

***ETHIOPIA 2050: Grand Challenges & Opportunities***

***December 19-20, 2019***

***Addis Ababa, Ethiopia***

**Transformational infrastructure for  
inclusive and sustainable development in  
Ethiopia**

Desta Mebratu, Centre for Complex Systems, Stellenbosch University

Email: [desta@spl.sun.ac.za](mailto:desta@spl.sun.ac.za), [dmebratu57@gmail.com](mailto:dmebratu57@gmail.com)

# Vital signs of transformational moment

- ▶ *Systemic scarcity*: faced with confluence of Socio-economic and socio-ecological challenges of a global proportion resulting in a **resource and carbon-constrained world**
- ▶ *Institutional failure*: existing dominant **development paradigm and governance mechanisms** have significantly failed in addressing existing and emerging challenges
- ▶ *Emergent solutions*: growing body of **disruptive technology and knowledge systems** that could potentially provide long-term solutions to the key challenges

*All vital signs indicate that we are in a **transformational century** of historic proportion that may determine the destiny of humanity.*

# Why transformational infrastructure for Africa?

3

- ▶ More than **70% of the infrastructure** most African countries need for their development is yet to be built and hundreds of billion dollars is needed in the coming decade to fill existing infrastructure gaps
- ▶ The choice of infrastructure made in the coming decade will determine African countries capacity to make the transition to an **inclusive, low-carbon, climate resilient and resource efficient** economy that improves the wellbeing of its people
- ▶ Digitization of the global economy is expected to **redefine economy of scale** and have transformational effect on key systems including energy, manufacturing, and global supply chain systems in the coming decades
- ▶ African countries have a **unique leapfrogging opportunity** to a more sustainable economy that have higher potential to create more jobs and reduce poverty provided that they make an informed decision on their infrastructural investment

# Techno-economic drivers of the 21<sup>st</sup> century

- ▶ **Digitization:** as a result of the exponential development in the field of information and communication technology, **digitization of the global economy** has become one of the most defining drivers of the global economy in the twenty first century
- ▶ **Distributed renewable energy systems:** offer an unprecedented opportunity to **address energy poverty** and provide the basis for economic empowerment and eradication of poverty through a bottom-up process
- ▶ **Distributed manufacturing:** entails a transition from conventional mass production to mass customization that redefines economies of scale and promotes wellbeing through **distributed economy networks**
- ▶ **Self-organizing urban systems:** emergence of more stable and sustainable urban systems that operate as a **self-organizing socio-economic system** that is adaptive and productive both in terms of job creation and livelihood provision

# Lock-in and leapfrogging effect of emerging technologies

	Emerging technologies	Application regimes	Conventional outcomes	Transformational outcomes
1.	Artificial intelligence	Digitization and robotization	Consolidation of mass production and consumption resulting in huge job losses and concentration of wealth	Promotion of mass customization of production and consumption aimed at improved productivity and community empowerment
2.	Block chain technologies	Distributed ledger of transaction	Speculative capital accumulation through crypto-currencies	Promotion of distributed economy via efficient supply chain networks and digital local currency
3.	Biotechnologies	Genetic engineering	Narrow application aimed at power control and consolidation in the name of progress	Systemic applications aimed at improvement of human and ecosystem well being

# Four key principles for Industry 4.0 (Schwab, 2018)

- ▶ **Systems not technologies:** it is important to focus on systems that deliver **well-being** rather than being tempted to focus on technologies themselves.
- ▶ **Empowering not determining:** It is very important to value **human decision-making and agency** and design systems that harness new technologies to give people more choice, opportunities, freedom and control over their lives.
- ▶ **By design not by default:** society should not resign itself to the inevitability of default options. Design thinking, guided by **human-centred design**, as well as systems thinking approaches can help the world
- ▶ **Values as a feature not a bug:** we need to debate **values at all stages of innovation** as they are baked in design of all technologies

