] It should be noted that informal grid connection also happens outside informal settlements (Shout-Africa: Shout-Africa, 2019).

leading to major economic and social impediments and a lack of consistent energy supply for important public sectors. For instance, only 34 per cent of hospitals and 28 per cent of health facilities in Sub-Saharan Africa have reliable electricity access[10] (Adair-Rohani qet al., 2013; Shen & Ayele, 2020). Over 75 per cent of firms in Sub-Saharan Africa experience electrical outages on average 8 times per month for more than 5 hours, which result in around 8 per cent of annual sales losses (RES4AFRICA Foundation, 2023). Though informal connections provide marginal levels of access to the grid, for a part of the population this informal access provides a lifeline in the context of two main challenges: rapid urbanisation and social exclusion.

Rapid urbanisation is one of the most profound transformations that the African continent will experience in the 21st century. Currently, there are 1.2 billion people living in Africa and this number is expected to double by 2050 (World Bank, 2023). More than 80 per cent of that increase will occur in cities (World Bank Group, 2016), and Sub-Saharan Africa will host five of the world's 41 megacities by 2030 (Lagos, Kinshasa, Johannesburg, Dar es Salaam, and Luanda) (ISS Africa, 2016). African cities are the most rapidly growing urban centres in the world; they are the youngest and they are changing fast. Such rapid urbanisation is presenting important challenges. Between 50-60 per cent of the urban population currently lives in informal communities that face structural barriers to securing legal access to the electricity grid (The Borgen Project, 2023; World Bank, 2023). With this number expected to rise significantly over the next decade, this will put major pressure on the grid, thereby pushing many to find alternative, informal and off-grid solutions.

There is poor understanding of how and why people connect to the grid, which leads to social exclusion of marginalised communities. In urban settings in the Global South, the grid tends to be associated with formal and usually more wealthy parts of the city, while informality is linked to off-grid energy infrastructures. However, in practice these lines are more blurred. Exploring the topic of how people actually use the available energy infrastructures for energy supply in situ reveals a range of interventions that operate more flexibly, on the intersection of formality-informality (see i.e.(Banks, Lombard, & Mitlin, 2020; Bobbins et al., 2023)). Actors use and draw on all sort of available solutions to meet their energy needs creating a complex energy supply mix that is insufficiently understood. This makes the planning and expansion of electricity infrastructure difficult, especially in informal settings, leading to both spatial and social exclusion of specific urban zones and population groups (Bobbins et al., 2023). As the above shows, off-grid power systems and informal energy supply secure access beyond conventional grids but can also produce adverse social, environmental, and economic outcomes affecting sustainable energy transition efforts (Chapman et al., 2021).

# 5 At a geopolitical cross-road: An African Green Deal or A New Scramble for Africa?

Low carbon transitions do not take place in a social and political vacuum and it increasingly recognized that the pathway to low carbon development is disruptive by nature, transforming the materiality of energy production and land-use systems while undermining entrenched economic interests and political institutions along the way (Langevin, 2022). According to Hochstetler (2020) "an" energy transition is as such actually a series of political economy transitions, with different interest structures that should generate the participation of diverse actors and institutions of state and society.

[10] It should be added that about 58 per cent of health care facilities in Sub-Saharan African countries have no electricity at all (Adair-Rohani et al., 2013; Shen & Ayele, 2020).

To explore these dynamics, this section applies a political economy lens to the LCT discourse, highlighting some of the potentially competing interest associated with LCT in Africa, thereby providing opportunities for engagement on a programming and policy level. A political economy analysis can help explain why 'good' industrial and inclusive policies often fail to achieve their intended outcomes, why ineffective policies (or exclusive policies) can persist, and why potentially effective inclusive policies are not adopted or, when adopted, not fully or effectively implemented (World Bank, 2017). Especially in a world in which rising powers are reconfiguring global development trajectories with significant implications for their sustainability, it becomes increasingly important to understand whether and how low carbon energy transitions in Africa might be enabled or frustrated by the new global geography of power (Power et al., 2016).

A more detailed description of the main intra- and intercontinental policy frames, programmes and funds that aim to spur LCT on the continent can be found in Annex 1.

## 5.1 Africa as a geo-political playground for global energy needs

Africa is increasingly becoming a geopolitical and geo-economic playground for powerful countries and regional blocks as they look to African resources to secure both their short and long-term energy security needs. This has been particularly evident in the past year, following the outbreak of conflict in Ukraine and the subsequent "dash for African gas" by European countries that are redoubling efforts to extract and export fossil fuels from Africa (Cohen, 2022). Under the guise of its REPowerEU strategy, the EU is exploring energy export potential of countries like Nigeria, Senegal, and Angola to reduce its dependence on Russian gas rapidly. In addition, the MENA region has become of particular strategic value for EU's objectives to shift to "green" hydrogen by 2050 by establishing a steady supply from North-Africa. While some see green hydrogen as an opportunity for African exporters to benefit from the EU's industrial transition (Usman, Abimbola, & Ituen, 2021), others point to the risks of 'green neocolonialism' through the plunder of local resources, dispossession of communities, environmental damage and entrenchment of corrupt elites (Hamouchene, 2021).

Yet the isolation of Russia is not the only battle being fought with the help of African resources. There is also increasing posturing around Africa's critical mineral base, as the EU and US wake up to China's dominance over these resources and looks to claw back its influence on the continent. Battery technology in particular, relies heavily on mined resources like lithium and cobalt. Much like PV panels, the production of Lithium-Ion batteries is dominated by China, which also controls a sizable portion of mineral production (particularly lithium and graphite), and the majority of mineral processing. Chinese companies have sought to consolidate access to African Cobalt (primarily from The Democratic Republic of Congo (DRC)) and currently control nearly 70 per cent of DRC cobalt production (Kinch, 2020). With European demand for lithium projected to multiply up to 60 times by 2050 (Bobba, Carrara, Huisman, Mathieux, & Pavel, 2020) increased competition for Africa's minerals is on the cards. As processing of these minerals mainly takes place abroad, which risks confining African countries to the extraction stage of green technology value chains rather than investing in productive local employment (Medinilla, Sergejeff, & Domingo, 2022).

Despite these worrying trends and examples, it is too soon to speak about a new scramble for Africa as a closer look at European and Chinese investment, shows that the perception of increasing direct 'competition' between these geopolitical giants may be somewhat overblown (Medinilla et al., 2022). EU and Chinese actors have long used fundamentally different business models for African energy infrastructure, and have been working more in parallel than in competition. Renewable energy investment from both blocks combined barely even scratches the surface of what is needed and what is possible and increased cooperation between EU and Chinese companies on the African continent may actually

create opportunities for employment for Africa's youth. However, careful monitoring of the trends and investments will be needed to ensure transnational partnerships are mutually beneficial and Africa-led.

### 5.2 A need for policy harmonisation

When it comes to the LCT in Africa, there is an interconnected nature of policy interventions on an international, continental, and national policy level. Policy coherence and harmonization across LCT policy frameworks is therefore of utmost importance. Realizing Africa's LCT objectives, necessitates the development of strong domestic, continental and international partnerships, which requires a careful balancing act for African governments between investment and exploitation. If not managed properly, international LCT policies and practice could turn into another scramble for Africa's resources. To ensure a just transition, the continent needs to be mindful that the narrative of an LCT in Africa is not appropriated by polluters, and African initiatives are not captured or diverted to meet the interests of donor countries, transnational companies or other foreign interests (Sokona et al., 2023). Consequently, the need for an African-led Green Deal that addresses geopolitical power imbalances becomes increasingly important. This requires an "unprecedented strategic [political] vision — one rooted in Africa's shared history, responsive to its tremendous potential, and articulated with confidence" (Sokona et al, 2023: 10).

Although increasingly recognized as a crucial part of LCT, the political economy of energy transitions is a vastly understudied area and the knowledge base on interactions between national and global political economies is still thin (Boateng et al., 2023). Therefore, it becomes increasingly important to understand whether and how low carbon energy transitions in Africa might be enabled or frustrated by the new global geography of power (Power et al., 2016). A better connection also needs to be made between economic and social exclusion approaches and issues of political participation (Pouw & Awortwi, 2023), in the context of this paper, especially focusing on the inclusion and participation of youth.

# 6 Gender justice and meaningful youth engagement

This section delves into the obstacles that women and youth encounter in relation to the low carbon transition and emphasizes the need to address them. Specifically, within the framework of the LCT, women and youth confront distinctive barriers that require attention and consideration. These barriers include:

- A mismatch between new jobs and skills and qualifications;
- Limited access to financial resources for businesses led by women and youth;
- Limited access to information and communication technologies (ICT);
- Discriminatory social norms, including gender biases entrenched in legislation, the burden of unpaid care work, and women's underrepresentation in leadership positions (Soumare, Ushie, & Abril, 2021);
- Limited meaningful inclusion of youth voices in decision-making processes related to jobs and climate action.

Importantly, it should be highlighted that these barriers are not exclusive to the energy transition process. Rather, they represent systemic challenges persistently faced by women and youth in the African labour market across various sectors, which have yet to be resolved.

