

DISCUSSION PAPER No. 363

The political economy of green industrialisation in Africa

By Alfonso Medinilla and Bruce Byiers

December 2023

This paper discusses the complex landscape of green industrialisation in African countries, proposing a multilayered political economy framework to analyse the available opportunities and risks for emerging economies.

As major industrial economies adopt 'green growth' policies and narratives, African governments must navigate pre-existing challenges in economic diversification, as well as global climate commitments. The paper emphasises the intricate relationship between technical considerations, political complexities and the diverse interests and capabilities between and within African countries.

It introduces four 'proactive' strategies to categorise green industrialisation efforts, covering activities that are both relevant for exports outside the continent and for African domestic and regional markets under the African Continental Free Trade Area (AfCFTA).

Finally, the paper discusses cases where African countries are technically well-positioned to benefit from a green industrial revolution and whether or not structural factors, institutions and actors can align around it. Yet political economy challenges persist. Robust industrial policies that take account of political realities between and within countries are crucial for maximising low-carbon opportunities, playing into a rapidly evolving global market, leveraging specific African assets, and addressing constraints.

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Acknowledgements

We thank all the experts consulted during the drafting of this project, and particularly Poorva Karkare, Graham Teskey and Andrew Mold for their feedback on an earlier version of the paper. Thanks also to Carlotta Maria Paschetto for layout.

Acronyms

ACET	African Center for Economic Transformation
AfCFTA	African Continental Free Trade Area
AU	African Union
CBAM	Carbon Border Adjustment Mechanism
COP	Conference of the Parties (UNFCCC)
CRM	Critical Raw Material
DRC	Democratic Republic of the Congo
ECA	Economic Commission for Africa
EU	European Union
EUR	EURO (European Monetary Unit)
EV	Electric Vehicle
FDI	Foreign Direct Investment
FTA	Free Trade Agreement
GVC	Global Value Chain
IRA	Inflation Reduction Act
JETP	Just Energy Transition Partnership
MoU	Memorandum of Understandings
OECD	Organisation for Economic Cooperation and Development
REC	Regional Economic Community
RVC	Regional Value Chain
SME	Small and Medium-sized Enterprise
UNCTAD	United Nations Conference on Trade and Development
UNECA	United Nations Economic Commission for Africa
UNFCCC	United Nations Framework Convention on Climate Change
US	United States
USD	United States Dollar

Introduction

Industrialisation and industrial policies are back on the agenda worldwide. But economic and industrial development policies today are increasingly intertwined with the energy transition and the need to dramatically reduce global greenhouse gas emissions.

Most major industrial economy governments have adopted some form of ‘green growth’ narrative. The EU and US are trying to compete with China to produce and supply the technologies required to accelerate the decarbonisation of energy systems, industries and societies (Hensley and Lappetelainen 2023; Karkare and Medinilla 2023). The global environment in which developing countries seek to industrialise is therefore changing. African governments are seeking economic diversification and greater value addition in this evolving global marketplace amid the urgent need for job creation, while navigating global climate commitments and pressures to decarbonise existing industries and limit new greenhouse gas emissions as much as possible.

The shift in both public and private resources driven by the ‘green transition’ or ‘green industrialisation’ may create new opportunities for emerging economies to participate in the global economy, but they potentially add a layer of complexity to an already challenging task. Beyond technical aspects, the quest to decouple economic growth from increasing greenhouse gas emissions implies a reallocation of resources both between and within countries with political implications in terms of who captures the benefits and how much blocking power ‘losers’ may have.

Although decarbonisation initiatives inevitably entail tradeoffs and power dynamics, most research on the energy transition has been carried out from “a socio-technical perspective” while “politics and power have received less attention” (Pederson et al. 2021). At the same time, policy-oriented research on how developing countries and late industrialisers can ‘navigate climate and development narratives’ points to the need for a context-driven approach to understanding the potential paths towards green industrialisation, including looking at the interests and incentives at play at local, national, regional and geopolitical levels (Byiers et al. 2023).

A framework for analysis

This paper proposes a framework to better understand the political economy of green industrialisation in African economies. The starting point is that efforts to promote green industrialisation in Africa will depend on the interaction of a range of factors and actors, operating at multiple levels, thus requiring policymakers to design technically desirable, but also politically feasible, green industrial policies.

We start from the observation that while several African countries have a clear interest in promoting green energy and green industrialisation, not all African states buy into the green transition narrative, not least given their small historical contribution to global warming and emerging fossil fuel extraction opportunities across the continent. Further, not all countries will have the same opportunities or capabilities to enter green industrial value chains. That implies a need to also understand the geopolitics of the decarbonisation agenda, navigating the different narratives on ‘green windows of opportunity’ and the ‘right to develop’ in a more carbon-constrained environment, and how these interact with domestic and regional politics (Byiers et al. 2023).

Given the cross-border nature of the effects and risks of climate change, and African ambitions to create regional and continental value chains under the African Continental Free Trade Area (AfCFTA), the paper further highlights the need to understand regional interests and incentives as they play out between countries. Those global and

regional commitments interact with domestic politics and sectoral interests within countries, requiring tools to analyse the interaction of interests and incentives at all levels (Byiers et al. 2019). Such analysis is paramount in contexts where ‘deals trump institutions’ (Pritchett et al. 2017; Dercon 2022). Such an approach will help identify where opportunities for cooperation exist around the green transition agenda, whether in terms of renewable energy, ‘green’ regional value chains (RVCs) or wider provision of regional public goods to support the green transition (ACET 2021).

The remainder of this paper is organised as follows: section 1 discusses the conflicting ambitions of rapid industrialisation and green transition, and the added complexity of green industrialisation in the context of the AfCFTA. In section 2 we lay out an analytical framework with four broad strategies for green industrialisation, and propose a multilayered political economy approach to complement this. In section 3 we illustrate this using specific sector examples. Based on this, we reflect on the options for effective African green industrial policies to maximise opportunities linked to both domestic and export markets for green manufactured goods.

This paper is part of a longer-term project on the political economy of African green industrialisation. It serves as the methodological framework for more in-depth analysis on green technology sectors, including, critical raw materials for an African battery value chain (Karkare and Medinilla 2023); hydrogen and green ammonia production and use in mineral fertiliser production.

1. African green industrialisation opportunities: managing conflicting ambitions

1.1. Industrial policy concerns

The basis for African industrialisation ambitions is clear. Past decades of high economic growth have been accompanied by limited job creation, often being driven instead by increased exploitation of non-renewable natural resources. The economic structure of many African economies remains dominated by raw material extraction, while African trade with other parts of the world remains proportionally higher than within the continent (UNECA 2016).

African economies thus require economic transformation through industrialisation, implying a combination of: (1) raising productivity within sectors by enhancing efficiency through technological upgrading, infrastructure and skills, and (2) raising productivity by moving between sectors, expanding into new areas with higher value addition (see Macmillian, Rodrik etc). A basic example would be the move from agriculture and mining into food processing, manufacturing and key related services, thus raising value addition across the economy. Industrialisation is therefore a result of designing and implementing policies to help promote these shifts in allocation of human and financial resources.

