

# Green Metropolises & Green Economic Zones – A New Approach for Establishing Green Economic Ecosystems in the African Continent

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## THE WORLD IS ON THE EDGE TOWARDS SUSTAINABILITY

### Challenges for a sustainable world

The world has to turn. Climate change is the key challenge of human mankind. Like in no other challenge, it is essential to survival that the world must revolutionize its energy supply and industrialization efforts. It is clear and without any doubt, that the West will not be able to feed the future energy demand by own resources and capacities. Steel, chemical and construction material producers will require such huge energy resources, carbon free energy suppliers will not be able to meet with resources from Europe and or US. And this evaluation does not even consider the large volumes of energy required for the future E-mobility in Europe. The Western world faces additional challenges, each one of them with significant impact.

- The demographic shift towards aging population will result in a significant slow down in economic growth in the West and China due to missing human capacity and qualified workforce. Germany's growth already is suffering 0.5–0.7% GDP growth because several hundred thousand of qualified workers and engineers are missing to support economic development.
- Implementation of digitalization by replacing current infrastructure is another key challenge for the West. Having to replace current analog systems and environ-

- ments require huge efforts in terms of change management and reaching buy in of users into the new technology along all levels of society.
- Reconsidering current supply chains and adopting to the new framework of globalization impacted by climate change will be another key challenge for corporates in the West. Considering the CO2 footprint, global logistic bottlenecks, dependencies to single suppliers, limitations of raw materials and rising energy costs will lead to revaluations of current suppliers. Old and proven supply relations are no guarantee for success anymore.
  - Falling back to protectionism and increasing political instability will lead to enormous burden on free trade and multipolar economic development. China-US trade war, Russian political isolation, UKs economic collapse after Brexit, increasing Nationalism in e.g., Brazil, Hungary, and Turkey, and running out of traditional business models based on fossil fuels with harsh consequences on the petroleum producing countries in the world are just some of the daily risks and challenges for sustainable industrialization and development.
  - Water crisis, natural disasters and endangered food security will be additional challenges in the coming years – and it is starting today. The climate is shifting fast already – by the end of the decade the world temperature will increase by 1.5° Celsius already with major consequences for water resources and supply, significant increase of natural disasters and many countries and regions, which will not be able to produce sufficient food volumes for its population. This will be an additional significant burden for the global stability, its economy, and its member states. Building up additional food production resources now, will be essential.
  - Missing global environmental awareness and expertise within governing bodies as well as neglected enforcement of protective measures lead to increasing deforestation, micro plastic pollution of all global oceans, dramatic ground water pollution, desertification, and a gradual extinction of biodiversity. All these effects will lead to instability, migration, and disasters on a global scale.

### **Africa is becoming the true beneficiary of the transition towards sustainability**

Looking just purely at the facts it becomes obvious, that the African continent is elemental and essential for the global transition towards decarbonization, sustainable economic growth and stability in this multipolar world. Like now other region in the world, the continent has the resources, the population, and the strategic location to be the global enabler for the much-needed transition and change.

Africa having by far the youngest population will be best positioned to create human capacity for the future. Africa's youth is hungry for technology and determined to build up a stronger and modern continent. The new generation is not connected to old paradigms and can enter the latest technology development without being blocked or slowed down. For example: Today Africa is by far the biggest and most ex-

perienced region for mobile payment. Nobody did it earlier, nobody has more transactions per day. The true strength of the continent is reflected also by the number of start-ups in the high tech and sustainability sector. Africa's impressive growth rates in these new innovative segments show the true future capacity and opportunity the continent has to offer.

Africa has the resources – not only the raw material resources – but the essential carbon free energy resources. The potential in respect of photovoltaic and hydro energy are unmatched worldwide. Africa can be and will be the dominant energy source in a world of tomorrow. And the world depends on it. But Africa has also the fundamental preconditions to become the key producer of green hydrogen, green methanol as well as green LNG. Looking at the natural resources it becomes very clear that the continent is essential for the future global industrial development and growth. From energy storage to green chemicals – from E-mobility to green fabrics – the world needs Africa. More than ever before.