## 6.1 Gender justice

The evidence reveals that while women are well-positioned to access green jobs in many sectors, they are currently overwhelmingly concentrated in sectors that are likely to create more low-end types of job opportunities (Soumare et al., 2021). Women in sub-Saharan African countries are more likely to work in the informal sector, which offers less stable jobs and lower wages (Chakma, Rigg, & Ramsay, 2022). This is primarily due to their limited access to education, household and childcare responsibilities, and safety concerns during the commute to work. Socio-cultural norms and unequal access to economic assets, such as land and credit, further hinder women's full participation in economic life. Additionally, gender stereotypes, biases, and a lack of training, mentorship, and networking opportunities act as barriers for women attempting to enter the workforce, including the energy sector. In Ghana, for example, despite the number of women graduating with science, technology, engineering and mathematics (STEM) degrees is increasing, female employment in the electricity sector is not (Dejene, 2020). As a result, women with STEM degrees and technical training certificates often end up working in unrelated fields, underutilising their skills.

However, it is worth noting that improved energy access and the use of clean energy can support gender parity in several ways. For instance, clean cooking reduces health risks associated with indoor air pollution, benefiting women and children in particular. By spending less time collecting firewood, women have more time for other activities, including employment outside the home. The availability of household electricity enables mobile communication and facilitates chores and homework in the evening (Burney, Alaofè, Naylor, & Taren, 2017). Household electricity enables mobile communication as well as chores and homework to be done in the evening. Furthermore, street lighting contributes to the safety of women, who often have limited access to private vehicles. Improved transportation options can also shorten daily commutes and reduce the time taken to receive emergency healthcare (IEA, 2022a).

## 6.2 Meaningful youth engagement

The literature review also indicates a lack of gender analysis and exclusion of women and youth in decision-making processes related to energy transition policies and projects across Africa (Bell, Daggett, & Labuski, 2020). For example, Nigeria's Energy Transition Plan, launched in August 2022, has prompted civil society organizations to advocate for the meaningful inclusion of local youth and women in its review and implementation. These groups are often disproportionately affected by the economic and environmental impact of fossil fuels (Ibunge, 2023; Nigeria Energy Transition Plan, n.d.). Nigerian youths have called for an energy transition that is economically viable for young people and aligned with the current education systems and local context (Langevin, 2022).

At the continental level, the African Union Youth Envoy has been advocating for the inclusion of youth voices in decision-making processes related to jobs and climate action. The African Union has representation for youth groups at its commission in Addis Ababa, as well as in regional economic communities (Ighobor, 2022). Youth engagement is also gaining importance in national policies and programs, with civil society organizations in Nigeria advocating for the meaningful inclusion of grassroots youth and women in the review and implementation of Nigeria's Energy Transition Plan. This inclusion is crucial to address the projected impact on their livelihoods and access to employment opportunities. However, there is limited knowledge about the effectiveness of African youth and women's involvement in discussions and processes related to low-carbon transition.

Within multilateral organisations, there is a positive trend in enabling youth to participate in the climate discourse (Strzelecki, 2022). There is YOUNGO – the official youth constituency of the United Nations Framework Convention on Climate Change (UNFCCC), Youth

Advisory Group on Climate Change, which brings youth climate movements and voices closer to UN leadership, and the SDG7 Constituency (SDG7 YC), associated with the United Nations Major Group for Children and Youth (UN MGCY), which is a formal and dedicated youth engagement mechanism in UN sustainable development processes focused on energy. It also promotes youth engagement in other energy-related initiatives in the multilateral system (Ingaruca et al., 2022). Despite these efforts, yet again, their effectiveness and influence of the multilateral, continental, or national political processes appears to be limited (Khan et al., 2021).

It is an imperative that a just energy transition addresses the gender- and youth-specific barriers and ensures women's and youth's access to stable and well-paid employment in the energy sector and beyond. The positive impact of improved energy access and the use of clean energy on gender parity, particularly in terms of health, time allocation, safety, and transportation is a major add value. However, more efforts must be made by various women- and youth- engagement mechanisms at the multilateral, continental, and national levels to addresses the lack of gender analysis and exclusion of women and youth in decision-making processes related to energy transition policies and projects, and their effectiveness.

# 7 Decent work for youth and women in LCT

The premise of the transition to low carbon economies is that it can present a hopeful solution to mitigate effects of climate change while creating decent jobs for Africa's ever-growing youth workforce (Lijfering & Lacey, 2022). The effects on employment creation resulting from a low carbon transition can be distinguished into direct, indirect, and induced. Direct employment effects concern jobs created in the economy to support the growth of the generation capacity of renewable sectors, including energy distribution. Indirect employment refers to jobs created in the supply chain of energy technologies to support the expansion of the energy supply. Induced jobs are when workers spend their salary on services such as transport or goods such as food, thereby creating additional employment outside the energy sector (ILO, 2016).

The African Development Bank has identified renewable energy and related technologies as one of the main drivers of the Fourth Industrial Revolution (4IR), meaning that the increased energy supply will be an important enabler of innovation, as well as economic and social development beyond the energy sector (IRENA & ILO, 2022). Such developments will lead to changes in the type and location of jobs in the energy sector and beyond, including jobs that will be lost to automation through digital transformation. The predictions are however optimistic and assume that jobs that will be created through the growth of the local RE sector will eventually surpass 4IR job losses, limiting the impact on employment locally. Studies by the International Labour Organisation (ILO, 2016) and other institutions have pointed to four types of possible impacts of the twin (green and digital) transition on labour markets:

1. The expansion of greener products, services, and infrastructure will translate into **higher labour demand across many sectors of the economy, thereby leading to the creation of new jobs.** Examples include jobs in renewable energy, energy efficiency, manufacturing, transportation, and building and construction (ILO, 2016). In addition to direct jobs, indirect employment is created along the RE supply chains (Renner, 2017), including in the building of necessary infrastructure (IRENA, 2017). And as new income is generated and spent across the economy, further (induced) employment is created.
2. **Some of the existing jobs will be substituted** as a result of transformations in the economy from less to more efficient, from high-carbon to low-carbon, and from more to less polluting technologies, processes, and products. Examples include the shift from the manufacturing of internal combustion engines to the production of electric

vehicles, changing from truck transport to rail, as well as the energy transition itself, as clean energy replaces fossil fuels.

3. **Certain jobs may be eliminated, either phased out completely or massively reduced in numbers, without direct replacement.** This may happen where polluting and energy- and materials-intensive economic activities are reduced or phased out entirely, such as in the closing of inefficient coal mines. However, it is not certain that the employment created by RE will directly benefit those negatively impacted by the transition (Hanto et al., 2021).
4. Many, and perhaps most, **existing jobs** (e.g. plumbers, electricians, metal workers, and construction workers) will simply **be transformed and redefined** as day-to-day workplace practices, skill sets, work methods, and job profiles are greened. For instance, plumbers and electricians can be reoriented to carry out similar work with solar water heating or solar photovoltaic systems.

Depending on the specific national energy context, African countries will experience a combination of these impacts. In many countries where fossil fuels are not dominant, or countries with an immense energy backlog, renewable energy can create new jobs that did not exist before. In such scenarios, the employment impact will be the highest. New jobs will be created, and the transition cost will be the lowest. In countries where hydropower is dominant, the diversification of the energy mix can also lead to additional job creation. In coal-producing countries such as South Africa, jobs will be lost without intervention. Each of the above-mentioned impacts can be positive or negative, depending on numerous factors. Specific elements that characterise African labour markets such as high levels of job informality, a constricting political economy of energy policies and international investments,[11] a large young, but unskilled workforce and an overall shortage of jobs must be taken into consideration when designing LCT pathways. Therefore, it is important to have a closer look at employment opportunities and challenges within the energy sector (and to some extent beyond) in Africa, both at present and considering the future of work. Finally, the nature of these employment opportunities in terms of job decency should also be reflected on in the context of a just LCT.

## 7.1 African energy labour market

Before diving into the job market of the African energy sector, we should put employment creation through LCT in a global perspective. In 2019,[12] the energy sector employed 65 million people worldwide, which accounted for only 2 per cent of global formal employment, relatively evenly distributed across fuel supply (coal, oil, gas and bioenergy), power sector (generation, transmission and distribution), and end uses (vehicles manufacturing and energy efficiency for buildings and industry), with China having the largest number of energy workers. Half of the global energy workforce is employed in clean energy technologies. The global energy sector demands more high-skilled workers than other industries, with 45 per cent of the workforce requiring some degree of tertiary education, from university degrees to vocational certifications. Emerging economies in the Global South are employing more low-skilled or informal workers in manual tasks, whereas in advanced economies, many labour-intensive parts of the energy business have been mechanised or automated. Women are strongly under-represented in the energy sector, accounting for only 16 per cent of traditional energy sectors and only 12 per cent of them being in leadership roles (excluding in utilities sector) (IEA, 2020).

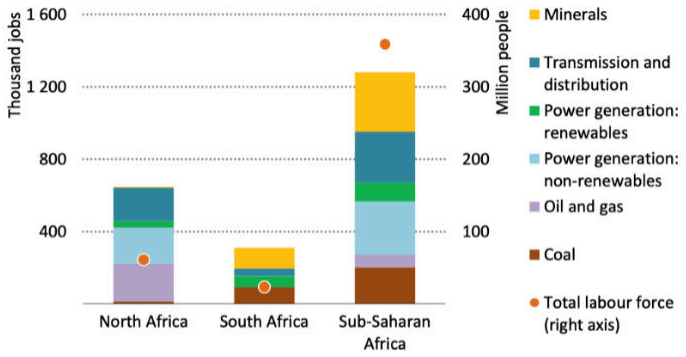
[11] See for instance (Kazimierczuk, 2020) for the description of the political economy process behind the development of the Lake Turkana Wind Power Project in Kenya – one of the biggest wind farms in Africa.