Yet, while industrialisation is a longstanding priority of African governments, the African Union (AU) and Regional Economic Communities (RECs), economic transformation has often gone in the wrong direction, and the relative contribution of the manufacturing sector to African economies has been declining in the past decades. Sub-saharan economies, along with Latin American economies, experienced what Rodrik calls “premature deindustrialisation”, meaning that those countries saw a reduction in industrialisation opportunities, sooner and at lower levels of income than early industrialisers and Asian countries (Rodrik 2016; Oks and Williams 2022). This is in part because productivity growth in Africa has been slow compared to other regions, with structural change (movement between sectors) contributing to productivity growth rather than productivity gains within sectors (Dinh 2023). Recent data reveals more positive dynamics: a reversal in the deindustrialisation trend seen since independence (Kruse et al.

2022); rising manufacturing employment as a share of total employment, albeit outside Southern Africa (Luke et al. 2023); and a higher share of manufactures in intra-African than external trade (Songwe 2019). At the same time, recent evidence shows that the value of intra-Africa trade is not only underestimated, but also more diversified than exports to other parts of the world (Mold 2022), indicating the potential of intra-African trade for boosting higher manufacturing value-added. Some green technologies may also be well suited for a more decentralised approach to manufacturing, allowing to build on the dynamism of African SMEs (Kaplinsky and Morris 2019), and proximity to growing domestic markets (see section 3.3). However, the industrialisation and employment needs of African economies remain high.

Within this context, the African Continental Free Trade Area (AfCFTA) is increasingly cited as the tool for African governments and regions to promote industrialisation. To date, 47 African countries have ratified the agreement and small volumes of trade have begun to take place under its rules. Though a trade agreement, industrialisation is the underlying goal of the AfCFTA through economic diversification and regional value chains (AU 2019), thus helping to move the continent's economic model away from overreliance on exporting primary products towards increasing 'self-sufficiency' and new jobs through larger and 'thicker' African (regional) markets (Byiers et al. 2021). Through the AfCFTA, African countries have thus committed to address persistent barriers to trade and enable businesses to raise productivity through economies of scale, specialisation, and new market opportunities linked to regional value chains.

While the AfCFTA offers an increased range of opportunities for regional industrialisation, including through clustering and trade facilitation, industrialisation efforts in Africa have often struggled to achieve their objectives at the national and regional levels. Past research shows how industrial policy efforts succeed only where political and business interests align within states (Whitfield et al. 2015) and between states (Byiers et al. 2018). Further, as late industrialisers, the current global context presents African countries with additional challenges: not only is global trade in goods slowing down (Evenett 2023), but the window of opportunity for export-oriented industrialisation may also be narrowing given changes in technological development. The increasing skills and capital intensity of manufacturing technologies mean that African countries may find it more difficult to mimic the success of East Asian countries (Rodrik 2023). African industrialisation ambitions will also increasingly have to take account of climate concerns.

1.2. Adding a green layer of complexity

Although some analysts see reducing greenhouse gases as an unnecessary and unfair burden on low-income countries, it is increasingly clear that climate-blind industrialisation would come with a high future cost. According to estimates, a 1% increase in African exports is associated with a 7.2% rise in CO₂ emissions on the continent (de Melo and Solleder 2022).¹ Bengoa et al. (2021) model the CO₂ impacts of intra-African trade through the AfCFTA in particular, and estimate that the agreement will lead to a marginal, 0.3% increase in CO₂ emissions, accompanied by a 19.6% increase in non-CO₂ greenhouse gas emissions, and a 21.5% decline in air pollutants though this comes with considerable heterogeneity across countries. Though these estimates are lower than de Melo and Solleder (2022), growing first and cleaning up later may no longer be a viable option as the costs of climate mitigation will rise over time (Coulter 2023). At the same time, research also shows that shifting to more technology intensive manufacturing is associated with lower emissions (Avenyo 2022).

¹ These patterns are consistent with Africa being the most upstream region as it exports mostly raw materials undergoing further transformation in recipient countries. It is also consistent with high-income countries outsourcing the most pollution-intensive activities in supply chains to low-income countries.

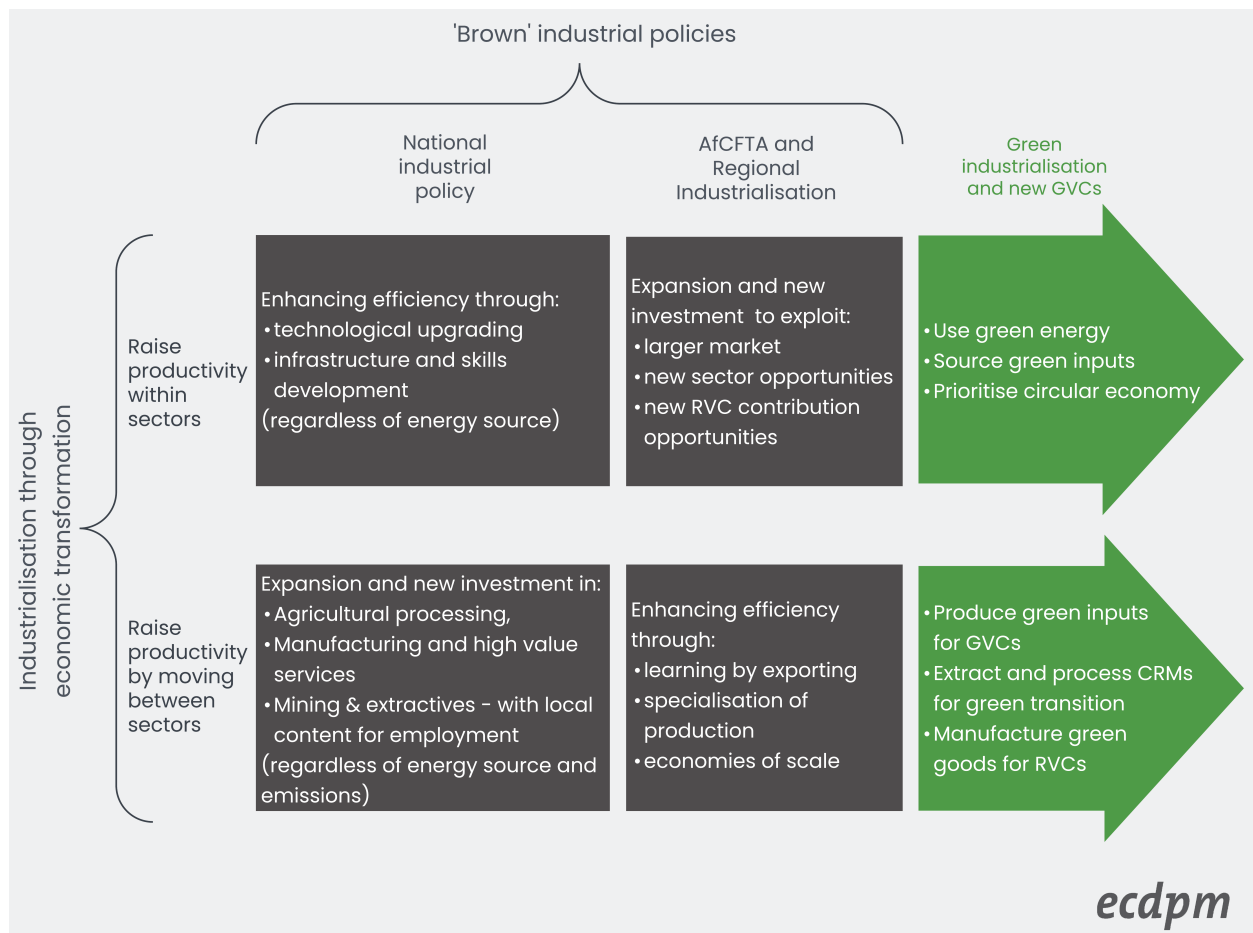
As low carbon and energy efficient production becomes the global norm, measures such as the EU's carbon border adjustment mechanism (CBAM) are increasingly likely to penalise inefficient, brown industries. Even if steering investment towards 'green' rather than 'conventional' industrial policy objectives arguably changes little in terms of challenges for developing countries (Altenburg and Assmann 2017), it nonetheless adds to the different objectives that policies must address.