It will be of the essence for global prosperity and stability to define and develop industrial and cooperation models, that these resources will be utilized on a fast track, but with mutual benefits for the Western off-takers as well as the African providers. Creating value adding industries and building up processing capacity on the continent must be a precondition in a global cooperation model between Africa and the rest of world.

### **INVESTING IN AFRICAN GREEN METROPOLISES IS INVESTING IN SUSTAINABLE SOLUTIONS AND SUPPLY SECURITY**

#### **Urbanization in Africa**

According to a study of the EU Commission (Atlas of the Human Planet written by Pesaresi et al, 2016) the degree of urbanization on the African continent is 81.3 percent. Moreover, Africa is the continent where the degree of urbanization has grown fastest since 1990. The study pointed out that Africa's population has quadrupled in the last 40 years and the density of built-up areas has tripled tripled. Further, it is stated that "between 2000 and 2015 alone, the built-up area doubled. This growth is mainly due to Burundi, Malawi and Niger (built-up area of urban areas tripled from 1990 to 2015), as well as Angola, Ethiopia, Benin, Burkina Faso, Côte d'Ivoire, Democratic Republic of Congo, Gambia, Ghana, Guinea, Mali, Mozambique, Nigeria, Rwanda, Senegal, Sierra Leone, South Sudan, Tanzania, Togo, Chad and Uganda (area doubled) attributed. attributable. Of 74 countries worldwide where both building density and population growth are above the global average, more than half are in Africa, half of which are low-income countries (LICs)."

Based on the results of the Atlas of the Human Planet, the Scientific Service of the German Bundestag (Anonymous 2020) analysed the advantages and disadvan-

tages of urbanization. Because of shorter communication routes and the higher concentration of capital, knowledge and connections to national and international flows of, cities can be seen as engines of the economy. In developing countries in particular, factors such as the availability of electricity, medical care, and drinking water and sanitation also play a role, medical care, and the supply of drinking water and sanitation. However, there are also fundamental problems which are in line with the lack the political and financial capacities to solve problems early and efficiently. The study concludes: "In particular, the emergence of unregulated or informal slums and the slow expansion of the necessary infrastructure (roads, electricity, water, sewage, garbage disposal) infrastructure (roads, electricity, water and sewage, waste disposal, etc.) are general characteristics of cities in developing countries. In slums, people often live illegally or unregistered, so they often have no legal claim to their housing or to benefits from the state or municipality. If they become victims by violence or robbery, they often do not turn to the police. Apart from this, there are problematic aspects that go beyond the impact on residents and their quality of life: cities consume more energy and resources than rural areas and produce than rural areas and produce significantly more pollution in the process."

### Foreign Investments into Africa

The inflow of foreign direct investment (FDI) to Africa showed a clear dichotomy in the past decade: In the relatively economically strong countries of North Africa and in the Republic of South Africa, the funds came predominantly from the Western industrialized nations. In the nearly 50 other sub-Saharan countries, however, China and India led the way in terms of total inflows from 2010 to 2019. This is according to an analysis of data from the United Nations Conference on Trade and Development (UNCTAD). These are "mirror data," i.e., data from the FDI source countries.<sup>1</sup>

With regard on the overall investments, the private capital flow from European countries into Africa is still low. Especially, German companies play only a comparatively minor role in Africa. The reasons why Africa is not lucrative as an investment location for many foreign companies are complex. The main factors are (Martens, 2022):

- The humanitarian disasters and political conflicts of recent years (Somalia, Rwanda, Congo, Sierra Leone, Sudan, etc.)
- Small markets and correspondingly low domestic and regional demand
- Inadequate infrastructure, especially in the communications and transportation sectors
- Low level of education
- High inflation and volatility of exchange rates
- Negative terms of trade
- Extremely unequal income distribution and related political instability

- Lack of reliable incentive systems (interest rates, taxes, etc.)
- High foreign debt and related lack of hard foreign exchange

The political and structural problems are probably the main reason why the African elites themselves do not invest a large part of their capital in their own country. It is estimated that about 40% of their funds end up as flight capital in safe havens outside the African continent. Conversely, capital flight, corruption and mismanagement by these elites are partly responsible for the political and structural problems of many African countries.