[12] IEA estimates that total energy employment in 2021 was up around 1.3 million from 2019, and could increase by another 6 percentage points by 2022. Clean energy accounts for virtually all of the growth in energy employment. The report with updated post-pandemic figures is scheduled to be released in October 2023.

In 2019, the formal energy sector in Africa employed about 3.9 million people out of which, 62 per cent of jobs were generated on the supply-side of energy (particularly oil and gas), 23 per cent in power generation and distribution; and 15 per cent in the energy use (IEA, 2020). There are, however, many more informal energy-related jobs, particularly in the sectors requiring low-skilled labour such as the commercial collection and sale of biomass. In rural areas, harvesting of firewood and production of charcoal provides another important source of income and employment in many sub-Saharan African countries (Nalule, 2019). A number of these jobs may be performed by youth and women, however, a granular understanding of the profile of these workers is not currently available. Considering economy-wide ratios between formal and informal employment, total energy-related employment may be as high as 11 million (IEA, 2022a).

Energy-related employment varies enormously by region (Figure 6) and level of formality. For instance, thermal power generation companies are important formal employers in North Africa, while mining and connected jobs make up a relatively high share in South Africa (± 90 per cent of all jobs in the energy sector (Statistics South Africa, 2019)).[13] In central African countries, the largest employment opportunities are created in the mining of critical minerals sector where the total number of people working in mining could be four- to eight-times higher when informal workers in artisanal and small-scale mines are included. In DRC, for example, the formal mining sector employs 120.000 people, while estimates of informal employment range from 500.000 to 1 million. In Nigeria, of the estimated 49.600 people working in the country's distributive renewable energy sector, 31 per centare working in the informal economy. The prevalence of part-time, temporary, and informal work creates 'blurred lines' on the African energy labour market, making it impossible to obtain reliable statistics and discuss the decency of many of these jobs (Daniel, 2020; IEA, 2022a; IRENA & ILO, 2022).

**Figure 6. Direct formal jobs in the energy sector by region in Africa, average for 2015-2019**




*Source: (IEA, 2022a)*

The employment in the charcoal and firewood sector, the major source of energy in Africa, is largely informal. In Nigeria alone, the firewood and charcoal sector employs some 41 million workers, most of these working in the informal economy. Bioenergy (wood, charcoal and grass), coal and kerosene are dominant energy sources in the informal economy. Reliable information about the size of this part of the energy labour market is difficult to come by. However, considering that as recently as 2019, about 906 million people in Sub-Saharan

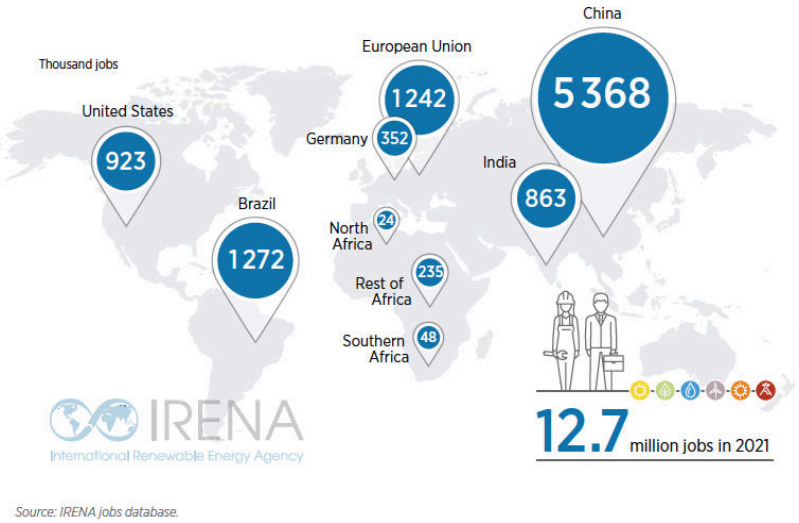
[13] In 2019, 39 per cent of South African miners were employed in the platinum group metals sector, 21 per cent in the coal sector and 20 per cent in the gold sector. The rest were absorbed by the iron ore sector and smaller operations, such as the production of other minerals, lime works and stone quarrying (Statistics South Africa, 2019).

Africa had no access to clean cooking fuel, the contribution to the economy must be substantial (IEA, 2022b; ILO, n.d.-b)

Historically, many energy jobs were found in the fossil fuel industry. In countries such as Nigeria, Angola and Algeria, for example, the oil industry accounts for 80-90 per cent of exports and 10-50 per cent of GDP, making it an important driver of employment (IRENA and AfDB, 2022). However, it has been estimated that a disproportionate share of fossil fuel jobs in Africa are held by foreign nationals working at major multinational oil companies. In fact, according to some estimates, fossil fuel industries employ less than 1 per cent of the African workforce directly (Lenhardt, 2020). Indirect energy jobs tied to oil, natural gas and coal – local suppliers, downstream distributors, etc. – are difficult to estimate, but there is a general sense that the fossil fuel industry in Africa is largely dissociated from African communities.

More recently, the clean energy sector has generated significant direct employment opportunities, as well as throughout its value chains, and these are greater than those of conventional energy sources. To date, the estimated employment generated by the clean energy sector in Africa is still modest, with just 322.000 jobs across the continent (Figure 7), largely concentrated in sales, installations and related services. Nevertheless, the sector is growing rapidly and is expected to grow up to 8 million jobs by 2050) (IRENA & ILO, 2022; RES4AFRICA Foundation, 2023). In contrary to the fossil fuel industry, an important aspect of the RE jobs would be that they are held by African workers. For instance, the decentralized renewable energy (DRE) sector, which includes a number of off-grid solutions, has been a source of stable employment, especially in communities located far away from urban centres. In Kenya, DRE jobs greatly outnumber those of the national utility-scale power sector, with estimated employment of no more than 8.000 workers in Kenya Power and Lighting Company (KPLC). In Nigeria, the number of DRE jobs is fast approaching that of the oil and gas sector (currently 65.000), although only about 28 per cent of these DRE sector were performed by youth. In Uganda, the DRE sector directly employed nearly 30.000 workers, while Ethiopia nearly 14.000 jobs were created. Although, the Covid-pandemic resulted in major job losses, the total number of jobs has almost reached the level of pre-pandemic employment. Similarly, to the rest of the energy sector, women are not well-represented in the sector, especially in leadership roles. The employment in the RE sector has not been well documented beyond a number of country level reports or individual case studies (Box 3), which makes it difficult to assess the overall employment impact of the sector (IRENA & ILO, 2022).

**Figure 7. Renewable energy employment in selected countries**




*Source: (IRENA & ILO, 2022).*

**Box 3. Examples of an off-grid solar solution**

**BBOXX**, a company connecting customers to clean energy, clean cooking, operates in more than two dozen African countries. It has sold more than 500.000 solar home systems. The company has a staff of more than 1.000 in the Democratic Republic of Congo, Kenya, Rwanda and Togo. A major market for the firm is Kenya, where it has 350 employees, 40 per cent of whom are women. The company's headquarters is in the United Kingdom and its solar equipment is manufactured in China.

**Husk Power Systems** launched an initiative in Nigeria to build at least 500 solar mini-grids. The aim is to add some 400.000 new grid connections for households and small- to medium-sized enterprises by 2026, electrifying 900 health clinics and 100 schools; enabling productive activities, including agri-processing and cold storage; and providing energy for 8.000 female-led businesses.

**M-KOPA** has crossed the threshold of more than 1 million customers for solar lighting and related pay-as-you-go products. It employs more than 1.000 people (up from 855 in 2018, half of whom were women). The number of direct sales agents working on commission rose from 2.100 in 2018 to more than 7.000 at present. Most of the company's workers are in Kenya, with most of the rest in Uganda.

**Mandulis Energy** is involved in on and off-grid solutions from pico- to mini-grids and has seen turnover increase by at least 50 per cent per year over the past three years. The company is currently developing 16.500kW off-grid sites using gasification technologies across Uganda. A particular opportunity is providing refugee settlements with electricity, and the company is already working with UNHCR. Overall, the expectation is that over half of Uganda will never be connected to the national grid, and off-grid and clean cooking represent a potential $20 billion opportunity in Uganda. Mandulis expects to hire up to 6.000 people in the next three years (with a 50:50 gender balance), although without tying these predictions to realistic sales projections this claim has to be viewed with a degree of caution.

The above-mentioned examples (Stewart & Trace, 2021) indicate that decentralised off-grid energy sources can provide stable employment for women and youth, especially in communities located far away from urban centres. Although the attention in the off-grid sector is moving towards creating more jobs for women, creating jobs for youth seems to be of a lower priority, as it is often not reported in the project descriptions.