Although the AfCFTA agreement itself says very little on sustainability or green industrialisation, the (draft) decisions of the November 2022 extraordinary AU summit on industrialisation "resolve to ensure that patterns of industrialisation in Africa align with international environmental agreements and commitments". Further, they point to the need for "the international community to support Africa's effort to leapfrog to an inclusive, resource efficient and low carbon economy through the promotion of green industrialisation and circular economy based on efficient utilisation of natural resource endowments" (AU 2022). More recently, the AfCFTA investment protocol, agreed in early 2023, makes explicit reference to 'sustainable investment' to encourage low-carbon investments and includes an article dedicated to investment and climate change (Article 26) (AfCFTA 2023).

Despite increased explicit recognition of the need to link the continental industrialisation agenda with international climate concerns, the focus of most national and indeed regional industrial policies has been on promoting economic transformation regardless of energy source or associated greenhouse gas emissions. These instead prioritise the availability and affordability of energy. While analysts and experts, including the ECA have long promoted a "low-carbon and inclusive pathway" (UNECA 2016), inequality and poverty remain key development challenges in African countries. That raises the need for a balancing act between energy access, green transition and inclusive economic development, ensuring that the significant capital costs associated with green energy infrastructure and production methods do not disproportionately affect vulnerable groups, or even lead to further 'premature deindustrialisation', when businesses lack access to the means and public support their Western counterparts increasingly rely on. Green industrialisation, and participating in new green global value chains therefore adds another layer of complexity to an already complex policy area.

Figure 1 below reflects the additional complexity of combining green ambitions with those of promoting economic transformation. While the process of industrialisation or economic transformation has commonly been the focus of national policies, it is also increasingly seen as the realm of regional and continental agendas. Adding green industrialisation ambitions implies a combination of raising productivity and lowering carbon emissions within existing industries, and raising productivity by shifting resources from low productivity sectors to enter new low carbon sectors. These two shifts can then be seen as the basis for thinking about future green industrialisation paths.

Figure 1: Adding complexity to African economic transformation pathways



Source: authors

Many of the political economy challenges for implementing 'brown' industrial policies will likely be relevant (even if different) for green industrial policies. Recent studies cite "the complex interaction between highly globalised value chain actors (specifically the MNCs), path dependent local institutions and interests of incumbent local actors" (Swilling et al. 2022). The "wicked problem" nature of green transformations (Andreoni et al. 2022) will mean that the energy transition and green industrialisation processes will be subject to a "vast multiplicity of struggles, each with their own context-specific temporal and spatial dimensions" (Swilling 2019). There is also a risk that "if governed largely to preserve existing power relations, the renewable energy political economy may replicate existing dynamics of power" (Burke and Stephens 2018). All this requires policymakers and international partners to take explicit account of those different power dynamics as green industrialisation policies are prepared and rolled out.

At the same time, the green transition may offer "new avenues for national development" (Hausmann 2021). Kenya's president William Ruto regularly calls for "repositioning [...] Africa as the clean, green continent of the future in order to exploit the opportunities arising from the transition to green industrialization" (Ruto 2023). Several countries including Kenya (geothermal) and Ethiopia (Hydropower) have a very high share of renewables in their energy systems, while across the continent there is a massive untapped solar and wind power potential, which could create suitable conditions for clean industries. Morocco has made strides towards a renewable energy transition, and is investing significantly in the decarbonisation of its existing industries (Byiers et al. 2023; Green economy tracker n.a.). Lema et al. (2020) talk about "green windows of opportunity", highlighting the need for institutional change to take advantage of these green opportunities, in contrast to opportunities brought about by technological

change and/or demand. As this paper discusses, formal institutional changes interact with the informal institutions and power relations cited above, thus calling for a deeper understanding of the political and economic factors, actors and incentives that shape this interaction, and that ultimately will influence African green economy trajectories.

2. An analytical framework

2.1. Four strategies for green industrialisation

Against this background, it is useful to categorise the green industrialisation opportunities available to African countries. These range from mining and mineral processing (lithium, cobalt, copper and Rare Earth Elements) as inputs to regional and global green value chains; to manufacturing and assembling green consumer products and their components, including electric vehicles (EVs), decentralised solar solutions, etc.; but also reducing emissions of existing heavy industries (e.g. fertilisers, iron and steel); the production and export of renewable energy as well as clean fuels and carriers such as green hydrogen, ammonia to Africa and beyond. While there are examples of each of these across Africa, they often remain ad-hoc and appear, as yet, detached from strategically focused industrialisation policies and strategies, especially at the regional or continental level.

Building on UNECA (2016), Hausmann and Schrag (2023), and Hausmann et al. (2023) we identify four pro-active green strategies to achieve green industrialisation objectives. These combine activities that are both relevant for exports outside the continent, and for African domestic and regional markets under the AfCFTA.

