Beating the Climate Change Odds –
Can Africa lead the Resource Efficiency Marathon?"

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Time is ticking away as countries are getting ready to assess progress towards the Paris Agreement, and, thus, foster greater international co-operation. Whilst there are staple barriers related to the common but differentiated responsibilities, equity and intractable financial obstacles, the global stock take, stipulated in Article 14 of the Paris Agreement, should enable spaces for greater dialogue and transparency aimed at achieving long term goals. The objective is to enhance climate action and to see new opportunities and pathways emerge through practice.[1]

The Global Stock take will also recognize the adaptation commitments of developing countries and will measure matters regarding adequacy and effectiveness of adaptation action. Although documenting the effectiveness of adaptation at a large scale is not without its problems, what is certain, is that many African countries have designed ambitious Nationally Determined Contributions (NDCs).

Indeed, there are hopeful new signs that Africa is taking climate action with greater commitment in line with a continental resolve to work towards the achievement of the ambitions of the Paris Agreement. Africa is the only region that boasts a body that acts at the level of Heads of State to enable African governments to give more strategic direction to climate change matters – this is the Conference of African Heads of States on Climate Change (CAHOSCC). Africa has adopted adaptation as its principal response option given that the carbon footprint of the continent is relatively marginal - less than 4 per cent. Nonetheless, the latest report of the Intergovernmental on Climate Change (IPCC) – the Special Report on Climate and Land - warns that the temperature over land is rising at almost twice the global average rate, impacting on human and natural ecosystems, and further mentions that in 2015, about 500 million people lived in areas undergoing desertification – an increase of circa 300 per cent since 1961. Arid lands in Africa are included in this count. [2]

Indeed, over the years, land degradation has taken its toll on two important livelihood sectors in Africa – agriculture and forestry. Drought and desertification, soil erosion and nutrient depletion have all contributed to a considerable reduction in agricultural yields which have led to a reduction in GDP of several countries on the continent. Biophysical pressure on land accompanied by increased degradation has resulted in dysfunctional food systems and this is often perceived as a driver for climate induced migration. It is estimated that two thirds of African lands are already degraded leaving close to 65 per cent of the African population affected.[3] IPCC asserts that a

[1] Pathak, Swapna "Equity in the Global Stock take" in The Implementation of The Paris Agreement on Climate Change edited by Vesselin Popovski Taylor and Francis Group, 2018.
[2] https://www.ipcc.ch/site/assets/uploads/2019/08/4.-SPM_Approved_Microsite_FINAL.pdf
[3] https://www.wri.org/blog/2016/04/restoring-africas-degraded-lands-improving-farmers-rights

coordinated set of responses at all levels drawing on both adaptation and mitigation is required given the magnitude of the problem.

Today, several African countries are demonstrating their willingness to ratchet up ambition levels, and this is self-evident in the revised NDCs – many of which are advocating for more significant climate action. The paper seeks to understand the changing realities of managing climate change in Africa. First, it discusses the several challenges that African countries have to contend with in managing climate change impacts. Second, it poses several mega trends that are superimposed on structurally related ones, for example urbanization and conflict. Third, it looks at green industrialization as a possible pathway to managing Africa's industrialization ambitions and as a resource efficiency opportunity. Fourth, the paper argues that there are emerging challenges, such as stranded assets, that may disable Africa's prospects for implementing sustainable development, for example, if resource rents are targeted for funding strategic goals linked to education and health. The paper supports the premise that Africa, as a latecomer to the technological advancement can take the lead in several natural resource development areas.