The circular economy is another important employer in Africa and a growth market for LCT employment. The circular economy is a model of production and consumption involving sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products for as long as possible. The concept has been growing in popularity among businesses and policymakers worldwide as a mean to reach climate goals and the potential of 7 to 8 million new jobs globally (ILO, 2023). Unfortunately, reliable data that could shed light on employment in the circular economy sector in Africa and the quality of jobs on the continent are not available. Anecdotal evidence, however, indicates great potential in terms of the size and importance of the sector. An example of circular jobs are informal waste collectors – also known as waste pickers or waste reclaimers. They earn their livelihoods from collecting, sorting and aggregating waste found in streets and landfills, or sourced directly from households and selling this recyclable waste to buyback centres or formal recyclers. In South Africa, some researchers estimate that there are up to 215.000 waste reclaimers. In Morocco, the official estimate is between 7.000 and 10.000 informal waste collectors but other estimates indicate that there may be as many as 34.000 (Sadan & de Kock, 2022). Most of the circular jobs created are in the informal economy and are driven by poverty rather than green thinking. Rapid urbanisation and increased economic activity make

the need for recycling and waste-to-energy activities an important growth market for job creation, and the sector is projected to grow at an annual rate of 8.5 per cent (Lijfering & Lacey, 2022).

Finally, niche sub-sectors, like geothermal (mostly in East Africa), nuclear (South Africa) but foremost the informal energy sector should not be overlooked, yet there is no reliable data available that could indicate the employment generated in these sectors and their chains. Moreover, as Africa progresses on its low-carbon pathway(s), increased access to both grid and off-grid decentralised renewable electricity will enable additional employment through induced jobs and economy stimulation. Expanding electricity supply to agriculture, health services, commerce and other productive uses, as well as to clean cooking would also create jobs. Larger scale infrastructure developments that electrify the economy will likely have a major (shorter-term) impact on employment and productivity (IEA, 2022a).

## 7.2 Job creation in LCT: main opportunities

Ultimately, as the result of a just low carbon transition, all new employment provision will be low-carbon jobs. However, considering the low-carbon trajectory in Africa as a long-term process, there will be both major opportunities and challenges on the way when it comes to creating decent jobs for women and youth. This section highlights the most important opportunities and barriers to employment creation in LCT in Africa.

### 7.2.1 Employment opportunities in energy production

Developing the infrastructure, supply chains and appliances to give households access to modern energy services, particularly in rural areas, requires an extensive local work force, for building new facilities, as well as operating and maintaining these. The International Energy Agency (IEA) estimates that in total, 2.8 million jobs can be created in Africa by 2030 to provide universal energy access, of which around 55 per cent are jobs in operations and maintenance. Providing universal access to electricity alone by 2030, may generate around 1.8 million jobs across the continent. Around 700.000 of these jobs are related to grid connections, for the construction of grid infrastructure and the refurbishment or construction of power plants; another 700.000 jobs are created for mini-grid connections and around 400.000 for the manufacturing and installation of solar home systems (Box 4) (IEA, 2022a).

Regarding the latter, the localisation of renewable energy manufacturing will be important to consider. Spacing projects out equally along different locations may allow for steadier skills demand and the creation of permanent jobs (Daniel, 2020).

**Box 4. Potential in the local production of solar system components in South Africa**

Increasing the local production of solar system components has been a key objective of the South African government. Renewable Energy IPP Procurement Programme (REIPPPP) rules focus on relatively low-value solar PV components, such as module frames, mounting structures and inverters. Local manufacturing capacities were leveraged for solar in the steel, electrical equipment and fiberglass industries and among specialised services, including legal and financial services, engineering design and others. South Africa does not have any manufacturing capacity for ingots, wafers or cells. Also, a long lull between auction bidding windows led to a stop-and-go cycle that slowed domestic manufacturing progress.

One study estimated that with an investment of about USD 4 billion by 2030 and greater localisation, more than 30.000 local solar jobs could be created under the country's 2019 Integrated Resource Plan, with its goal of 6.4 GW of solar PV capacity. Another study finds that some 35.000 jobs could be created by 2030. Creating these jobs will require

addressing barriers, including insufficient and unpredictable local demand and lack of price competitiveness with low-cost foreign producers; stronger local content requirements; and strategic cooperation between the government and industry in finance, infrastructure and trade policy.

*Source: (IRENA & ILO, 2022)*

IEA estimates that 1.3 million jobs may be created by 2030 in addition to those that result from expanded energy access. Over 60 per cent of these new jobs would be related to power generation and grids and another 20 per cent would be related to energy efficiency. Unlike jobs related to energy access, those related to the construction and installation of clean energy facilities, equipment and appliances are likely to continue growing beyond 2030 as demand for energy keeps on rising. These jobs are created in professional services, construction and manufacturing or other occupations. Most of the jobs require technologically advanced skills, calling for specialised training and education. Around 100.000 of the estimated jobs are low skilled, offering opportunities for those that lack access to education (IEA, 2022a).

Achieving universal access to clean cooking facilities and fuels is expected to create fewer jobs than access to electricity, but across a wider range of occupations. IEA estimates that 393 million Africans gain access to LPG cookstoves and 117 million to biogas digesters by 2030. This creates an estimated 350.000 jobs in the African LPG sector and 230.000 new jobs in the biogas digesters sector and chain. In total, the jobs created along the LPG supply chain are split between terminals and filling plants (approximately 30%), retailing and distribution (60%) and other cross-cutting professional positions in sales, administration and finance (10%). In countries that produce LPG, additional jobs will be created in refineries and cylinder manufacturing. Regarding the biogas digesters, around 50.000 new jobs can be in construction, cement production, manufacturing of electronic machinery and equipment and metal smelting, as well as 180.000 jobs in operating and maintaining digesters (IEA, 2022a).

Standardisation, compliance and safety of workers and companies investing in RE operations and constructions have a potential to generate new white- and blue-collar jobs. For example, in the LPG sector and its value chain, operators of terminals, storage, cylinder refilling and delivery networks, including drivers of LPG tank trucks and local installers are expected to be in great demand, although they must be well trained in following safety procedures to prevent accidents and to handle them efficiently if they do occur (IEA, 2022a).

### 7.2.2 Employment opportunities in energy usage

In relation to the notion of modernisation mentioned above, replacing the millions of kerosene lamps, candles, and flashlights used in many African countries with modern solar lighting can provide a cheaper alternative and stimulate job creation. A study found that replacing these lighting systems with modern solar lighting technologies for people living outside the grid could create 500.000 new jobs related to lighting in countries of the ECOWAS region (Energiewende Team, 2018; Mills, 2014). According to IRENA, the off-grid value chain alone, including sales, marketing, installation and services, could create at least 4.5 million jobs globally by 2030 (EEP Africa, 2019). Moreover, as domestic production capabilities of RE materials are assumed to increase, a higher share of local manufacturing jobs may be observed (Oyewo, Aghahosseini, Ram, & Breyer, 2020). The occupations with the highest number of projected jobs and that will have the largest increase in jobs are plant and machine operators and assemblers, with more than 300% increase and electricians and labourers with more than 200% (Teske, Dominish, Briggs, Mey, & Rutovitz, 2019).

Solar technicians, energy assessors, technology installers, clean electricians, retrofitters, pipefitters, plumbers and clean-energy auto manufacturing line workers are all examples of

renewable energy-related jobs for which the demand in countries could increase. According to an IRENA report on the circular carbon economy, biomass could play a major role in the decarbonisation of the industry sector, providing a sustainable alternative to fossil fuels (IRENA, 2020) thereby being an important potential employer for Africa's labour force.

#### *7.2.2.1 (Self-)employment in micro-, small- and medium-size enterprises (MSME)*

Many young African women and men see the potential associated with the development of micro-, small- and medium-size enterprises in the renewable energy sector. Particularly for African countries, entrepreneurship and self-employment are becoming priorities in youth employment strategies and policies. It should be noted however, that due to the prevalence of unemployment and underemployment, there are some entrepreneurs by vocation, but also a large number of entrepreneurs out of necessity. In view of Africa's specific business climate, micro-enterprises[14] have an important role here. Remarkable initiatives are underway throughout Africa, with dynamic companies in the distribution and installation of solar kits (see Box 3 in Chapter 4 for some examples).

Nevertheless, there is a need for more women- and youth-led initiatives that address both LCT and capacity building of youth and women who are facing challenges such as access to finance, lack of technical and digital knowledge, and lack of experience in business management among others. As a result, in the absence of strategies and tools to support entrepreneurship, a large proportion of young entrepreneurs remain in the informal economy or in the intersection of the formal and informal sectors, often outside traditional wage jobs (Vale et al. 2022).

#### *7.2.2.2 Employment due to induced jobs*

In addition to the direct and indirect jobs that will be created, attention also needs to be given to the ripple effect increased energy supply and employment creation can have. The number of induced jobs is potentially far greater than those in the energy sector itself (IEA, 2022a). There is a correlation between electricity access and the productivity, competitiveness and scaling potential of companies, which, by extension, impacts labour demand as well as entrepreneurship more generally (Sichone, Mulenga, Phiri, Kapena, & Fandamu, 2016). For instance, countries like Nigeria and South Africa are notorious for their power outages, but electricity shortages affect employment in the majority of African countries (Africa Infrastructure Knowledge Platform, 2023). The World Bank estimates that frequent power problems reduce the likelihood of an individual being employed by as much as 35-41 per cent. Conversely, increased access to electricity is associated with increased labour market participation (Tagliapietra, Occhiali, Nano, & Kalcik, 2020). The link between (reliable) electricity access and productivity is most obvious in manufacturing and industry, but it truly cuts across sectors. The broader job potential associated with renewable energies, will be spread across the economy, but also concentrated in basic manufacturing, agriculture, engineering, transport equipment, utilities, construction and their supply chains (Daniel, 2020). These are most likely the most important job creation gains for youth and women related to the LCT.