1. **Decarbonise existing industries.** This entails upgrading technologies and investing in renewable energy inputs to make the existing industrial base greener and more circular. This strategy builds on greening the existing industrial base while retaining or raising productivity. The ability to apply this strategy depends on proximity and access to renewable energy sources, access to credit and investment, as well as vested interests within those sectors that may block such a shift (see Ashraf and Karkare 2023 on circular textiles). It may also be shaped by market access for lower-carbon goods, which may justify the investments and higher initial production costs. Below we take a closer look at greening aluminium production, a key 'hard-to-abate' sector.
2. **Produce inputs for global green industries.** This can also be thought of as 'helping others decarbonise' (Hausmann 2023). This strategy uses mineral resources to feed into, and potentially claim a different position, in evolving global value chains, potentially through regional value chains. Several African countries, including Namibia, DRC, Zambia, Zimbabwe and South Africa are seeking to leverage their 'critical raw material' (CRM) deposits of lithium, copper, cobalt, manganese, graphite and rare earth elements (REEs) that are essential to meet global demand for battery production, wind power and electric motors (among others) to bring greater value addition to their economies. While some like Namibia are pursuing new mineral extraction partnerships with the EU (EC 2022), others, like Zimbabwe, have imposed export controls on their CRMs to avoid minerals being exported raw from the country (and continent) and encouraging investment in processing (Chingono 2023) and value addition for the economies in question.
3. **Manufacture green goods for African markets.** This strategy entails producing green manufactured goods to address a specific demand and need, targeting African economies though potentially going beyond. This would focus on producing goods that address African problems, for example, producing or assembling electric motorcycles, light-duty EVs and electric busses for urban mobility, or seeking to scale up the local assembly of decentralised solar solutions, adapted to African use-cases, or producing low-cost, sustainable building materials using locally-sourced inputs (Langmaack et al.

2021; Kaitwade 2022). This approach to stepping up the value addition ladder could include producing components or inputs into renewable energy value chains, such as inputs into wind turbines, though this has so far been difficult in South Africa (Morris et al. 2022) and ideally would exploit regional market opportunities and recent RVC ambitions as stated under the AfCFTA. This strategy builds on the fact that intra-African trade has higher manufactured value added than external trade (Songwe 2019; Mold 2022).

4. **Leverage brown capabilities to jump to green industries.** What countries produce today, defines the ease with which they can move into related, potentially higher value products (Hidalgo et al. 2007; Hidalgo and Hausmann 2009). Countries like Morocco or South Africa that are producing cars and automotive components, for example, have a relatively shorter ‘distance’² to cross to move into EV manufacturing, or even the battery value chain (Karkare and Medinilla 2023). These countries can leverage existing capabilities and industrial linkages to take advantage of opportunities in more complex, adjacent activities (Mealy and Teytelboym 2022). Countries can adopt both horizontal measures (e.g. higher education, innovation policy) and vertical, sector specific measures to enable green industries to develop. This may also include specific fiscal and energy measures to enable technology transfer through foreign investment.

Although not mutually exclusive, these categories help think about African green industrialisation ambitions and strategies and the means for achieving them, including the political economy dynamics around them. They are summarised below in Table 1.

Table 1: Proactive green strategies for African green industrialisation

Pro-active green strategies	What
1. Decarbonise existing industries	Invest in clean power to reduce the emissions of existing carbon intensive industries; direct electrification; hydrogen use; Decarbonise logistics through technology and modal shifts
2. Produce inputs for green industries	Expand extraction of CRMs; Encourage investment to move up the value chain to processing of inputs into green RVCs, GVCs and manufacturing
3. Manufacture green goods for African markets	Produce green manufactured parts and consumer goods that address specific African issues, e.g. light EVs, decentralised solar (assembly); building materials; green fertilisers
4. Leverage ‘brown’ capabilities to jump to green industries	Leverage existing capabilities and downstream linkages to enable green industries like passenger EVs; piloting energy-intensive future technologies, including various H2 carriers

Given the complexities of promoting industrialisation and the additional concerns of doing so in a ‘green’ way, it is important to go beyond the above strategies by applying political economy thinking. Efforts to decarbonise existing industrial structures will require particular policies and dialogue between multiple actors and incumbent firms, often across borders, to ensure access to clean energy and green inputs (e.g. hydrogen and renewable ammonia), or create the standards and conditions for a sustainable or circular economy. Similarly, moving into new green sectors and

² See Balland et al. (2022) for an updated introduction to the study ‘economic complexity’

(global) value chains adds additional complexity alongside new structural reform objectives between and within countries. At the same time, where incentives can be aligned within and between sectors and countries, shifting dynamics around actors and interests may offer new opportunities for promoting investment and job creation, allowing early-adopters to make important gains while helping deliver on wider decarbonisation ambitions.

The following section proposes an approach for disentangling the different actors and factors that may affect the design and implementation of a green industrialisation policy along the lines discussed above.

2.2. A multilayered political economy approach

As the above discussions reflect, green industrialisation outcomes will result from the interaction of multiple factors at the geopolitical level, between countries within Africa, and within countries. With renewable energy sources reportedly growing at a faster rate in developing than developed countries for the first time, “understanding context-specific spaces for locally-embedded actors to initiate change is a strategically and academically important focus of inquiry” (Swilling et al. 2022).

To help systematise and disentangle those different interests and influences, we propose separating four levels at which actors and factors are likely to influence green industrialisation dynamics within each of the above four green strategies. These are:

1. Global, geopolitical factors
2. Continental/regional factors
3. National factors
4. Sectoral factors

At all levels, the incentives for promoting green industrialisation will be affected by formal institutions, in the form of formal commitments, policies, laws and regulations. These interact with informal institutions or ‘rules of the game’, which shape behaviour and how reforms and new initiatives are implemented in practice, or not. The ability to promote the green industrialisation strategies discussed above will also depend on a range of structural factors, not least natural endowments for renewable energy or carbon capture, but also geographical location, historical political relations, embedded economic structures, and the nature of specific renewable energy sources. The interaction of these factors will affect the behaviour, interests and incentives of key actors within states at a political and bureaucratic level, as well as the opportunities available for private sector and civil society.

Building on existing tools that seek to encourage ‘thinking and working politically’, (Byiers and Vanheukelom 2016), the remainder of this paper illustrates how this analytical framework might be used to further explore the political economy dynamics of green industrialisation in different country cases. Table 2 below summarises the four political economy lenses and the different levels at which these play out (see Annex for a more detailed version of the table with example questions).

Table 2: At each level, how do the following affect the political incentives around green industrialisation for each country³

		Structural and foundational factors	Formal institutions	Informal institutions	Key actors
Levels of analysis	Global, geopolitical	- the geographical distribution of fossil fuels, natural resources and renewable energy potential between and within countries	- climate related policies and commitments		- governments and/or multinational companies/investors
	Continental and regional	- geographical characteristics of the country in question in terms of proximity to markets	- industrial and trade-related policies and commitments	- informal power relations and alliances that shape policy decisions and implementation	- donor support and partnerships
	National	- existing and historical economic structures and trade relations	- natural resource management and concession rules and regulations	- 'de facto' rules shaping actor behaviour (as opposed to 'de jure' rules) and the business environment	- coalitions or grouping of countries, public or private sector actors
	Sectoral	- historical socio-political relations and alliances around different resources	- access to and functioning of carbon markets and current carbon prices		- key political players or hegemons - key businesses and associations in state-business relations

In the next section we apply this framework to examples of each of the four above strategies. This short overview illustrates the different opportunities and green industrialisation pathways available to different African countries. In addition, a political economy approach helps unpack these opportunities and understand the real 'distance' between technical and theoretical potential on the one side, and industrial and commercial viability on the other.