Africa is still in the front line of climate impacts

If enhanced ambition is being talked about in climate conferences and in the lead up to COP 25 ahead of the stock-take, there is new momentum to the climate debate, revved up by a youth movement in the interest of intergenerational equity. Expressed through the prism of climate justice and a strong responsibility to call on the current generation not to mortgage the future of younger citizens of tomorrow, Sweden's Greta Thunberg is creating strong waves as she warns against climate complacency.[4] This relentless call to action is echoed by the recent Intergovernmental Panel on Climate Change (IPCC) special reports on 1.5 degrees Celsius warming and the recent climate and land reports, highlighting the fact that the window of opportunity for reducing greenhouse gas emissions is rapidly closing. Both reports mention the urgency of tackling rising emissions and point to Africa as a continent under siege given the greater exposure it faces due to its limited adaptive capacity and structural problems, not helped by endemic poverty in many African countries.

In a region where population growth is often seen through the lens of youth unemployment and rapid urbanization, the IPCC report on 1.5 degrees warming presents several sectoral challenges to Africa as well as geopolitical, economic, environmental and social ones. Currently, millions of youths in Africa see no real prospects outside the perceived allure of migration. They perceive few employment opportunities and wrestle with economic hardship. Women, Africa's greatest latent reservoir of potential and increased prosperity, tend to find themselves at the margins of development as they contend with gendered impacts of climate change, struggling to sever ties with traditional sources of energy and other forms of poverty. Indeed, in May 2017, the number of people in dire need of humanitarian intervention in East Africa was estimated at 16 million.[5]

[4] https://www.vox.com/policy-and-politics/2019/9/17/20870760/greta-thunberg-climate-change-youth-strike-senate-democrats
[5] https://www.iom.int/sites/default/files/country_appeal/file/East_Africa_Drought_Appeal-apr-dec2017.pdf

The IPCC 1.5 degrees warming report has far reaching implications for Africa and its small island states. It is a widely and long-held view that Africa is the region most impacted and will continue to be the hardest hit by the negative impacts of climate change due to its limited adaptive capacity and the fact that its economies are heavily reliant on natural resources which are climate sensitive. Indeed, the report warns that, with both 1.5°C and 2°C of global warming, greater proportions of people will be exposed to more climate-induced hardship.[6] Millions of people across Africa rely on agriculture and coastal-related productive systems and livelihoods, much of which will be exposed to the vagaries of climate change and variation as well as to extreme weather events. There is a strong sense amongst IPCC scientists that global warming even of 1.5°C is likely to have devastating impacts on food security as crop yields and nutritional content reduce, especially in the temperate and sub-tropical zones of Africa (such as the Sahel and most of Southern Africa).[7]

The IPCC 1.5°C Celsius warming report will require much higher ambition to reduce emissions of greenhouse gases, especially among the biggest emitting countries such as the USA, China and India. Limiting global warming to 1.5°C will be less damaging for Africa. For instance, net reductions in crop yields of maize, rice, wheat and nutritional content are projected to be less severe at global warming of 1.5°C compared to 2ºC, particularly in sub-Saharan Africa.[8]

Africa faces the challenge of raising a large portion of its population out of poverty while assuring climate-compatible sustainable development. Africa needs to reduce its vulnerability (a function of sensitivity, exposure and adaptive capacity) and both prepare for and better manage adverse impacts. The region is exposed to climate impacts, both biophysical and those related to its inherent social and economic vulnerability. Limited adaptive capacity and lack of technical and financial resources to insulate the continent against extreme events and other severe impacts, worsen the situation.[9]

Adverse impacts of climate change and increasing severe weather events are constraining national development agendas and progress and have implications for sustainable development and the achievement of the Agenda 2030 and Agenda 2063 goals. African countries are working towards safeguarding their economies, many of which are agrarian-based and reliable and predictable rainfall. In addition, the region has the ambition to industrialize and will rely on its agricultural production base to secure such aspirations, especially to achieve food security and surplus. This is vital for Africa's industrial development ambitions. Beyond all the structural problems, there are mega trends that have been superimposed on existing problem areas. Africa's management of these mega trends will largely determine the region's ability to take advantage of capitalizing on green economy opportunities.