However, because of the actual crisis with Russia and the dependence from Chinese economy, Western companies see Africa as the market of the future. Especially with regard on investments into green technologies and sustainable projects the African continent is becoming an interesting. With regard on the limitation factors given ahead new ways are required for making investments in metropolises more secure. In other words, the sustainable development of the African continent can be only accelerated with secure investment conditions. For this it is required to come up with new special economic zones on the continent.

### The Role of Special Economic Zones in Africa

Special Economic Zones (SEZs) go by many different names (including free zones, export processing zones and industrial parks), and come in many varieties. Overall, there is no universal definition. The most commonly used definition of SEZs, is based on the three key criteria: (1) A clearly demarcated geographical area; (2) a regulatory regime distinct from the rest of the economy (most often customs and fiscal rules, but potentially covering other relevant regulations, such as foreign ownership rules, access to land or employment rules and (3) infrastructure support.

Based on the definition given ahead, a Comparative Study on Special Economic Zones in Africa and China was made by UNDP United Nations Development Programme China (Anonymous, 2016). For African counties they came to the conclusion that high-level political commitment and support for effective inter-ministerial collaboration is necessary. Also, the sufficient funding for infrastructure development, joint ventures between foreign SEZ companies and local companies. Further, thrlinking up with universities and Technical Vocational Education and Training (TVET) institutions and high environmental standards is recommended. The recommendation for the Chinese Government to support SEZ are the conduction of training and exchange programme for African government representatives and SEZ managers and to that sets out various models of SEZ legislation, incentives, job creation agreements and procurement agreements for linkages with the local economy. Also, the support of technical education and training for industries targeted by SEZs and the use of energy efficient and renewable energy technologies in SEZs is recommended.

Another study from United Nations Conference on Trade and Development (UNCTAD) has the focus Special Economic Zones (The World Investment Report 2019, Anonymous, 2019). With regard on regulatory framework and governance the study concludes that “numerous governance models exist and the choice depends on the objectives and desired strategic focus of individual SEZs. Also, it is concluded that the “legal framework for SEZs – mostly national SEZ laws or provisions in customs or other legal frameworks – often sets the parameters for these zones’ governance and institutional set-up”. Taking the results of UNDP and UNCTAD into account, it is getting clear that with regard on the sustainable development of African countries the definition of a SEZ must be defined in another way. In the line of fact-finding journeys to Africa, participation at African conferences and many discussions with African stakeholders from politics, business science and finance, the concept for Green Special Economic Zones (GSEZ) for Africa has been developed by the authors and their partners. Additionally, a global benchmarking with three leading zones was conducted to identify the best model for African Green Special Economic Zones. The benchmarks were Dubai International Financial Center, Lithuania and Suzhou International Park. As a result, the integrated approach for the development of Green Special Economic Zones for Africa was developed (Figure 1). The new definition of a GSEZ is as follows:

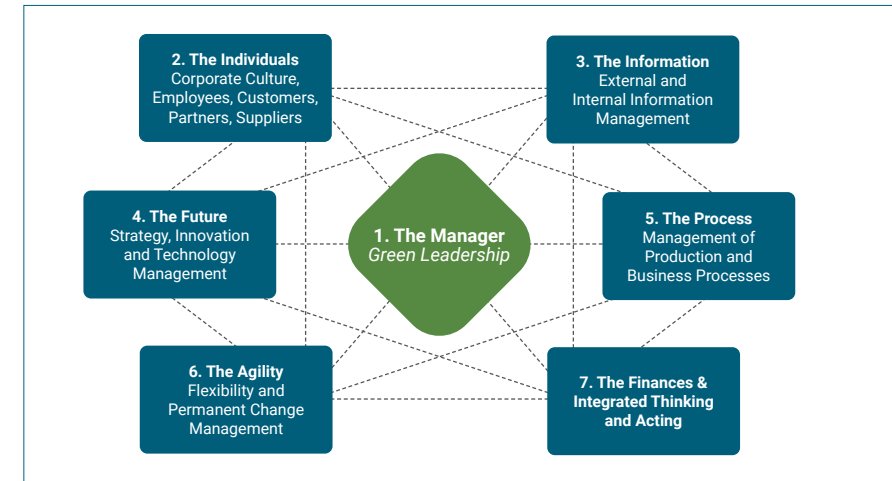
- A clearly demarcated geographical area inked to a metropolis
- A regulatory regime distinct from the national laws and of the national economy
- Regulatory led by an independent steering board.
- Clear focus on green industry sectors using green technologies and digitisation
- Centres of excellence for research, education and training with linkage to international partners
- Sustainable business strategy where profits are re-invested in the country.
- GSEZ regulations based on a carbon zero strategy