3. Unpacking green industrialisation opportunities

3.1. Decarbonise existing industries: aluminium in a greening global market

Even if the industrial base in African countries is often small, carbon-intensive industries can nonetheless be important mainstays of the economy. Aluminium production is a high productivity but energy intensive process. Though limited in its employment generation, it is key, for example, to the Mozambican economy in terms of export revenues. High temperature smelting makes it a 'hard-to-abate' sector,⁴ meaning that with current technologies it

³ See annex for more detailed questions

⁴ About 40% of the total emissions in aluminium production are process emissions which are key for its production (Triki 2021). As it develops, the demand for aluminium in Africa is set to grow severalfold, though from a low base (Ibid.).

is difficult or prohibitively expensive to significantly reduce greenhouse gas emissions. The objective here is to maintain existing productivity levels while lowering carbon emissions (see figure 1 on economic transformation pathways).

Mozambique's aluminium smelter Mozal (majority owned by Australian mining company South32) produces around 560.000 tonnes of aluminium per year, the bulk of which is destined for the EU market. As well as the aluminium smelter process itself being carbon-intensive, Mozal is the biggest electricity consumer in the country, and is supplied through a specific arrangement with South Africa's heavily coal dependent Eskom (Machado 2023; [Motraco](#)). As the EU phases in a Carbon Border Adjustment Mechanism (CBAM), the country will face a high price premium in its main market as of 2026, that will potentially increase once 'indirect' emissions from the energy used are also included. These global factors therefore have an impact on current and future opportunities in the sector.

At the same time, in terms of structural factors, Mozambique has significant renewable energy, specifically hydropower potential, which could be used to decarbonise and expand its primary industrial exports. In addition to the existing 2075 MW Cahora Bassa hydropower plant, the government has been trying to develop the 1500 MW Mphanda Nkuwa hydropower dam for many years.⁵ Using hydropower directly and verifiably could shield Mozambican exports from the EU's carbon border adjustment, while - in theory - also bring down energy-related costs of production in the long run, and create incentives for further investment in (green) energy intensive industries. The prospect of rising carbon prices may make these plans more urgent and commercially viable. Yet while technically feasible, realising such a large-scale transition will require a significant shift in Mozambique's energy and industrial policies.

A closer look at the institutional factors shaping the sector reveals further layers of complexity. The story of aluminium in Mozambique is largely one of a post-war, first-mover Foreign Direct Investment (FDI) 'mega-project', with stronger linkages to the international than domestic economy. Having been encouraged by generous tax incentives (Loyce 2017), the plant arguably retains strong informal bargaining power vis-a-vis the government. Aluminium today still represents 20% of the total exports of Mozambique (Club of Mozambique 2023), its share having declined from 65-70% in the early 2000s only as a result of rising mineral exports.

While the theoretical case for decarbonising aluminium smelting is relatively clear cut, the continuing tax advantage and the way that 'informal' state-business relations define much of how policies are implemented in Mozambique (Byiers et al. 2020) raise questions about how the government will respond to shifting global dynamics and the risk of rising aluminium prices into the EU market. Since 2010, Mozambique has been betting heavily on natural gas extraction for its economic growth trajectory, which may further reduce the business case and the incentives among key political and economic actors to promote clean energy.

Overall, while shifting global dynamics, and the EU CBAM in particular, may alter renewable energy calculations and accelerate the development and implement of the Mphanda Nkuwa project, and while this could support the case for further investments in green energy intensive industries, much will depend on how the government responds to the specific case of Mozal, where its political weight in the past led to quite specific investment conditions.

Summary of key political economy factors:

- **Global** - EU CBAM coming in and likely to expand to cover energy inputs, raising the price of Mozambican aluminium

⁵ The total estimated cost of the project is USD 4.5 billion. The EU has recently committed to supplying EUR 500M in financing (Takouleu 2023).

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- **Regional** - Mozambique-South Africa energy relations affected with potential switch to investment in clean energy
 - **National** - existing state-business relations around Mozal and other extraction sectors likely to influence the space for 'bargains' to promote a green industrialisation agenda unless Mphanda Nkuwa leads to a genuine structural shift.
 - **Sectoral** - as a hard-to-abate sector, greening aluminium hinges on access to technology for greening the process itself, and large-scale finance to increase green energy inputs.
 - **Overall** - this strategy implies a need to understand political priorities and space for challenging rather than protecting the vested interests of incumbent firms.

3.2. Produce inputs for green industries: African battery minerals⁶

Africa has significant reserves of so-called critical raw materials (CRMs), including at least a fifth of the reserves of the global raw materials needed for battery-powered vehicles such as lithium, copper, cobalt, manganese and graphite (Diene et al. 2023). As demand for lithium-ion batteries is expected to multiply within the decade, mineral-rich countries aspire to add more value to their resources through processing, thus offering the possibility of moving employment from low to higher productivity employment in the minerals sector (see figure 1). However, currently, battery minerals by and large leave the continent raw and unprocessed, with refining, and manufacturing, mostly taking place elsewhere, especially in China.

Several initiatives are underway to leverage these resources for industrialisation. Zambia and the Democratic Republic of the Congo (DRC) in 2022 pledged to jointly develop a battery value chain, while both the US and EU have signed separate MoUs with these countries to enhance extraction and develop processing capacity. The lithium-ion battery value chain is also identified as a key priority for African manufacturing under the AfCFTA.

The potential for green industrialisation appears straightforward. As the EU and US seek to de-risk and diversify their supply from China, African producers can leverage their resources to attract critical investments in processing and manufacturing, adding value to their mineral-based exports.

A closer look at the political economy factors in the sector, however, also reveals a number of key global, regional, national and sectoral barriers for African economies to enter into the value chain (Karkare and Medinilla 2023). These range from energy and infrastructure deficits to limited industrial capabilities, low domestic demand for processed minerals, batteries and EVs, and a high degree of vertical integration and concentration in China of the value chain. In addition, African countries, unlike the US and the EU, do not have the fiscal space to support these highly technology-, energy- and capital-intensive industries through subsidies, further impacting their competitiveness. The difficulty then relates to how Zambia and DRC can overcome these constraints, given existing domestic political challenges that undermine the investment climate and cross-border cooperation, while also geopolitically positioning themselves to benefit from the competition between superpowers.

While these challenges mean that it will be difficult to transplant a full African battery value chain based on mineral extraction alone, there are still significant opportunities for increasing African participation in both upstream and downstream activities and segments. Countries can position themselves to attract investment in refining and producing mineral concentrates for exports, while some opportunities can be found in assembling EVs and battery packs for (domestic) e-mobility and renewable energy storage. Seizing those opportunities will require smart industrial policies, regional cooperation, and a strong understanding of the global competitive environments in the sector.