Managing growing mega trends – demography, urbanization, infrastructural development

The first mega trend is demography. Africa's population is growing fast, most notably in urban and peri-urban areas. According to the World Bank the urban population in Africa will double to more

[6] https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf
[7] https://report.ipcc.ch/sr15/pdf/sr15_spm_final.pdf
[8] https://www.ipcc.ch/pdf/special-reports/sr15/sr15_draft.pdf
[9] https://www.ipcc.ch/site/assets/uploads/2018/02/ar4-wg2-chapter9-1.pdf

than 1 billion by 2042, and cities like Abidjan and Nairobi will surpass the 10 million threshold around the same time.[10] Providing basic services to the citizens of these cities will be beyond the capabilities of governments based on current trends and realities. In addition, based on current trends, in less than three generations, 41 per cent of the world's youth will be African. A UNICEF report in 2014 reported that "humanity is increasingly African".[11] By 2035, Africa's labour force will be larger than China's. The big question is: how can Africa benefit from this imminent demographic dividend? How can it turn demography into a pole of economic growth and social transformation and not simmering instability that looms large, if left unmanaged? The continent with the largest share of informal labor can spark new energy – create new jobs for youth entrepreneurship and take advantage of rising demand and relatively stable macroeconomic conditions. With 15 million people entering the job market annually, Africa can take advantage of its demographic dividend. [12]

Another important mega trend is urbanization. Urbanization presents both challenges and opportunities for Africa. Africa will bear the burden of responsibility for coping with the climate change conundrum for the foreseeable future given its underdevelopment. The UN estimates that the population of Africa will reach nearly 2.5 billion by 2050 - about 26 per cent of the world's total - and nearly 4.4 billion by 2100, close to 39 per cent of the world's total. [13] Concomitantly, the region is mostly ill-equipped to manage the transition from rural to urban. Africa's urban population has doubled over the last 50 years while slum and other informal dwellers account for half of the urban inhabitants in Africa. The case of the Addis Ababa trash landslide that killed at least 113 people is a stark reminder of what happens when poor infrastructure, poverty and informal settlements are brought together. The main challenges for rapidly urbanizing African countries include infrastructure, energy, water supply, and transitioning into manufacturing and higher-value services [14] .

Meanwhile, although Africa still depends on commodity exports, mostly but not exclusively to China, economists predict that Africa is increasingly showing signs that it is ripe for a manufacturing surge. This surge will have urban dividends as Africa's middle class will grow and their appetite for commodity goods will increase. The region is forecast to become the second fastest growing region in the world by 2020 and some countries are becoming quite skilled at taking advantage of on-going technological revolution and manufacturing potential to cater for domestic demand, to boost intra-African trade, currently at 16 per cent and increase trade volumes to other areas of the world.[15] The urgency of structural transformation is gaining priority and African leaders are affirming their ambition towards achieving sustained and inclusive growth that is produced as part of the golden trio of innovation-technology, competitiveness and productivity. In this process, Africa can invest in low carbon technologies as a necessary means to leapfrog the need for vastly increased emissions and help to avoid a doomsday Malthusian style set of impacts from global warming. Services for energy, water and basic amenities will increase with a rapidly urbanizing region and there are opportunities not just for technological leapfrogging, but to also create the right business opportunities that will enable the informal sector, largely urban, to tap into new markets arising

[10] https://www.un.org/africarenewal/magazine/april-2019-july-2019/africa%E2%80%99s-megacities-magnet-investors
[11] https://www.uneca.org/es-blog/how-can-african-countries-capitalize-current-geopolitical-changes
[12] http://www3.weforum.org/docs/WEF_EGW_FOJ_Africa.pdf
[13] https://qz.com/africa/1099546/population-growth-africans-will-be-a-third-of-all-people-on-earth-by-2100/
[14] https://www.csis.org/analysis/urbanization-sub-saharan-africa
[15] https://www.un.org/africarenewal/news/africa%E2%80%99s-free-trade-agreement-hinges-commitment-and-implementation

from the creation of green jobs. In sub-Saharan Africa the informal sector contributes about 55 per cent of GDP, and accounts for 70 per cent of employment.[16]