With the establishment of new special economic zones on the continent, Africa will present global benchmarks in terms of transparency, rule of law, ease of business and administrative efficiency. Africa will be one of the most attractive and secure investment destinations for Multinational corporations. Utilizing digital processes, artificial intelligence and blockchain tools will maximize investor’s security as well as enforce proper compliance procedures.

### A new Framework for Green Technology Management in Green Economic Zones

*Innovation in green technologies and digitisation are the key to successfully mastering the challenges of the future. With new green and digital technologies new solutions and ways can be created to slow down climate change and to raise living standards in*

**Figure 1:** Green IMLead®-Heptathlon for Innovation & Sustainable Development (Copyright 1984–2021, Rolf Pfeiffer & Bertram Lohmüller)



*emerging countries.* In order to bring green technologies into emerging markets the methodical framework Green Management & Leadership was developed by Lohmüller and Pfeiffer (2020).

Green IMLead®, stands for integrated management and leadership with focus on the implementation of digital applications and green technologies (Figure 1). The idea is to pool different approaches to technology and management with a focus on managers and project leaders responsible for spearheading specific green projects. Managers are equipped with “green” leadership skills for managing individuals such as staff, suppliers, and customers. Managers can be defined as relevant persons from both companies investing into GESZs and persons involved in the management of GSEZs. They also bear responsibility for managing external (market and business environment) and internal information (data gathered from processes, product data, data derived from infrastructures). These days, managing information has strong overlaps with digital solutions, artificial intelligence, and Industry 4.0 solutions (connected factories). Innovations with a bearing on emerging technologies and business models are an important prerequisite for dealing with current and future market requirements. Suitable production and business processes are required to manage integrated waste management systems, but they tend to be overhauled in faster and faster development cycles. As a result, it’s important for managers to be agile and possess the right change management expertise. Ultimately, all of these activities need to be financed and all fields need to be connected and integrated into one another. This should also be reflected in the know-how offered by managers and scientists in adopting integrated action and thought.

The Green IMlead® model is used a framework to integrate green technologies and digital applications into GSEZs.

### PILOT “SPECIAL BATTERY ECONOMIC ZONE IN DRC” – A MODEL FOR DEVOPLING GREEN METROPOLISES

One of the key drivers for the new definition of GSEZ in African counties was the interest of African governments in investments into green technologies. The discussions with leading African and European companies have shown that they see a great potential in Africa. But because of instability, corruption and political risks the concerns for investments are very high. In the discussions with CEOs from leading technology companies it got clear, that investments are only possible when economic zones with an independent legal framework are existing.

Also, it was realised, that there is a change in the strategy of African governments for developing their countries. In the discussion with leading politicians as presidents and ministers of more than 20 countries at the DRC-Africa Business Forum in Kinshasa (24–25 November 2021) it got clear that they are willing to support the green transformation of their countries. Also, it was seen that they are willing to develop new and independent regulation for the GSEZs in their countries.