⁶ For an in-depth case study, see Karkare and Medinilla (2023)

Summary of key political economy factors:

- **Global** - rising global demand for batteries is leading to opportunities for African countries with large deposits of CRMs, while competing subsidies in other regions may influence overall potential
- **Regional** - formal institutional mechanisms such as Memoranda of Understandings (MoUs) are a necessary but not sufficient basis for cooperating bilaterally or regionally to promote processing within Africa and support RVC creation and cooperation
- **National** - strong incentives for each country to promote domestic processing and capture value added, while e.g. in DRC, domestic political economy factors undermine the investment climate required for long-term processing investments.
- **Sectoral**- mining itself can offer 'inclusive' employment opportunities, but often with great social risks and costs; refining of battery minerals and manufacturing of battery components is highly technology-, energy- and capital-intensive.
- **Overall** - this strategy entails a risk of a short-term political focus on rent-extraction from minerals rather than long-term, complex, processes of promoting regional cooperation, processing and longer-term industrial capabilities.

3.3. Produce green manufactured goods for African markets: urban e-mobility assembly

This strategy rests on supporting economic transformation by entering new green sectors, often focused on national and regional markets, where e-mobility may offer some opportunities. While Africa's automotive production is relatively modest on a global scale, it has witnessed significant growth (see below), and a notable emergence of startups in countries like Kenya, Rwanda, Egypt, and Nigeria, aiming to develop potential African markets for electric vehicles (EVs).

The case for African EVs is that certain African mobility needs are well suited for electrification. Startups such as Roam Electric in Kenya, Kiira Motors in Uganda, Zembo in Uganda, and Spiro in West Africa, are targeting segments like public transportation and two- and three-wheelers. The entry costs of manufacturing these locally can be relatively low, offering an opportunity for growth. Electric buses do not require an expansive public charging infrastructure, and can be relatively easily implemented on existing routes, including those operated by private contractors. Two- and three-wheelers are relatively easy to assemble using existing, imported components, and represent a potentially enormous market. Today 20% of the world's registered motorcycles are in Africa, while in some countries like Burkina Faso and Uganda they represent more than 70% of the total fleet (Ayetor et al. 2023).

Not only are these e-mobility solutions relatively low-tech, compared to the passenger EVs made by leading global brands, they also allow for combining components (like drivetrain and batteries) from various suppliers, and are more suited for initial smaller scale production. This may offer opportunities for African SMEs that are close to consumer markets to enter into and develop manufacturing clusters (Kaplinsky and Morris 2019), and enter into regional value chains. Roam for example recently inaugurated a new motorcycle assembly plant with an intended capacity of 50.000 units per year (Kemp 2023). BasiGo (Kenya), on the other hand, offers small BYD (leading Chinese EV manufacturer) buses as a pay-as-you-go service, to lower the entry barrier for electric buses in the private 'matatu' market, while looking to move into local assembly at a later stage (Business Daily 2023). Similarly, Spiro (Benin, Togo, Rwanda) has focused on bringing Chinese manufactured electric motorcycles to the market, offering a network of charge and swap stations to meet local needs, and is currently developing assembly plants in Benin and Togo (Komminoth 2023). Even though there is a risk of overreliance on imports of plug and play components with only limited value addition locally, the low entry barriers to EV vehicle assembly can be a potential first step on the green industrialisation ladder.

In addition to different business models, there are different inroads into electric bus and motorcycle manufacturing. Uganda's Kiira Motors is a state-owned company, "established to champion value addition in the nascent Motor Vehicle Industry in Uganda through Technology Transfer, Contract Manufacturing and Supply Chain Localization" (Kiira), with a view to producing buses, pick-ups, light and heavy-duty trucks, and 2 and 3-wheelers. This reflects an explicit political decision to use state resources to promote manufacturing in a 'new' green sector, with direct presidential involvement in the case, and highlighting the political salience of such e-mobility solutions.⁷ In contrast, Kenyan EV startups reflect a private-sector led ambition to exploit the Kenyan market. Roam electric stemmed from a Swedish research project, subsequent investment in Kenya and partnership with Uber (Doll 2021). Spiro in turn started as a Chennai, India-based, company moving into the West African market, and is now majority owned by a UAE-based investment fund.

In any case, proactive policies and government support are essential to accelerate demand. Despite its growing middle class, Kenya's demand for, and production of EVs (motorcycles) remains in its infancy. In 2023, it introduced VAT exemptions for a range of e-mobility appliances, including buses and motorcycles to boost adoption. It has also announced a new e-mobility policy (Kemp 2023), while the state utility is looking to develop public charging infrastructure (Onyango 2023). Several other countries have put in place fiscal incentives, have removed import duties, and created infrastructure support for e-mobility (Odoom and Awuah 2023). At the same time, in many African markets, there are notable gaps that could seriously impede the growth of a mature e-mobility system. These include large-scale imports of second-hand vehicles combined with fossil fuel subsidies, which are often politically and economically deeply ingrained, or the lack or inconsistency of standards and regulations (Ayeter et al. 2023), including those related to emissions.

In order to scale electric urban public transport, governments and industries will not only need to bridge public infrastructure and policy gaps, but also ensure that the end users, and especially private operators have reliable access to, and see long-term benefits in a shift to, EVs. This may also mean finding a workable balance between a more formalised urban transit system, and supporting the electrification of private, often informal operators.

Summary of key political economy factors:

- **Global** - increasing availability of technology and inputs for simple assembly of e-vehicles; rising demand can trigger commercially viable localisation of production
- **Regional** - potential to benefit from regional markets but likelihood of facing national industrial prioritisation and regional competition rather than cooperation
- **National** - national political 'visibility' as an incentive and connected ability to use public procurement to enter new sectors such as electric public transport in Uganda, though alternative strategy of growth sector with rising supporting infrastructures in Kenya
- **Sectoral** - relatively low-tech nature of production provides greater opportunities for African countries to assemble these EVs with several initiatives sprouting across the continent, though risks from second-hand imports or simply greater reliance on new imports of finished goods with minimal value addition locally
- **Overall** - this is a potentially less 'politically sensitive' green industrialisation strategy than those above given the absence of incumbents and the political salience of 'green', 'modernisation' policies by governments and heads of state. While arguably less capital intensive than some heavy or high-tech industries, scaling African manufacturing and consumption of complex green goods like motorcycles nonetheless requires policy coordination and reforms.

⁷ From the website, "It's important to note that the name Kiira EV was recommended by the President of Uganda, HE Yoweri Kaguta Museveni during interactions with the team in December 2009. This was at a meeting following the President's visit at Makerere University resulting into the Presidential Initiative Fund for Science and Technology Innovations which took effect on 1st July 2010." (Kiira 2023)

3.4. Leverage existing ‘brown’ capabilities: African EVs and components

While the above reflects promising new green manufacturing initiatives, existing African automotive producers are lining up to jump from internal combustion engine (ICE) vehicle manufacturing to higher tech EVs and even battery manufacturing. This exemplifies the potential of using existing capabilities, market networks and industrial know-how to ‘jump’ into ‘nearby’ production of green goods, thus representing a move to lower emissions while maintaining high productivity jobs (see figure 1). South Africa and Morocco lead African automotive manufacturing for exports, each producing over half a million cars per year. Moroccan car manufacturing in particular has grown significantly in recent years, with producers like Stellantis and China’s BYD joining Renault-Nissan to produce vehicles in the country. Egypt follows from a distance, while several other countries are looking to attract new automotive investments (Harper 2021).