**In agriculture**, a sector dominated by youth and women, which employs most of African labour, a lack of electricity is an obstacle to the adoption of sophisticated machinery and irrigation systems and can lead to avoidable losses. Even minor investments in climate smart agriculture, agro-processing and modern organic fertilizer production could create more than three million additional jobs in rural areas (ILO, n.d.-b). For example,

[14] In general, micro-enterprises are defined as businesses with up to 10 employees, small businesses as those with 10 to 100 employees, and medium-sized enterprises as those with 100 to 250 employees. In Africa, the majority of job creation is coming from the smallest businesses (less than 19 employees) (ILO, 2015b).

decentralizing solar driers among cassava farmers has seen incomes increase by 150 per cent and reduce loss by 30 per cent. In the fishing industry, the absence of cooling installations can be limiting at best and detrimental at worst. The opportunities in the hydrogen sector can also translate into opportunities for the local green fertiliser production, which can increase food security of the local population. Nevertheless, access to energy, including off-grid electricity, remain a major challenge, particularly for the poor youth and women from rural areas due to high costs of exploitation, availability and skills needed to productively use it (Soumare et al., 2021).

**Transport** is another important sector. To increased energy demand for transportation use is currently largely met by oil, but restrictions on the sale of inefficient vehicles, new and used, should help to improve efficiency. Electric vehicles meet only a small share of growth due to high costs and limited grid reliability. However, electric two- and three-wheelers are really taking-off, especially in the large urban (informal) moto-taxi sub-sector, but also in the rural areas. Potential in upgrading public transport services with electric/green power vehicles may have important consequences for its reliability as well as the quality and size of formal direct employment (as well as in indirect employment, as reliable public transport is a mean to access jobs for a number of commuters every day).

Finally, **services** are also concerned, from healthcare and sanitation to telecoms, sustainable tourism, hospitality, and even hairdressers. With inefficient power supply, they cannot guarantee the reliability of their work consistently. In all cases, lower productivity, yields and income that result from unreliable or non-existent electric power negatively impact labour demand and entrepreneurship, providing a promising avenue for low carbon transition.

### 7.2.3 In the light of the 4th Industrial Revolution

An important factor affecting employment in LCT is the increased digitalisation as part of the Fourth Industrial revolution. National industrial plans increasingly focus on industrial processes for improved use of critical minerals, as well as development of clean energy technology supply chains and manufacturing. Among other technologies, we can distinguish green hydrogen, storage, e-mobility, digitalization of transmission and distribution grids (RES4AFRICA Foundation, 2023). These technologies show potential to create jobs in the future of work, with storage technologies and green hydrogen production being particularly important.

Batteries are crucial for broadening access to clean energy, particularly for off-grid communities. In Africa, the battery market is forecast to grow sevenfold by 2030, creating a possible avenue for local manufacturing and job creation (although high level expertise may be needed). However, most of the technological know-how is currently concentrated in the Global North and Asia, which will create an important barrier for the local entrepreneurs to independently enter the market. Therefore, it is likely that jobs in this sector, at least in short-term will be concentrated in the sales and services departments. It is crucial to ensure opportunities related to the storage technologies do not come at the expense of the most vulnerable communities. Ambitious goals for battery recuperation, recycling and repurposing must be set, creating additional opportunities in the circular economy value chains potentially for low-skilled (informal) workers (Anglivie et al., 2021).

Often overshadowed by solar and wind, green hydrogen is increasingly crucial for a sustainable global future. Green hydrogen is generated via electrolysis, which splits water into hydrogen and oxygen using electricity. But for the hydrogen to be ‘green’, the electricity must come from renewable sources, like wind or solar power. With an abundance of sunlight and wind, Africa is ideally positioned to exploit green hydrogen’s potential. Ground breaking projects are taking shape across the continent. The Africa Green Hydrogen Alliance (AGHA), established in 2022, emphasizes Africa’s competitive edge due to low production

costs. Egypt, Kenya, Mauritania, Morocco, Namibia and South Africa are making significant strides in the green hydrogen sector. For instance, new Namibian hydrogen project is estimated to generate 15.000 jobs during the direct construction of the project, and a further 3.000 created permanently when the project is fully underway. An analysis by McKinsey on behalf of AGHA identified a possible increase in GDP for member countries of between $66 billion and $126 billion by 2050, as well as up to 4.2 million new jobs as a result of green hydrogen investments (Panchia, 2023).

Many ancillary services generating new jobs are mentioned in the national hydrogen development roadmaps that could realise job creation targets. They vary from the manufacturing of electrolysers and other necessary equipment, and the construction of green hydrogen production facilities, which require renewable-energy sources, to distribution networks and transport and logistics (Hancock, 2023). Despite the optimism, it should be mentioned that producing hydrogen and hydrogen-based fuels brings high cost and low energy efficiency. Moreover, most of the hydrogen will be produced for export to Europe and beyond. Thus, the question arises whether its production would not be coming at the expense of expanding local access to renewable energy to meet socio-economic needs, to enable clean industrial development, and to meet domestic climate targets within the context of the Paris Agreement (Corporate Europe Observatory, 2022; Panchia, 2023). As most of this development is led by the international private sector, African governments must play a critical role to assure that the development of this sector is done on their own terms, benefitting national economies and generating decent jobs for youth and women.

Considering that the opportunities related to job creation in light of the 4IR are still in a very early stage, evidence is lacking on their actual impacts and potential.

### 7.2.4 Women at work

Despite a number of challenges (see chapter 6), a positive development has been noted that even in sectors where women are not well-represented, they are finding niches, often as small women-led businesses in indirect jobs in green construction, renovations or energy efficiency. Nelson and Kuriakose (2017) note that women are accessing some opportunities in the “construction, operation, or maintenance of large-scale renewable energy utilities in energy generation, transmission, or distribution”.

Jobs in energy-related industries are also attracting women, “such as the construction of large-scale renewable energy infrastructure, and services such as restaurants, catering for workers, health and social services, and temporary housing” (Nelson & Kuriakose, 2017). Overall, the majority of job opportunities in the energy transition are projected to be within the male-dominated manufacturing, construction and energy sectors, and women’s strategic access to skills development will be critical for accessing such opportunities (Grantham, 2022).

Furthermore, Bell et al (2020) also highlight the opportunity to increase the value of “pink-collar” jobs historically dominated by women, such as care for children and the elderly, teaching and caring for polluted ecosystems. They argue that these jobs are low-carbon jobs and putting them on a higher pedestal within the new economy will ensure that marginalized people within current unsustainable energy systems are strongly valued (Bell et al., 2020).

Still, there are examples of changing social norms through the engagement of young women in transitions. In a study of the gendered access, distribution and uptake of solar energy across two rural counties in Kenya, community leaders expressed some disbelief in the ability of women to become solar engineers. However, the women who were eventually trained to provide technical services for energy supply management and led the energy centere quickly became role models for girls and shifted the community’s perspective on the “acceptable” jobs for women in the energy sector (Winther, Ulsrud, & Saini, 2018). Several

initiatives already aim to increase female empowerment through energy access programmes in Africa (See Box 5) but more efforts are needed to tip the scale.

**Box 5. Examples of initiatives that aim to increase female empowerment through energy access programmes in Africa**

A number of initiatives provide networking, training in technical skills and apprenticeship opportunities to encourage women to build careers in the energy sector. For example, The Clean Energy Ministerial, ENERGIA, ECOWAS Policy for Gender Mainstreaming in Energy, the Global Alliance for Clean Cookstoves, Power Africa's Women in Rwandan Energy, and SEforAll and Enel Foundation's Open Africa Power programme.

In addition, a growing number of companies are recruiting, training and supporting female entrepreneurs and workers in the clean energy sector. Jaza Energy, a Tanzanian company, trains and hires all-female local teams to operate a distributed network of solar powered battery charging stations. Around 40 per cent of the sales agents employed by WID Energy in Zambia, which distributes solar home systems, are women. These companies also achieve a larger reach by having female sales agents and staff, who are often better at convincing households and communities to adopt clean energy solutions and teaching how to operate and maintain solar home systems.

*Source: (IEA, 2022a)*

## 7.3 Job creation in LCT: main challenges

### 7.3.1 A lack of access to electricity

Electrification plays a crucial role in creating opportunities for income-generating activities. Without electricity contributing to job creation and rising incomes, the overwhelming majority of the population cannot afford meaningful usage with their current level of income, closing the vicious circle of poverty. The grid expansion needs to go hand in hand with training, job creation and income generation in the transmission sub-sector and beyond. Off-grid systems would provide an opportunity for many African countries to leapfrog energy supply development, particularly in rural areas. However, despite a number of more flexible, pay-as-you-go solutions that are available, a large share of the population still cannot afford to connect or use a reasonable amount of electricity, let alone purchase appliances that can help generate income (Blimpo & Cosgrove-Davies, 2019).