Third, green infrastructure will be a fundamental component of a new growth trajectory. Africa can determine the contours of its development trajectory and can climate-proof its growth to ensure that it is building new infrastructure that is climate resilient and can weather economic and environmental storms. Africa's infrastructure financing needs are estimated at $135 billion per year. Currently, only around $77 billion is being funded, leaving a financing gap of almost $60 billion. Appropriate infrastructure development is a critical enabler for economic growth and contributes significantly to urban development across Africa.[17]

Infrastructure can be the ultimate test of climate action – it can determine whether, as an investment, Africa is on the right path and because the continent is already infrastructurally poor, it can help make the case for avoiding the lock-in effect. If successful, Africa will not find itself retrofitting existing infrastructure – but rather using smart infrastructure to usher in new growth, innovation and competitiveness.

Recent infrastructure investments in Africa have been mainly in the communications and energy sectors. Climate-proofing these substantial investments is essential as Africa stands to be impacted the most from the adverse effects of climate change and variability. This is particularly so as most of the investments will support the construction of long shelf-life infrastructures such as railways, roads, ports, dams, power stations, and irrigation canals which tend to be vulnerable to changes in climatic patterns. For example, the water needed for hydropower generation or irrigation may not be available in the future in the amounts needed or at the right time; roads may get washed away more frequently because of more frequent high rainfall events.

Limited existing infrastructure in Africa is already severely impacted by extreme events associated with climate change. For example, as a result of the unusual El Nino events attributable to climate change in recent years, hydropower production from the Kariba Dam - which supplies most of the electricity consumed in Zimbabwe and Zambia almost ceased in early 2016 when the volume of water in the reservoir dropped to about 12 per cent of capacity[18]. A 2015 study by the World Bank and the Economic Commission for Africa on Enhancing the Climate Resilience of Africa's Infrastructure (ECRAI)[19] found that failure to integrate climate change in the planning and design of power and water infrastructure could entail - in the driest climate scenarios - losses of hydropower revenues of between 5 and 60 per cent, depending on the basin. [20]

Towards resource efficiency – green industrialization

In Africa, growth is strongly correlated with the consumption and exploitation of natural resources. Growth in Africa is often associated with intense use of non-renewable resources – soil, water, forestry etc. Transforming production lines and aligning them with the relevant infrastructure will

[16] https://www.un.org/en/ecosoc/integration/2015/pdf/eca.pdf
[17] https://www.afdb.org/fileadmin/uploads/afdb/Documents/Publications/2018AEO/African_Economic_Outlook_2018_-_EN_Chapter3.pdf
[18] Yet many large scale dam infrastructure projects will be developed on the continent over the next few decades to unleash Africa's largely untapped hydropower potential.
[19] Two studies have been produced: one on the power and water sectors and one on the roads and bridges sector. These are accessible online at: https://openknowledge.worldbank.org/handle/10986/21875 and http://documents.worldbank.org/curated/en/270671478809724744/pdf/110137-WP-PUBLIC-ECRAI-Transport-CLEAN-WEB.pdf
[20] https://www.worldbank.org/content/dam/Worldbank/Feature%20Story/Africa/Conference%20Edition%20Enhancing%20Africas%20Infrastructure.pdf

boost food systems and enable reliable water and energy supplies.

Hence, as Africa's continued growth will have a debilitating impact on natural capital. Greening industrialization provides fresh new impetus for turning current supply chains and linking natural resources to markets, and value chains that will enable the diversification of Africa's economies and ensure greater value added. It is fair to assert that African countries aspire to arrive at structural transformation – which means the ability to move from lower to higher productive activities – thus shifting away from agriculture to industry and modern services within these sectors to higher productivity niches.