Morocco especially is able to leverage existing automotive capabilities, as well as existing trade agreements with the EU and US to position itself for downstream manufacturing in the EV value chain. Renault-Nissan and Stellantis, Morocco’s major automakers have announced plans to expand EV production in the country, primarily for export to the European Union. China’s XEV has announced plans to start producing EVs in Morocco for Europe as well (UNCTAD 2023). This follows Morocco’s rapid expansion of automotive capabilities in the past decade, in which it was able to move from basic assembly to developing a fully fledged automotive cluster, producing progressively more complex components and employing over 200,000 people. This makes for a significantly shorter distance to EV and component production than starting up an entirely new industry and capabilities.

Beyond historical production know-how, export market access is another critical enabler for more complex green industries. Unlike South Africa, Morocco has easy access to two major export markets for vehicles and components. In addition to the EU market, it has an FTA with the United States, and exports automotive components and electronics to the US market. These linkages are also leading to increased interest in battery precursor production in Morocco, specifically targeting the US market (Karkare and Medinilla 2023).

This shows the importance of existing capabilities and linkages, and how some countries are likely to have relatively easier inroads into green tech manufacturing. South Africa, for example, is comparatively more dependent on a domestic market, and while EVs are a significant priority under the Just Energy Transition Partnership (JETP) (Vanheukelom 2023), the country also faces logistical and energy challenges, which risk slowing down the start of EV production (Thukwana and Cele 2023).

Summary of key political economy factors:

- **Global** - rising global demand for EVs, so advantages for those able to make the jump and leverage existing trade agreements
- **Regional** - nascent potential for regional automotive value chains under the AfCFTA though this has been one of the sectors to hold back completion of negotiations (along with textiles).
- **National** - the political economy of the automotive sectors in both South Africa and Morocco reflects long-run political strategies, protection for investments and a focus on export markets, both also reflecting the long-run political histories of both countries
- **Sectoral** - even though the sector is skills- and technology-intensive, existing capabilities in the ‘brown’ industry can allow for a ‘jump’ into green sectors
- **Overall** - building on existing political and economic structures from a national perspective, this may also be a ‘politically neutral’ strategy for green industrialisation where both economic and political interests can more easily align, with less incumbents and vested interests to address.

Conclusions: towards politically-informed African green industrial policies

The overview above illustrates that from a technical point of view, many African countries are well placed to participate in a green industrial revolution. They hold reserves of many of the critical minerals needed for green tech, they have abundant renewable energy potential, some upstream capabilities, and established trade links with the leading markets for green technologies, renewable energy carriers and green industrial inputs.

It also shows that these technical, somewhat apolitical metrics are only part of the picture. In practice, green industrialisation will be faced with many of the same political economic challenges that have long hampered African industrial development, including misaligned political and economic incentives, short-term policy approaches to extract rents from minerals with limited processing, and state-business relations that favour sectoral or national protection over competition and regional cooperation. Added to limited capabilities for complex manufacturing, small domestic markets and infrastructure deficiencies, the challenges remain formidable.

This paper introduced four 'proactive' strategies for African green industrialisation to categorise the broad spectrum of green industrial opportunities that African countries can seek to develop. These are not mutually exclusive, but instead offer a way to systemise thinking about opportunities and necessary capabilities, as well as the underlying political economy factors that shape the ability of emerging economies to prioritise green industries. To summarise the four:

- **Decarbonise existing industries** - this strategy implies a need to understand political priorities and space for challenging rather than protecting the vested interests of incumbent firms.
- **Produce inputs for green industries** - this strategy entails addressing the risk that short-term rent-extraction from minerals dominates political incentives, and prioritising longer-term, complex, processes of promoting regional cooperation, processing and longer-term industrial capabilities.
- **Produce green manufactured goods for African markets** - this is a potentially less 'politically sensitive' green industrialisation strategy than those above given the absence of incumbents and political salience of 'green', 'modernisation' policies by governments and heads of state, yet it requires comprehensive policy coordination and reforms to grown domestic demand and harness regional opportunities.
- **Leverage existing 'brown' capabilities** - building on existing political and economic structures from a national perspective, this may also be considered a more 'politically neutral' strategy for green industrialisation where both economic and political interests can more easily align, yet it requires suitable conditions for high-tech industries and services.

Ideally, countries pursue combinations of these strategies, reinforcing one another where possible. Morocco and South Africa, for example, are able to decarbonise existing heavy industries, while also pursuing a resource-driven path, and using some of these capabilities to jump towards higher tech green industries.

While in all four broad strategies, there are distinct opportunities for African countries, these are unevenly distributed. Some countries have more leverage than others, and are able to position themselves for early investments in emerging green technologies. Others risk lagging behind, leading to a further future concentration of green industrial opportunities. This underscores the need for strong regional and continental policies. In the automotive sector and renewable energy sector, for example, strong regional and continental policies can create the conditions for low-income countries to produce a limited number of complex products and inputs in regional supply chains (UNCTAD 2023).

Implications

In order to maximise opportunities in low-carbon and green industrialisation, African countries will need industrial policies that either alter current incentive structures or find ways to work with or around these, with limited financial resources available to do so.

Government efforts to support particular, strategic industries have long been seen in a negative light, but recent green industrial policy measures in the US, EU, and China have lifted the last remaining taboos on an expansive state support to key industries (Veugelers and Tagliapietra 2023; Siripurapu and Berman 2022). Although few African countries today are in a position to enter in a global subsidy race, there is a strong case for African green industrial policy measures that are adapted to a rapidly evolving global market environment, that leverage specific African assets and address African constraints to seize new green and low-carbon industry opportunities in a politically-informed way.

This could entail specific policies to provide targeted infrastructures, policy support and (limited) fiscal incentives to encourage 'green' investments, coordination platforms to address common green industrial promotion challenges according to the above strategies both between and within countries, and broader strategies to leverage regional and continental markets to promote regional value chains. This can be done nationally and regionally, to leverage the suite of AfCFTA trade and investment protocols alongside existing regional trade areas, which also offer the current advantage of high political salience.