### 7.3.2 A lack and mismatch of skills

Global energy sector demands more high-skilled workers than other industries. Therefore, skills mismatch on the energy sector labour market is one of the major challenge for creating more and better employment for the youth and women in Africa (IRENA; The European Commission; and ILO, 2018). Some skills gaps already exist for technical and engineering positions and could grow as the renewable energy sector continues to expand. For instance, skills necessary to benefit from the 4IR and new technologies are currently missing (Howard, 2023). Re- and up-skilling (especially for the communities affected by the transition, like coal miners) is equally important but lacking, particularly in 'LCT transition regions' where the economy is dependent on coal, oil or gas. Skills gaps could lead to project delays or even cancellations, cost overruns, and faulty installations. Efforts are needed in education and training systems to develop renewable energy curricula, integrate green modules into vocational training courses, support apprenticeships, and establish common quality

standards. Nonetheless, there are promising experiences. For example, Cape Verde launched a Renewable Energy and Industrial Maintenance Centre, whose main activity is the training of professionals in the areas of design, assembly, and maintenance of PV installations.

Various intervention models and programs to promote job creation in clean energies have shown a clear advantage of combining technical and vocational training (TVET) with entrepreneurship training. However, systems for identifying, integrating and implementing new green competencies in TVET in Africa are still weak. Only 20 per cent of African TVET institutions regularly conducts national skills forecasts and these forecasts rarely pay explicit attention to the new skills required in a low carbon economy (Regt & Gianchandani, 2020). A 2015 study examining the status of low carbon economy skills and technologies on offer in TVET institutions in Kenya found that the majority of TVET courses do not integrate such technologies in their training and that practical training through project work was missing. It also noted low skill levels among instructors linked to low levels of funding and support, including insufficient staff training on renewable energy skills and low carbon technologies (Jahonga, Ngore, & Muramba, 2015).

At the same time, the accessibility of education and skills training opportunities in technical and engineering fields is highly unevenly distributed across Sub-Saharan Africa. Countries like South Africa, possess a strong infrastructure for technical education and skills development, but similar opportunities are more limited in other African countries. Kenya, for example, has had to attract skilled migrant labour to develop the national wind energy sector and relies on importing clean technology products, such as solar panels. Hence, there is a great need for investing in inclusive TVET institutions that can equip African youth with the skills for the future of work. Some private initiatives, such as Solar Sister in Nigeria (See Box 6), provide a promising solution led by female entrepreneurs, however more similar initiatives are necessary to close the gap.

**Box 6. Solar Sister – an example of women-led capacity building initiatives in LCT in Africa**

Solar Sister is a training and job creation initiative working across Sub-Saharan Africa to empower women entrepreneurs within the solar sector. Since 2009, Solar Sister has trained nearly 7.000 female entrepreneurs, focusing mainly on women in rural areas with low-income households who lack access to grid power, to sell portable solar lanterns, solar home systems, clean cookstoves, radios and fans among other solar-powered products. These women receive holistic business and technical training, marketing support and ongoing support to build sales, earn a commission and re-invest in their business. Solar Sister entrepreneurs are projected to mitigate more than 10 million tonnes of CO2 emissions over ten years, while replacing the usage of 660 million litres of kerosene.

*Source: (Solar Sister, n.d.)*

### 7.3.3 The extractive sector

The extractive industries are among the traditional pillars of the African economy, although the number of direct jobs created by the mining sector is minimal, ranging from 1 per cent and 4 per cent, at most. The mining sector creates more indirect employment through the linkages between the sector and other industries, but these indirect jobs are difficult to measure (Signé & Johnson, 2021). The sector also had a reputation regarding serious labour- and human rights violations. Nations across Africa have launched an array of policy initiatives to improve the situation in the sector. For instance, requirements for mining companies to provide local employment and development support, as well as measures to bring artisanal and small-scale mining under formal regulation. But so far, the

sector is highly productive in terms of revenue, but employs relatively few people, limiting their economic contribution.

Increased automation associated with new technologies threatens jobs in this sector and predictions related to LCT indicate that the oil and coal sectors are expected to have the highest job losses (ILO, 2018). A decrease in employment in extractives would lead to the closing of (some) of the coal mines and annexed villages as well as the supportive industries. Not all people will be able to transition to the jobs in other mines or sectors, as these jobs are not necessarily created in the same place where the jobs are lost. Therefore, it is imperative to focus on providing re- and up-skilling programmes and alternative employment for affected workers, that ensures that traditionally mining-oriented communities have a place in a new green economy. Yet, the evidence on how to do it so far is very thin with pilot initiatives currently underway.

The development of and investment in clean energy sectors can help absorb workers who have lost their jobs through a process of transition. This is relevant for both the energy and technological transition. Options include smart grid, battery- and electric vehicle technology (COBENEFITS, 2019). For instance, in Mali, some of the promising economic sectors include renewable energy, agriculture, waste management, construction, forestry and carbon finance.

On the other hand, there will be an increase in other forms of mining. The low carbon transition is likely to create demand for 3 million tons of minerals and metals needed to deploy solar, wind, and geothermal energy by 2050 (Cust & Zeufack, 2023). Many of these minerals are found in abundance across Africa. Countries such as the Democratic Republic of Congo, South Africa, and Zambia are already key players in the low carbon transition, being major producers of cobalt, copper, and platinum. For such countries that are rich in metals and minerals, the long-term prospects may be better than for the fossil fuel producers (ILO, 2018). The mining jobs are often performed by the younger population, thereby offering an important growth market for youth employment. Private sector stakeholders who operate for profit will always try to influence energy policy to be developed according to their needs. A strong support of national policies will be necessary to assure that these jobs will be decent and benefit local communities. As evidence suggest, such approaches to policy development even in the renewable energy projects at scale, come at the expense of workers and communities[15] (Kazimierczuk, 2020; Lomax, Mirumachi, & Hautsch, 2023).

### 7.3.4 Newly created (non) decent jobs

There is an important question about the quality and the sustainability of the jobs created in the process of moving towards a low-carbon transition, which is often due to the informal and temporary nature of the jobs created. Jobs growth markets such as construction and circular economy are rarely decent, as it typically provides work only for a limited time, does not provide living wage, leading to a roller coaster of job creation and loss. Construction also has limited cross-linkages to other sectors of the economy and often disturbs local communities dynamics,[16] leading at times to conflict and general social, economic and cultural disruption (ILO, 2023; IRENA & ILO, 2022).

There is also a need to make sure jobs created in clean energy-related sectors, particularly in minerals production, are decent. The expected growth in demand for critical minerals holds the potential to lift some of Africa's most marginalised communities out of poverty. However, miners face bigger occupational health and safety risks compared to most other

[15] See for instance the discussion about the Lake Turkana Wind Power Project in Kenya (Kazimierczuk, 2020).

[16] See for instance (Kazimierczuk, 2020) for the description of the local dynamics of constriction jobs distribution during the development of the Lake Turkana Wind Power Project in Kenya – one of the biggest wind farms in Africa.

professions, especially in small-scale mining operations, where regulatory standards are weak and health care or compensation in the event of an accident are often non-existent. Human rights violations, child labour and poor environmental, social and corporate governance are also frequent in this sector. Efforts by policy makers, traders and mining companies to formalise small-scale mining may help to improve health and safety. In the longer-term, increased mechanisation and digitalisation of mining including the increased use of sensors and big data means that some low skilled jobs may be replaced by skilled jobs in remote urban offices (IEA, 2022a). Well-designed local reskilling plans will be necessary.

# 8 Towards a just and inclusive low carbon transition in Africa

Based on a synthesis of existing research, the paper highlights a number of knowledge gaps in the literature on LCT and provides a starting point for further exploration and research. This report is also a call to action as the transition process remains at its initial stage. Youth today continue facing the same challenges and barriers on the labour market in the context of LCT as in other sectors. Many of which have existed for generations. It is high time to actively address the disparities and hurdles that hinder their progress. It is the responsibility of (national) policies and strategies, as well as the global community all together to propose a mechanism that will assure that the transition process does not repeat the same patterns of exclusion as in the high carbon economy. To support further research in that direction, this report conceptualizes a just, inclusive, youth-centred and gender responsive LCT in Africa, as well as identify important knowledge gaps for further research. Together, this report will provide a base for developing a research agenda on the theme of youth employment and low carbon transition for the IDRC's Sustainable Inclusive Economies (SIE) division.

## 8.1 An Africa-specific definition of just low carbon transition

Much theorising and assessment of just LCT transitions has been focused on high-income countries in the Global North which are predominantly geared towards changes in power production, redesigning grids and increased efficiency of consumption towards net-zero pathways. As this paper has shown, this conceptualisation of LCT is not fit for purpose in Africa as it has a radically different energy landscape and social and political context. In addition, considering that Africa is a vast and highly divers continent, a one-size-fits-all approach for LCT in Africa simply won't work. Low-carbon transition in Africa should therefore promote the development of just transition pathways that are grounded in contextual-realities and are based on different structures within industries, workforce composition, social and dynamic political economy factors (Lenhardt, 2020). Importantly, considering the loosely defined state of carbon neutrality on the African continent, as well as current energy supply and demand landscape, a just LCT will have to focus on the cleanest electricity generation possible, the sustainable use of biomass and providing equitable access to clean energy (Lenhardt, 2020) without adding to energy poverty.[17] In this regard, a phased approach will be needed to balance the goals of reducing emissions and a more sustainable energy mix, while at the same time increasing access to electricity, especially for marginalised and rural communities.