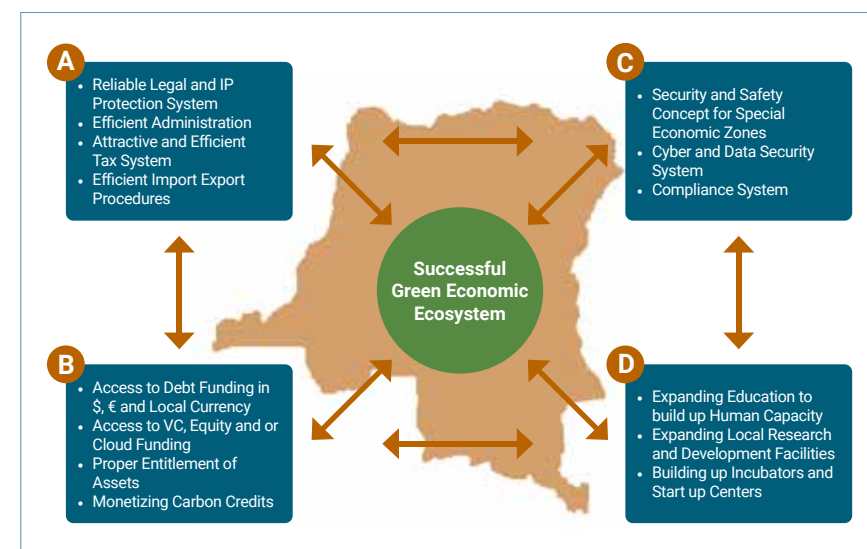
A first result it was agreed with the Government of Democratic Republic of Congo to develop a pilot framework on Battery Green Special Economic Zone. The aim is to establish infrastructure and manufacturing for the whole value chain of battery production for delivering to both African and European markets. The new Green Special Economic Zone in DRC has following objectives:

- Developing a framework/best practice blueprint to establish and implement a transparent, efficient, and sustainable ecosystem
- The new unique structure of Congo Battery Special Economic Zone gives it a robust regulatory and legal framework that provides the Zone’s clients and investors with a safe and secure ecosystem to conduct their business.
- All business registered at the Congo Battery Special Economic Zone are subject to the laws of the Congo Battery Special Economic Zone that will be enacted to administer day-to-day operations of the firms and individuals in the Zones.
- DRC’s Battery Special Economic Zone’s new unique legal and regulatory framework will be based on international standards and principles of common law that is tailored to the region’s unique needs, creating the optimal environment for industries and services to grow.

With support of UNECA United Nations Economic Commission for Africa and African Export-Import Bank it was agreed to develop a framework including following aspects (Figure 2):

- A) Reliable legal and IP protection system, efficient administration, Attractive and efficient tax system, Efficient Import Export procedures  
 B) Access to debt funding in \$, € and local currency, Access to VC, equity and or cloud funding, Proper Entitlement of assets, Monetizing Carbon Credit  
 C) Security and safety concept for special economic zones, Cyber and data security system, Compliance System  
 D) Expanding Education to build up human capacity, Expanding local Research and Development Facilities, Building up Incubators and Start up centers

**Figure 2:** Integrated approach for the development of green special economic zones for Africa (figure developed by the authors)



On important point for realizing a concept for a GSEZ is the deep involvement of key stakeholders from all areas. In the project Green (Battery) Economic Zone these are:

1. Government of the African Country. Democratic Republic of Congo (DRC)
2. Financial Institutions
3. Non-Governmental Organisations as UNECA
4. Congo Green Zones Joint Steering Council.
5. Experts & Advisors for a steering council Prominent and respectful international Council members will enhance investor’s confidence and trust and will support the successful business development in the DRC.
6. Experts in following areas: Customs & Tax, Sustainability, Security and Safety, Communication & PR

**Figure 3:** Structure of the green special economic zones – zones in the Democratic Republic of Congo (figure developed by the authors)



The structure of the Battery GESZ is shown in Figure 3.

Cross continental approach versus protective measures and single interests are shown in the current efforts to develop technology leadership in Africa. Best practice sample is the new Center of Excellence for battery technology in the Democratic Republic of Congo. The new research center with significant global relevance will be a joint venture between leading edge academic institutions from the DR Congo, Zambia, Japan and Germany. Some of the best and brightest scientists and researchers will cooperate on a global scale to develop the latest technology in the battery space for the continent and will enable Africa to expand its production capacity by qualifying and educating Africa’s best talents in this technology segment.