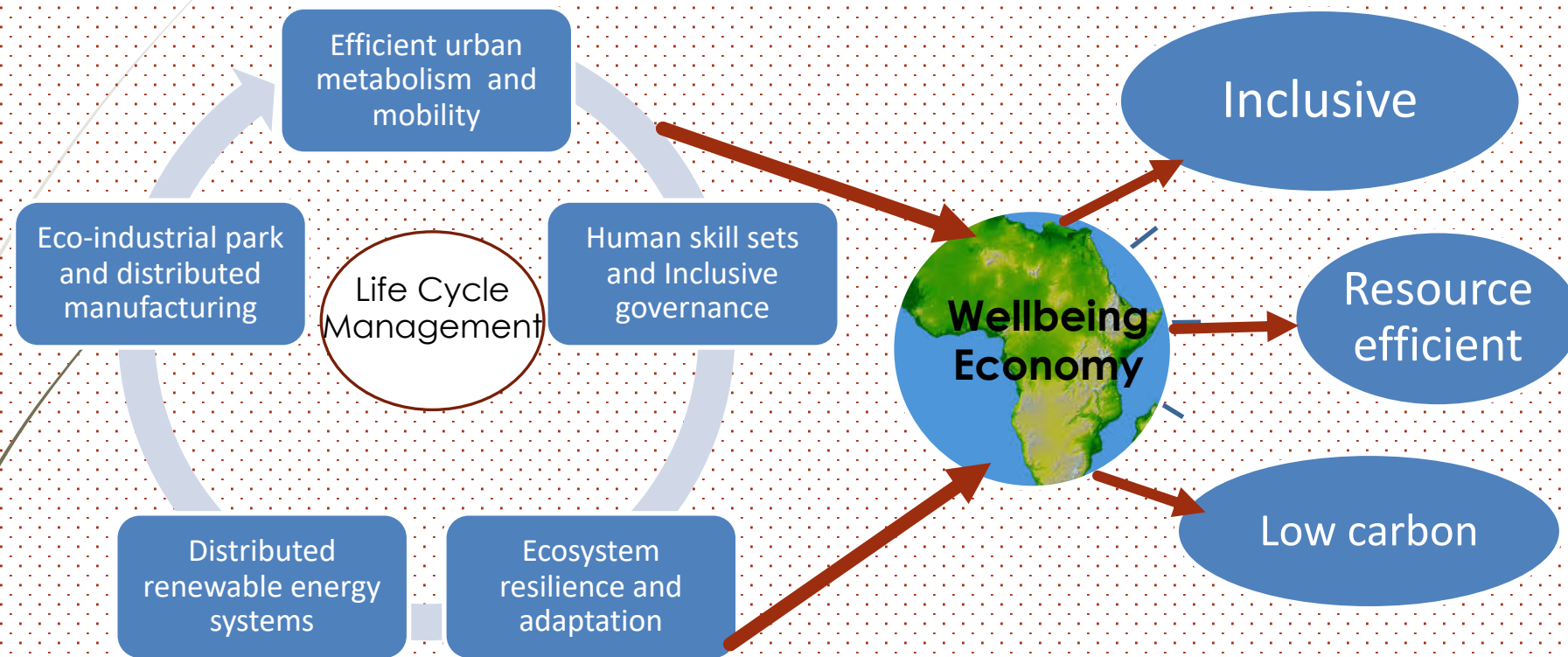
# Critical sectoral considerations

7

Critical infrastructure	Transition considerations for Africa
<b>Ecological</b>	Strengthen <b>resilience-building</b> approaches in management and governance of social-ecological systems through ecosystem-based adaptation and nature-based solutions
<b>Energy</b>	Policy and investment preference to <b>renewable energy development</b> with particular focus on promotion of distributed energy systems
<b>Industry</b>	Develop <b>eco-industrial parks</b> that have strong vertical and horizontal integration with local and national economies as a basis for inclusive and sustainable industrialization
<b>Urban</b>	Move to <b>smart urban infrastructure design</b> and development that combines light-touch top-down planning with bottom-up initiatives that are spontaneous, adaptive and collaborative.
<b>Governance</b>	Incorporate sustainability transition in <b>African developmental states</b> with a mandate and capabilities to facilitate new modes of governance within reconfigured inclusive polities



# Transformative infrastructure for Wellbeing Economy



Source: Mebratu D. 2019. Transformative leapfrogging to Wellbeing Economy in Africa; In Mebratu D & Swilling M, Transformational Infrastructure for development of a Wellbeing Economy in Africa, African Sun Media, Stellenbosch.



# Concluding points

- Ethiopia has huge **potential of leapfrogging** into an inclusive, climate-resilient and resource efficient economy that effectively contributes to the improvement of the wellbeing of its people
- This would require avoiding **possible infrastructural lock-in** that may result in stranded assets that may have least investment return at best or significant socio-economic socio-ecological damage at worst
- Emerging technologies and knowledge systems create more favourable conditions for **combining top-down** strategic planning with **bottom-up** operational planning that create more jobs and reduce poverty at the local level
- Ethiopia's possibility for transformative development is dependent on its ability to **create a dynamic innovation space** that is responsive to the specific context of resource and needs of its people



African countries face unprecedented challenges of defining a future development pathway in a resource- and carbon-constrained world. This book addresses this challenge, with special reference to the set of infrastructure that most African countries require to meet the sustainable development goals and fulfil the aspirations of Agenda 2063. Infrastructure is a key factor that determines how resource and energy flow and transform through socio-economic systems. Decisions made today by African countries on their infrastructural configuration will determine the inclusivity, resource intensity and climate resilience of their development pathways for decades to come. This book is a product of a two-year research conducted by a group of African scholars who have an extensive academic and practical experience on the development of key infrastructure sectors in Africa.

*"Shifting the overall focus of development from growth to wellbeing economy resonates well with the needs and aspirations of Africans. This book makes a valuable contribution to the realisation of the objectives of Africa's Agenda 2063 on industrialisation, urbanisation, energy, and the environment."*

— H.E. Mrs Sahlework Zewde  
President, Federal Democratic Republic of Ethiopia



*Desta Mebratu is an Extraordinary Professor at the Centre for Complex Systems in Transition, Stellenbosch University. He has more than 30 years of experience working for industries, government agencies, universities and international organisations. He is Fellow of the African Academy of Sciences (AAS), the Stellenbosch Institute for Advanced Study (STIAS) and other institutes for advanced study.*



*Mark Swilling is a Distinguished Professor of Sustainable Development in the School of Public Leadership, Stellenbosch University, the Academic Director of the Sustainability Institute and Co-Director of the Centre for Complex Systems in Transition. He has published widely on topics related to sustainability and sustainable development.*



# TRANSFORMATIONAL INFRASTRUCTURE

for Development of a  
Wellbeing Economy in Africa



DESTA MEBRATU  
MARK SWILLING

EDITORS