[17] For example, people in urban areas can transition to a low carbon economy more easily as they already largely rely on modern (informal) energy including electricity and gas, however, with rapid urbanisation on the horizon, provisions have to be made to ensure that pressure on the grid is relieved and access to energy preserved (Silver & Marvin, 2018).

One of the main premises of a just transition to low-carbon economies is that it can provide direct, indirect and induced employment opportunities for Africa's youth. However, the available evidence about the energy job market does not pay enough attention yet to diversity impacts according to different social groups and thereby fails to make the analysis of the opportunities and barriers for youth employment more context specific. What is known however, is that youth, and women in particular, will have to overcome a number of challenges to benefit from a LCT transition, which are by and large the same systemic barriers typical for employment in other sectors of the African labour market. The major difference in the context of the low carbon transition is the fact that there is still time to take a proactive approach in identifying and confronting these obstacles which can result in a much more context-specific and inclusive LCT (Nsafon et al., 2023). The conceptualisation of a just LCT must therefore focus on securing workers' rights, provide social protection for affected workers and communities, remove barriers to integrating fossil fuel workers into clean energy sectors, and to build the necessary workforce capacity to deliver clean energy goals (Otlhogile & Shirley, 2023). This also means ensuring that marginalized groups and vulnerable individuals are not negatively impacted by the transition and that their needs and perspectives are taken into account in the planning and implementation of clean energy projects. Therefore, in order to achieve inclusive and equitable low-carbon development pathway, climate change and socio-economic development challenges should be addressed simultaneously.

The timing of the transition provides an opportunity to renew and push for an African vision of LCT. Building on existing plans, such as SDGs and Agenda 2063, African scholars calls for "genuine people-centred development, framed in terms of African values and cultures, focused on meeting the needs of every African, and centred on social justice, feminist values, and meaningful progress" (Sokona et al., 2023: 6). This process can be complemented by a more assertive international role, including (equal) South-South collaboration and self-reliance, more robust engagement in geopolitics, and systematic reform of the international architecture to address African and global challenges (Sokona et al., 2023). In this regard it will be crucial that the conceptualisation of a just LCT in Africa, is rooted in Africa's contextual realities, addressing systemic barriers and responsive to its tremendous potential. Finally, a just transition is more than a transition from unsustainable energy supply resources to sustainable ones. It should be a transition from an unsustainable and exclusive to an inclusive and just economy that provides sustainable livelihoods for all.

Based on the insights resulting from the evidence synthesis here presented, this paper puts forward the following definition as a starting point for discussions and research on just LCT in Africa:

> *"A just low-carbon transition in Africa provides pathways for scaling up clean energy supply and creating decent employment opportunities, while at the same time, improving access to affordable and reliable electricity and ensuring that no-one is left behind in the process. Recognising the diversity of contextual realities, (systemic and infrastructural) barriers and drivers of LCT, programmes and policies focussing on LCT in Africa have to consider the unique technical, social, economic, and political contexts as well as national needs for development. For Africa's young men and women, a just transition requires investing in skills, gender equality and meaningful engagement in decision-making processes to ensure they are not only ready to embrace current employment opportunities, but can also shape the future of work in the low-carbon economy."*

## 8.2 Key knowledge gaps

As this paper has highlighted, there is no single formula for Africa's Just Transition. Transformation to low-carbon economies requires multiple groups of actors across government, business and civil society and that each sector will have proponents and opponents to the change (Lenhardt, 2020). However, in order to steer the boat in the direction of a just low carbon transition in Africa, assuring that decent jobs for youth and women are created in an inclusive process, more context specific research is needed. Based on the scoping evidence for this review, the following knowledge gaps have been identified and clustered around the key justice elements of a low carbon transition journey in Africa.

**Distributive justice**

- Growth in Africa has been uneven, with different nations taking different social, economic and political pathways towards a low carbon transition with certain regions of the continent receiving less attention in the literature than others. Documenting LCT processes in different African countries, especially in the less studied countries, would provide important insights into specific policies and programmes and what work in different contexts.
- Literature on low carbon transitions are predominantly focused on techno-economic and clean energy dimensions, thereby consistently overlooking social and special dimensions of LCT that influence the uptake of technology and access to electricity on the continent.
- There is also a lack of insights on the business potential and energy infrastructure. Some recognition exists that the concept of technology maturity has to be expanded to capture the specific local conditions that affect technology diffusion.
- The decision-making about the use of all sort of available (formal and informal) solutions to meet people's energy needs is insufficiently understood.

**Procedural and recognition justice**

<u>Political economy</u>

- Research into the political economy processes behind the transition is rare. While the role of actors in an energy system is acknowledged, it is done so only in general, giving us little insight into knowledge acquisition and transfer, or networks of social capital.
- Policy perspectives are addressed, but these tend to regard the state as an autonomous actor. Governance systems where policies evolve through competing interests are largely ignored.
- Evidence on the role, impact and political economy of the formal and informal private sector actors in the LCT process is thin.

<u>Meaningful engagement of youth and women</u>

- Quantitative approaches, especially energy models, dominate the research, with topics focusing on resources, potential energy demands, and production of energy using RE technologies. The social processes that looks at the underlying dynamics of inclusion and exclusion of youth and women so critical to a sustainable energy transition are under researched.
- Established concepts are often informed by the discussions in the Global North and are inadequate to meet the challenge of low carbon pathway of Africa. A need for more evidence of an Africa context-specific LCT is needed.
- There is lack of information about the effectiveness and impact of ongoing numerous consultations with youth in the LCT policy process.

**Decent job creation**

- Determining the employment effects of the energy transition at a national, regional and continental level, particularly looking into induced effects, are hardly mentioned in the literature.
- The research into quality and decency of the jobs in the energy sector (especially in the informal and off-grid sub-sector) is largely missing. So is the research into jobs that are transitioning from the informal to formal sector as a result of increased (renewable) energy supply. In general, the informal sector, that drives by and large the realities of Africa's economies, is often ignored in discussions on LCT.
- 'Blurred lines' between formal and informal jobs in the energy sector are increasingly noticed by the researchers, yet the evidence looking into these dynamics and constructions of young people's livelihoods is largely missing.
- Considering that the opportunities related to job creation in light of the 4IR are still in a very early stage, evidence is lacking on their actual impacts and potential in terms of inclusive development.
- In addition to the direct and indirect jobs that will be created by LCT, attention also needs to be given to the ripple effect employment creation can have in forms of the socio-economic impact of LCT induced jobs.
- Considering the discussed complexities in the African energy sector, the available general ILO framework for decent jobs may need to be complemented with additional indicators in order to develop a specific methodology to measure decency or inclusiveness of jobs in LCT.
- So far, no African country provides a clear best practice example for sustainably achieving the job transition from the fossil fuel affected regions. Hence, there are limited opportunities to assess successes and failures from such processes.
- There is a lack of research on unintended consequences of LCT, especially impacting youth and women.

To address the above-mentioned knowledge gaps and contextualise the different dimensions of a just low-carbon transition, an inclusive research agenda that takes a youth and gender focus is needed to learn more about low carbon transition pathways in the Global South. This evidence synthesis paper, combined with case studies of Nigeria and South Africa will as such contribute to the development of such a research agenda on the theme of youth employment and low carbon transition for the IDRC's Sustainable Inclusive Economies (SIE) division.

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## Annex 1. Policy frames of Just LCT in Africa

### Continental policy frameworks

**AU Africa 2063: the continental blueprint**

The African Union Agenda 2063 has become a focal point for driving the continent towards the realisation of the Sustainable Development Goals (Royo, Diep, Mulligan, Mukanga, & Parikh, 2022). Adopted in 2013, this continental agenda is made up of 20 goals clustered into 7 aspirations. The AU's vision document: Agenda 2063: The Africa We Want' emphasizes the need to build "environmentally sustainable and climate resilient economies and communities that provide access to clean and affordable energy as the backbone of economic transformation". Despite this commitment, neither in the aspirations or transformational outcomes are specific goals defined for a transition to renewable energy, but efforts are underway to develop a Continental Energy Transmission Masterplan, with is aimed to enable coordinated generation and distribution of power in Africa.

In the Agenda's first 10-year masterplan and the continental progress report, there are a number of initiatives highlighted that are aimed addressing the climate crisis in Africa. A case in point is the Grand Inga dam, which is presented as the cornerstone of the AU commitment to "transform Africa from traditional to modern sources of energy and ensure access of all Africans to clean and affordable electricity" (African Union, 2020). The massive dam, which is in construction along the Congo River is meant to serve as a power grid across Africa that will spur the continent's industrial economic development. See Box 7 for more information. Despite its great hydropower potential, critics warn that the increased energy production might however not actually benefit the African population as corporate mining interests are outsourced internationally, making the project 'flawed economically, socially and environmentally' (Warner, Jomantas, Jones, Ansari, & De Vries, 2019). In addition, instead of bringing economic activity and employment to the region, the construction of the dam is displacing local communities, creating a loss in livelihoods for agriculture and riverine-dependent communities. The project also threatens an increase in greenhouse gas emissions; a loss of biodiversity; and deforestation and the lack of an environmental impact assessment or mitigation and environmental management plan make it unsure what the environmental and social impact actually is (Africa Business Communities, 2023).