And these battery developments show the true strength of the continent – Africa has the minerals and materials to produce Batteries, it created an optimal and stable eco-system for investors, has access to technology, research and builds up highly qualified human resources, has beneficial free trade agreements with the European Union and the United States and has clearly a huge cost advantage against any competitor from Asia and or the West. – and has the capital to implement it fast track.

**CREATING INVESTMENT CAPACITY FOR SUSTAINABLE LOCAL PROJECTS**

**The world’s responsibility: Protecting the Rain Forests in Africa**

It is of the essence that the world protects its existing rain forests.

Rainforests are sanctuaries of Biodiversity. Experts estimates that we are losing 137 plant, animal, and insect species every single day due to rainforest deforestation. That equates to 50,000 species a year. The Congo Basin is the second-largest tropical rainforest on Earth. The Congo Basin is a mosaic of forests, swamps, and savannas twice the size of Alaska. It is home to some of the world’s most endangered species, like African Forest Elephant, Okapi, Grauer’s Gorilla, Bonobo and Congo Peacock. Rainforests store billions of tons of carbon - Protecting tropical forests is one of the best ways the world can fight climate change right now.

In close cooperation with the Steinbeis University, rainforest conservation projects are getting developed in order to protect Africa’s biodiversity, to remain the CO2 storage capacity and to monetize carbon credits resulting from the rainforest protection measures.

These projects are truly win-win projects, for the world, for Africa, and its people living in the forests. The forests are protected, green funds are generated and can be invested in sustainable industrialization, education, and healthcare in the local communities.

Africa is leading the way again. By establishing one of the first digital carbon credit trading platforms, Africa is on the way to become the leading global supplier of sustainable and valuable CO2 certificates. Utilizing blockchain security and transparency features, it will revolutionize the trade with carbon credits. Another example of Africa’s fast track development towards digitalization and leading-edge technologies.

**Africa as a Key Location for Renewable Energy**

Large scale bio-gas production, organic fertilizer, prefabricated sustainable social housing, plastic recycling, smart and vertical farming, digitalization and utilization of Artificial Intelligence, green hydrogen and methanol, hydrogen locomotives, bio-



gas hybrid tractors and bio-LNG hybrid container ships, green construction steel and large-scale sustainable fabrics and textiles, and stratospheric drones delivering high resolution earth data for climate change research – just to list some of the opportunities for international companies to participate.

Like no other region Africa offers technology and engineering companies ample room to grow for the next decade to come. To show the significant demand: Africa needs urgently proper waste management. Over 90% of the waste is not recycled and disposed without adding value to its economy. Even worse Africa's waste is a major contributor to groundwater pollution and uncontrolled CO2 emissions.

On the other hand, hardly any other region offers such volumes and good quality of organic waste. According to initial data and on the ground research, the continent has enough organic waste to produce sufficiently Bio-CH4 to run over 28m passenger cars all year long and to produce about 17m tons of organic fertilizer and 11.6 m tons of Green Methanol. Utilizing these resources will be a game changer in terms of energy supply, independency of diesel imports, sustainability and high-quality fertilizer for Africa's agricultural sector. Therefore, it is a huge market for international technology and engineering companies, specialized in waste separation processing, biogas treatment and fertilizer production.

Preliminary feasibility reviews and studies have shown that the payback period after start of production is less than 5 years.

Africa has a tremendous need for sustainable social housing with decentralized power solutions. Prefabricated housing units, utilizing natural building materials such as hemp, will have a great future on the continent. With green funding mechanisms in place this industry can expect above average GDP growth. Technology is known and proven for years in Europe. Localizing the technology will enhance the cost competitiveness, will support sustainability and decentralized power solutions will relieve national grids and reduce consumer power spendings.

Again, a major opportunity for international engineering and renewable power companies to localize the technology and to form long term partnerships with key local players. With regard on the world's green future it can be stated that no other region in the world can create such an outstanding environment for sustainable industrialization.

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