In an era of growing natural resource scarcity, primary resource-rich Africa must shift away from being a marginal supplier of raw commodities, to harness the full potential of natural resources by diversification into greater value addition, through processing and marketing. Africa can argue that the Northern industrialization process, commencing in Western Europe towards the close the eighteenth century, was carried out at the expense of Africa. Africa was increasingly exploited as its raw materials were extracted, plundered and valorized for the benefit of the colonial metropoles while the population rapidly became a vast market reservoir for saturated European markets and to offset urban poverty in the North. Today, Africa can choose its own development trajectory and benefit from its low-carbon footprint and leapfrog the process of greening its economies. There are benefits in getting it right the first time around, as the region could find itself economically ostracized by countries that are technologically advanced. For instance, according to a UNEP assessment report, GDP growth in Kenya is projected to be 12 per cent higher under a green economy scenario, which could also lead to an additional 3.1 million people being lifted out of poverty by 2030, compared to a BAU scenario[21]. Whilst, it would be unrealistic for Africa to assume a pathway towards zero carbon emissions, a low carbon development trajectory will place less reliance on fossil fuels, and that will have an overall positive knock-on effect on health and energy security, once again impacting positively on current inequalities.

But, whatever the economic plumbing that needs to be done, Africa cannot just stumble into this development trajectory. Planning is the hardware of good development and proper economics. Many African countries are aiming towards structural transformation through industrialization. As economies grow, so too will energy needs, demand and services[22]. For instance, greening African cities may represent an opportunity to leapfrog the industrialization process – an urgency for most African governments that are seeing their cities grow logarithmically with all the implications relating to demand in energy services, migration, infrastructural poverty, and social disaggregation. Governments aspire to arrive at sustainable cities especially knowing that cities are generating 70 per cent of carbon emissions. In this vein we can observe Rwanda, currently aspiring to become a model African state in a similar league to Singapore[23].

Decoupling growth from environmental impact will limit the use of environmental inputs in production. It will also decrease toxic emissions and discharge. Hydroelectric power stations like Inga III in the DRC, the Mphanda Nkuwa dam in Mozambique and Sambagalou in Senegal are a move in this direction. Malawi, Rwanda and Kenya are investing in biofuels, solar energy and

[21] https://www.ictsd.org/bridges-news/bridges-africa/news/building-inclusive-green-economies-for-africa%E2%80%99s-sustainable
[22] https://www.mckinsey.com/industries/electric-power-and-natural-gas/our-insights/the-decoupling-of-gdp-and-energy-growth-a-ceo-guide
[23] https://foreignpolicy.com/2015/04/02/africas-singapore-dream-rwanda-kagame-lee-kuan-yew/

geothermal energy, respectively. Angola, Botswana and Namibia jointly operate the cross-border Cubango-Okavango River Basin hydropower project. Mauritius is greening its maritime chain. Other national programs such as the Hawassa Industrial Park (HIP) in Ethiopia which is a nation-level textile and garment industrial park with "Zero Emission Commitment". Some African countries have formulated a wide range of **National Energy Plans** and more specifically National Energy Efficiency Strategies or Plans. Initiatives in SSA countries along these lines are:

1. The South African Energy Efficiency Strategy (Republic of South Africa, 2008) links energy sector development with national socio-economic development plans and sets the target for improved energy efficiency at 12 per cent by 2015. [24] The Ethiopian Climate-Resilient Green Economy Strategy (Federal Democratic Republic of Ethiopia, 2011) contains the vision and strategy to achieve a middle-income country status by 2025 while developing a green economy. [25]

2. To date, 37 out of 47 SSA countries have introduced at least one type of renewable energy target for specific technologies or specific sectors. Most targets are numerical, although they take the form of non-binding, aspirational goals embedded in energy planning tools or at a broad policy level. [26]