**Box 7: The Grand Inga Dam Hydro Power project**

The Grand Inga Dam, located in western Democratic Republic of Congo (DRC) on the Congo River, is the world's largest proposed hydropower scheme. Grand Inga could produce up to 40,000 megawatts of electricity, over twice the power generation capacity of the Three Gorges in China, and more than a third of the total electricity produced in Africa. The Grand Inga dam will be constructed in 6 phases. Inga I (351 MW) and Inga II (1,424 MW) were commissioned in 1972 and 1982 respectively. Inga III is currently in the design phase, with the ultimate design and size being a subject of significant debate. The project has been estimated to cost US $80 billion, including cost of the transmission needed to carry its power across Africa and potentially to Europe. The main objective of the Inga Dam project is to support current regional power pools and their combined service to provide universal access to clean and affordable electricity in Africa.

*Source: (Warner et al., 2019)*

**The Africa Energy Transition Catalyst Programme**

In 2023, the African Development Bank launched the Africa Energy Transition Catalyst Programme (AETC), which aims to increase renewable energy generation in Africa by

facilitating the large-scale integration of renewable energy generation, thus increasing its share of the energy mix on the continent. The focus of the $7.88 million programme is decidedly on facilitating a 'Just Energy transition (JET) for Africa, defined as 'a low-carbon transition that is fair, inclusive, creates decent work opportunities and leaves no one behind' (AfDB, 2023). AETC works on national and regional levels and has a two-phased approach that focuses first on catalyzing private sector investments in early-stage RE markets to stimulate a transition to more inclusive and green growth model and secondly, on developing an Africa's Energy Transition Framework and Roadmap for African Union (AU) member states, with concrete milestones toward achieving decarbonization and investment in Africa.

The programme is in line with the Bank's Ten-Year Strategy, particularly the Light Up and Power Africa, Integrate Africa and Improve the Quality of Life for the People of Africa, the Bank's New Deal of Energy for Africa (NDEA) as well the Bank's 3rd Climate Change Action Plan. One of the main objectives of AETC is to create green jobs for youth, address skill shortages while promoting economic and social development.

**The African Continental Free Trade Area (AfCFTA)**

Established in 2018 and officially coming to effect in 2021, the African Continental Free Trade Area (AfCFTA), is a pact to form the world's largest free trade area by creating a single market for goods and services across Africa and deepening the economic integration of the continent. The AfCFTA aims to reduce tariffs among members and covers policy areas such as trade facilitation and services, as well as regulatory measures such as sanitary standards and technical barriers to trade. While the agreement itself makes minimal references to the environment, the pact does offer opportunities to leverage opportunities to promote green growth in Africa by strengthening renewable energy infrastructure, green industrial value chains and promoting a climate resilient developmental approach (Ismail, 2023).

A key starting point to exploring this potential is to realize is that trade agreements can have both positive and negative impacts on the environment. On the one hand, enhancing trade and economic growth tends to accelerate climate change by increasing emissions related to transportation and deforestation. Trade agreements also restrict the types of subsidies countries can provide, thereby for example limiting the options for subsidizing renewable energy. On the other hand, trade agreements can advance environmental objectives by creating new markets, and creating economies of scale and share know-how, thereby promoting economic efficiency and innovation in support of environmental outcomes. The eventual environmental impact of the AfCFTA is therefore still in the making and, in part dependent, on the specific provisions set out in the agreement (Van der Ven & Signé, 2021).

To ensure a positive environmental impact and facilitate a just, low carbon transition it is therefore crucial to facilitate negotiations between the member states on how to minimize negative externalities and invest in greening economies. In addition, it is important to align the agreement with initiatives like the EU Green Deal (see next section) and other African environmental sustainability initiatives like the Great Green Wall in ways that are responsive to local needs and fosters greater local ownership (Manduna & Fundira, 2022). In this way, the AfCFTA can serve as an entry point for working with African policymakers and the private sector to enhance green value chains, climate adapted agriculture, green manufacturing and services in energy and transportation and other sectors that are pivotal to Africa's green transition and decarbonization. A focus on a transfer of technology and knowledge in partnership with African businesses will be crucial to help achieve these objectives. Doing so could create the space for Africa's youth to drive this transition through integration in local value chains and the uptake of green jobs. Although the AfCTFA is still new, there is evidence that a shift to green growth strategies, including sustainable utilization of Africa's vast bio-diversity resources, can have a positive impact on employment (United Nations Development Programme, 2020).

## The Africa-EU Energy Partnership and the European Green Deal

Energy has been a formal priority for the AU-EU partnership since the launch of the Joint Africa-EU strategy (JAES) in 2007 (AU and EU, 2007), which also established the Africa-EU Energy Partnership (AEEP) to foster greater access to affordable and sustainable energy services in Africa. This partnership was supported by creating the Africa-Europe Alliance for Sustainable Investment and Jobs in 2018 to promote African employment and sustainable development aiming to create 10 million jobs in five years, boosting investment and promote sustainable development in Africa.

In the past years, climate action became a more central area of focus of the partnership and has increasingly moved the EU-Africa energy discourse from 'energy security and access' to 'sustainable and clean energy' (Medinilla et al., 2022). With the European Green Deal (EGD) the European Commission proposed an ambitious vision to transform the EU into a carbon-neutral continent by 2050 and promote a green economic transition (EU Commission, 2019). In this respect, the AEEP is seen by Europe as more than a way to reduce greenhouse gas emissions at home, it is a critical ingredient to a global low-carbon transition and a key market opportunity for European businesses. As such, the EU has a dual interest in Africa's energy transition; it hopes to see Africa leapfrog past a carbon-fueled development trajectory, but it is also looking to market its renewable energy technology abroad.

The interconnectedness of the EU and Africa in LCT and the potential of 'leapfrogging' carbon-intensive industrial development has been the central tenet of the European Green Deal narrative which is increasingly taking root in Africa's continental and national policy discussions, exemplified by Nigeria's recent net-zero commitments. This new narrative of African renewables as an opportunity rather than a development challenge comes back in the EU's rhetoric on infrastructure investment. In December 2021, the European Commission launched the Global Gateway strategy to mobilize €300 billion in investment for lasting global recovery. Approximately 50 per cent of that investment is committed to partnerships on expediting energy transitions and infrastructure development in Africa, particularly renewable energy generation and biodiversity protection (Cohen, 2022).

The implications of the EGD on African economies are expected to be multifaceted. As Africa's largest trade partner, reduced European demand for fossil fuels could depress global commodity prices, reduce the revenues of oil-dependent African countries, and disrupt their economies. At the same time, Europe's focus on renewable energy could benefit African countries that have important "green" minerals, like cobalt and nickel and spur the transition to green hydrogen (Usman et al., 2021). The EU-Africa partnership can as such help pave the way towards green technology manufacturing and assembly thereby providing new green job opportunities for Africa's youth. Investing in new green industrial hubs around battery-electric vehicles, manufacturing of solar and decentralised solutions, but also emerging technologies like green hydrogen and low-carbon heavy industry can be essential building blocks for an interconnected green economy (Medinilla et al., 2022), although it remains to be seen to what extent these employment opportunities are actually created on the continent.

## South – South cooperation: the Chinese Belt and Road Initiative

Following its launch in 2013, the Chinese Belt and Road Initiative (BRI) was hailed as an alternative to the Western international development model. For many African countries, the BRI not only offered an opportunity to quickly fill in critical and long-standing infrastructure gaps, its non-interference and equal partnership narrative was also seen as a welcome break from Western practice (ECDPM, 2022).

China is the biggest renewable energy market globally. It dominates the manufacturing and critical raw materials value chains for both photovoltaic (PV) and battery storage, and will

likely increasingly seek to leverage this overseas (Medinilla et al., 2022). Although a large share of China's investment in African countries has traditionally been in extractive industries and construction, investment in manufacturing of green technology has clearly increased in recent years and there is evidence that the advancement of Chinese industrial interests is increasingly central to China-Africa relations (Power et al., 2016). Since the COVID-pandemic, there has been a sharp decrease in BRI finance- from $11 billion in 2017 to $3.3 billion in 2020, although this drop is much less pronounced in the renewable energy sector, with hydropower, solar and wind accounting for 57 per cent of Chinese energy investments in 2020, compared to 38 per cent in 2019 (Nedopil, 2021).

Chinese energy finance has gone hand-in-hand with a growing presence of Chinese contractors in Africa's electricity sector. An estimated 30 per cent of the installed capacity in Sub-Saharan Africa between 2010 and 2015 was constructed by Chinese contractors (IEA 2016). A common criticism is that this strategy leads to missed job opportunities and skills transfer for Africa's local workforce, however, recent research shows that there is no notable difference in local employment between Chinese and other foreign companies in the construction and manufacturing sector, nor a significant difference in employment conditions and training (Oya & Schaeffer 2019; Development Reimagined 2020). Instead, local policies and labour market dynamics appear to play a much more significant role than the origin of the companies in question.

Chinese investments have also long been criticised for applying insufficient environmental and social standards, to which China has responded that it abides by host country jurisdictions and regulatory systems. This may change however as in 2021, the Chinese government issued the 'Green development guidance for foreign investment and cooperation', which explicitly calls for Chinese enterprises to adhere to "international green rules and standards". The guidelines also call for prioritising "clean and green renewable energy projects" in the energy sector (Nedopil, 2021). While the full implications of these guidelines will depend on their effective application, these developments signal a clear ambition of China to do more than lead on clean energy from the back (Medinilla et al., 2022).

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