Nonetheless, promoting green industrialisation creates additional challenges for emerging economies, such as access to, and diffusion of, technologies due to a high concentration of innovation in major industrial centres (Tagliapietra 2022), and higher exposure to a 'risk perception premium' (OECD 2023) which can disproportionately affect green industries that are capital intensive. Managing these structural difficulties requires additional policy coordination at multiple levels, and further balancing of short and long-term interests. But policy coordination itself can often become blocked when faced by vested interests both within countries, and between regional partners. Based on the above reading of early green industrialisation efforts and opportunities, we draw 5 lessons for politically-informed African green industrial policies:

1. **Look back to look ahead:** As the world focuses more on decarbonisation, African economies not only need to foster economic transformation and job creation, but they must do so in a manner that limits their own carbon footprint and/or aids other economies in reducing theirs. While that may offer opportunities to some economies, these will not be automatic, requiring policymakers and their international partners to define clear strategies that build on existing structural and institutional factors, existing capabilities, as well as political incentives. **Green industrialisation strategies and policies must therefore start with a good understanding of current capabilities, but also what allowed those to develop, and how they might be built upon.** The four proposed strategies serve as a basis for looking ahead.
2. **Political economy factors need to inform industrialisation strategies:** Different structural factors will affect the available options for a green industrialisation approach. Countries with large CRM deposits are clearly faced with different policy and political options to those with large fossil fuel deposits, or with a minimal industrial base. The path dependency of a pit-to-port model and the associated rents may make it difficult to effectively promote processing and job creation around those minerals, even if it is an expressed policy priority. Similarly, decarbonising existing industrial structures will likely affect vested interests in current production and energy supply structures. These **factors cannot be ignored but must instead be built into policy thinking, whether in terms of accompanying measures to promote greater**

inclusiveness or seeking ways to align with emerging political and economic interests around 'green' sectors.

3. **But formal policies are not enough:** Although industrial policy thinking and planning is key, formal industrial strategies, MoUs and regulations are only effective if implemented, where those who stand to lose access to rents or to markets may resist. Strategies that encourage entry into new green manufacturing or that help apply capabilities from existing 'brown' sectors to new green sectors may face less challenges, and provide openings towards a wider green industrial transition. At the same time, all strategies for green industrialisation increase the complexity of promoting industrialisation, introducing different sources of uncertainty, new dependencies, and policy challenges. **Formal policies and strategies must therefore be combined with more flexible, adaptive dialogue and discussion around ambitions and how to shape existing and emerging rents and power relations around those.**
4. **Regional, cross-border cooperation is essential to achieve scale:** Green industries have the potential to alter existing economic geographies, create new industrial hubs around resources, and existing industries. At the same time, as for industrialisation more generally, cross-border cooperation across African markets will be essential for achieving scale. In spite of stated ambitions to promote green RVCs in Africa, particularly through the AfCFTA, such regional efforts will not follow automatically. **National political actors must be able to show benefits to overcome existing barriers and competition, requiring regional or continental sectoral platforms to help identify and overcome coordination failures, something that is already being tested for the textile sector under the AfCFTA.**
5. **Green investments can be an opportunity if the right investment climate can be created:** Ultimately, the success of any industrial development will depend on underlying investment dynamics, where green investments will be shaped by issues of access to finance, investment security and the business environment more generally. **Framing the green industrialisation agenda as one of opportunities rather than moral duty will be key. As will be providing a policy environment that encourages production of low-carbon goods. From there, economies can move into more complex manufacturing, taking advantage of a widening African market under the AfCFTA.** That then offers the potential for a dual transition of promoting investment in job-creating, low-carbon investments.

Annex: A multi-layered political economy approach: Key questions to understand African green industrialisation opportunities

	Structural and foundational factors	Formal institutions	Informal institutions	Key actors
Global, geopolitical factors	<ul style="list-style-type: none"> - How do deeply embedded economic structures, global resource endowments and historical geopolitical relations or alliances shape the <i>opportunities</i> for countries to green existing sectors or move into new green sectors? (Or to what extent do they <i>reinforce current</i> industrial structures?) - How does exposure to climate risk shape interests and incentives to promote or undermine green industrialisation? 	<ul style="list-style-type: none"> - How much do formal global commitments and processes (e.g. UNFCCC process, COPs, Paris Agreement etc.) support or constrain national green industrial policy <i>opportunities</i> and <i>implementation</i>? - What are the implications of ‘big power’ policies affecting global markets and trade (e.g. the US IRA, or the EU CBAM and CRM policies)? - What are the implications of the existing international financial architecture on Africa’s industrialisation? 	<ul style="list-style-type: none"> - how are global climate processes enforced in practice and how do these shape green investments and their location? - What are the implications of ‘big power’ influence and alliance dynamics affecting global markets and trade in a specific sector? 	<ul style="list-style-type: none"> - What is the role and impact of Chinese, US and European governments and/or multinational company decision-making, competition and investments? - What role for donor support and partnerships or South-South cooperation in supporting green industrialisation?
Continental & regional factors	<ul style="list-style-type: none"> - What is the regional renewable energy potential (hydro, solar, wind)? - What regional energy interconnections and other key transboundary infrastructure is in place and or planned? - What regional value chain legacies can be built upon for greening existing industries or entering new ones? - Are there specific cross-border climate related risks 	<ul style="list-style-type: none"> - How do regional FTAs and the AfCFTA shape opportunities for green industrialisation? - What continental and regional industrial policies are in place, and how much do they reflect green ambitions? - How do ‘green corridor’ and trade facilitation policies and approaches support or undermine green 	<ul style="list-style-type: none"> - How effective are continental and regional green strategies and policies? How might they help to implement and achieve national policies and ambitions? - Where do political relations align within regional groupings or along corridors that 	<ul style="list-style-type: none"> - To what degree can member states align political and economic interests around common continental or regional green industrialisation goals? - How influential and interested are continental and regional organisations to promote green industrialisation? - Who are regional industrial hegemons

	or opportunities that could help shape green industrialisation policies?	industrialisation ambitions?	might be built upon to support RVCs?	and/or influential leaders and how do their industrialisation agendas affect regional green industrialisation opportunities? - what role for regional businesses and private sector associations ?
National factors	<ul style="list-style-type: none"> - What are the main current employment, forex and rent-generating sectors? - What is the role and political importance of fossil and green energy in the current energy mix? - What natural endowments (e.g. CRMs) are present? - What is the state of the energy transmission network (infrastructure)? - What, and how green, is the existing industrial base? 	<ul style="list-style-type: none"> - What industrial policy measures are in place and how effective are they? - How conducive and inclusive is the wider business environment? 	<ul style="list-style-type: none"> - How do state-business relations affect industrial and climate policy choices and implementation? - how are rents currently distributed in relation to fossil fuels and what would a switch to green sectors entail? 	<ul style="list-style-type: none"> - Who are the key stakeholders in key rent-creating sectors? - How important and influential in political discourse is the fossil fuel industry?
Sectoral factors	<ul style="list-style-type: none"> - How does the nature, importance and supply dynamics of fossil fuels and green inputs and technologies offer opportunities for green industrialisation e.g. fossil fuels as transportable, renewable energy less so. 	<ul style="list-style-type: none"> - How does the carbon price affect the commercial viability of a sector? - What sectoral policies are in place with implications for green industrialisation, and how effective are they? 	<ul style="list-style-type: none"> - How are natural resources managed (e.g. mining concessions), and how transparent is the process? 	<ul style="list-style-type: none"> - Who owns major industries, mining concessions? - Who controls which segments, and who benefits from greening, or not greening production?

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This publication benefits from the structural support by ECDPM's institutional partners: Austria, Belgium, Denmark, Estonia, Finland, Ireland, Luxembourg, The Netherlands and Sweden.

ISSN1571-7577