However, beyond the practical steps taken towards greening Africa's industrialization, there are new opportunities and possibly threats that many governments, especially resource rich countries will have to contend with. One such issue concerned Africa's mineral resources, and the possibility that some of its prized hydrocarbons – oil and gas may face the risk of becoming stranded. In Sub-Sahara Africa alone there are undiscovered, but technically recoverable energy resources estimated at about 115.34 billion barrels of oil and 21.05 trillion cubic metres of gas. [27]

Emerging threats – new opportunities - stranded assets – avoided emissions

Many countries in Africa are dependent on a range of natural resources for a significant proportion of their export incomes, and a large proportion of citizens are employed in sectors (such as the fossil fuel industry, agriculture and forestry, and tourism) potentially affected by climate change and stranded asset risk. Fossil fuels will be the sector most likely to be the most affected by stranding. The term "stranded assets" has been used to describe assets that will become a liability, "unusable" and "unburnable" as a new reality that will result in the divestment policy, consisting of displacing fossil fuels.

What might strand Africa's assets – and can this prospect be hemmed in Africa's political and economic narratives to avoid being caught in a wave of action without due preparedness. First, the price of renewable is at an all-time low. Second, regulatory conditions that self- imposed or otherwise to meet commitments of the Paris Agreement might mean that fossil becomes the new 'bad'. Third, technologies and infrastructure that will support massive deployment of renewable

[24] http://www.energy.gov.za/EEE/Review%20of%20National%20Energy%20Efficiency%20Strategy%202008.pdf
[25] https://www.undp.org/content/dam/ethiopia/docs/Ethiopia%20CRGE.pdf
[26] https://www.africaportal.org/publications/green-industrialization-sub-saharan-africa-guide-policy-makers/
[27] https://www.africaportal.org/publications/green-industrialization-sub-saharan-africa-guide-policy-makers/

energies and support a new wave of climate proofing current infrastructure might also render fossil-fuel based technologies obsolete. Fourth, evolving social norms are dictating the pace of change and civil society groups are increasingly speaking 'truth to power'.

Power sectors, agriculture, mining and associated value chain, transportation, and utilities will be at risk. This is even more worrying given that more than 70 per cent of total African exports tend to be derived from the oil, gas and mineral sectors, and account for about half of Africa's gross domestic product (GDP) as well as contributing significantly to government revenues. New oil and gas discoveries are emerging for countries like Ethiopia (natural gas reserves of 8 trillion cubic feet from the Ogaden Basin – worth a potential $7 billion a year once at full capacity) and South Sudan.[28]

For these African economies, oil and gas income will be a significant boost to bringing in much-needed foreign exchange as well as savings on imported fuels. Some of the raw materials used to manufacture mobile phones come from a variety of minerals sourced in many Africa countries. For instance, cobalt used in the production of micro-capacitors comes from the Democratic Republic of Congo which is the world's largest producer, while much of the arsenic used in the production of the microphone and speaker of the phone comes from South Africa which is one of the world's largest exporters. There is also the case of being 'locked out,' as African economies are still largely fossil-fuel dependent and possess vast reserves. If regulation, behaviour, and policy conspire towards low carbon-based development, especially in traditional export markets – this will mean that African countries will have to try to seek alternative "markets" for their hydrocarbon exports.

For Africa, ensuring synergies and managing trade-offs between natural resource management and climate change in order to achieve economic prosperity without compromising environmental sustainability and social equality and development will be largely predicated on the region's ability to put a high premium on survival. According to the International Energy Agency (IEA), energy demand grows with population and GDP. Therefore, significant investments in innovative technologies, energy solutions (i.e., carbon sequestration), and increasing access to clean and affordable energy will be required. Meanwhile, a rapid, large-scale energy transition towards renewables will create extra demand for fossil fuels as mining for raw materials, manufacturing, installation and the replacement will increase, as well as compete with other economic activity demand for energy. [29]

Currently, there is more awareness and interest about stranded assets among developed countries, but regardless of government policies, asset stranding can occur with dire implications to a wide range of sectors. As such, African governments should take the lead in developing critical analysis that will help them in decision-making and develop suitable policy and regulatory responses.

A number of African countries will be increasing their oil production, not to mention that there are new discoveries of oil and gas. Some would argue that these discoveries will challenge climate action and may test the conscience of leaders who might find it difficult to speak climate effectiveness on the one hand and engage in procuring rents from extractives. How do you square this circle? Can we realistically chart a radically new course of direction? Will some countries in

[28] https://www.bloomberg.com/news/articles/2018-06-29/as-crude-tests-begin-ethiopia-touts-nascent-oil-gas-industry
[29] https://energypost.eu/phasing-fossil-fuels-renewables-may-straightforward-swap/

Africa think it necessary to strand their assets? Is this new reality well within sight in Africa or is it a rather foggy trail that lurks in a very distant future. But, the crux of the matter is not just related to the trail that might or might not follow, but how it 'chooses' to ride the trail.

Finding a formula that supports minerals extraction whilst ratcheting ambition on emissions reduction is probably not such a big dilemma for some countries. After all, Africa's carbon footprint compared to the global average is quite small – a mere 4 per cent. But as the world prepares to keep global temperature at below 1.5 (realistic or not), some countries might find it more difficult to give up on a fossil fuel addiction, which has had no serious rival for several decades. This would be quite a test for countries who believe that their economies can gain from oil and gas production and commercializing products of hydrocarbons to willing buyers.

However, the debate merits some attention on several levels. First, the possibility of stranding rich mineral resources for a continent that accounts for only 4 per cent of global emissions can be labelled as a knee jerk reaction. Second, if mineral rich countries in Africa decide to head towards a stranded assets signpost, the quality of the transition, and the turns that this may imply will matter. Third, technology is a principal agent in the transition and is already drawn on quite significantly by nations who can flex their technological muscle in ensuring the quality of the refined product that comes out of the ground and the products that are associated with it. Whilst, this may still not be enough for a world keen on charting a zero-carbon emissions course, the strength of the argument might not enjoy much prime time attention from a political class in Africa that feels that their economic boom has not quite taken off in terms of real profits from oil and gas reserves. It is equally important to note that stranded assets come with risks and a possibility of 'stranding' jobs and communities in a continent that is increasingly unequal. It is reported that 10 of the most unequal economies are in Africa. Embedded in the transition are the speed and the scale associated with a non-fossil fuel powered economy.

The stranded assets discourse is steadily making its way into the central political discourse. Whether African countries prefer to delay the transition or not, countries graduating from fossil fuel economies will be looking towards new technologies as part of their new credentials and newly found status. This will constitute a double technological lock out – one that will mean irreversibility in terms of changing course and another one that will result in some form of technological 'blackout' because countries in Africa will not have the relevant infrastructure and technologies to join the club. This is even more a frightening prospect, because Africa is already stuck to a large extent in an energy time warp – given than more than 400 million of its populations still rely on biomass energy as the fuel for cooking. [30] The stranded assets debate is a real equity tester for many developing countries not least those in Africa. The region is richly endowed with renewable energies and whilst clean energy transition is shown positive signs in Africa, the vast number of people in the continent are energy starved – be this in the home, small scale industries or in the fields. Hence, in a decarbonisation, debate which is another way to look at stranded assets, Africa has a choice to move forward into greater resource efficiency or to contemplate a generation of cleaning up after itself. Indeed, the continent loses in the form of pollution related deaths, some would boldly attests that indoor air pollution is a silent killer that is claiming lives at an alarming rate

[30] https://www.iea.org/access2017/

and that pollutions robs African economies of billions of dollars (about USD 232 billions)[31]. According to NASA air pollution causes about 780,000 premature deaths per year in Africa[32].

Beyond governments with insatiable appetite for increased production of oil and gas reserves, fossil fuel companies across the world will not easily sever ties with the principal product and will continue to dangle huge profits down at leaders that may already be quite far advanced on the enticement barometer. A quick cost benefit analysis might provide forecasts to a mineral rich country that will be too good to ignore. Already, many African countries think that mineral extraction and climate action are not incompatible. After all, it took mature economies several decades to get to the realization that fossil fuel should be relegated as part of the club of harmful fuels.

The stranded assets debate is a real debate especially given the confluence of social norms, changing resource landscapes in the form of megatrends such as climate change means that this is not a conversation that can be stranded and left in the comfortable haze of a distant future. African economies need to approach the conversation with pragmatism, efficiency and leadership. The conversation cannot assume a zero-sum approach, because stranded assets are not simply about economics – there are real implications for social transformation. There are political economy considerations to be understood and there are borders that African countries have to cross-related to technology, skills, legislature, institutions that may blur their view if the risks are not fully appreciated and the efforts to hedge their bets are not considered. What is true, is that, whether Africa takes a new future towards a fossil fuel shy approach, it is inevitable that, its people and the current state of its economy will dissuade its leaders from putting all its eggs in one basket.

Conclusion

Africa's aspirations of resource efficiency will remain aspirations if they are not backed by strong leadership, sound macroeconomic environment, fiscal discipline, strong institutions and a robust knowledge base that will enable Africa to turn the tide from vulnerability to resilience. Current mega trends such as demography, rapid urbanization and substituting the brown infrastructure for nascent green jobs and skills are all part of the management challenge.

Africa, through its wide range of renewable energy options can transform its potential into reality through massive deployment of solar, hydropower, geothermal and wind, though only with useful information and planning. There are several examples of countries moving beyond the starting blocks and entering the fast lane, it is within the realm of possibility for Africa to lead the low carbon development trajectory, trading in low carbon consumable goods, deciding on its own formula and mix of green technologies with a reasonable dose of fossil fuel usage and embarking on a development process that is aligned with national and continental ambitions and plans.

Indeed, economic growth and environmental protection are not at odds – neither should they be pitted against each other – but in Africa's case, the two are inextricably linked – they form part of

[31] https://www.un.org/africarenewal/sites/www.un.org.africarenewal/files/The_cost_%20of_air%20pollution_in_%20Africa.pdf
[32] https://cen.acs.org/environment/pollution/Air-pollution-kills-780000-people/97/i17

our growth story, and as such, we should give them equal weight. Africa has been referred to as the continent of the future, it is a frontier zone through which progress and transformation will be measured. African countries will need to find ways to balance development and climate action, and this will require strategic-vision for those at risk. And of course, the vision should come from an African perspective, with bespoke policies in response to robust analysis and assessment.

Can Africa lead the resource efficiency race? The answer to this question also depends on how the region will earn itself a first comer advantage by attempting to scale up on resource efficiency efforts in key sectors that are important to its industrialization potential. It also means that Africa will need a strategy on whether to avoid emissions through stranding its assets or whether it can take a deliberate course of stranded for a limited number of years to enable the proceeds of mineral rents to extend to key development sectors. Governance and leadership challenges will not go away and strategies need to be devised to help the continent anticipate potential problems, plan new routes and implement important decisions on mineral governance. There may be alternatives to fossil fuels – but the region may or may not be able to choose if market forces are the main driver. Nonetheless, whether the decision is on greening industrialization or stranding its assets, the responses are not clear-cut and African leaders should approach the conversation on with pragmatism, efficiency and effective leadership. Opportunities do lie ahead with the potential for green industrialization, but these would come with trade-offs and governments might want to consider how they can continue to extract current mineral resources as part of their sovereign rights or attempt to take a development trajectory that will not be equated with a price tag of cleaning up the mess bequeathed by current generations to future ones. We have seen clear evidence in recent months that future generations want to stand up to be counted and will ask tough questions to ensure as part of their inalienable rights to a sustainable development.