Building Innovation Capabilities for Sustainable Industrialisation

Renewable Electrification in Developing Economies

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RE-IGNITING AFRICAN INDUSTRIALISATION THROUGH INNOVATION

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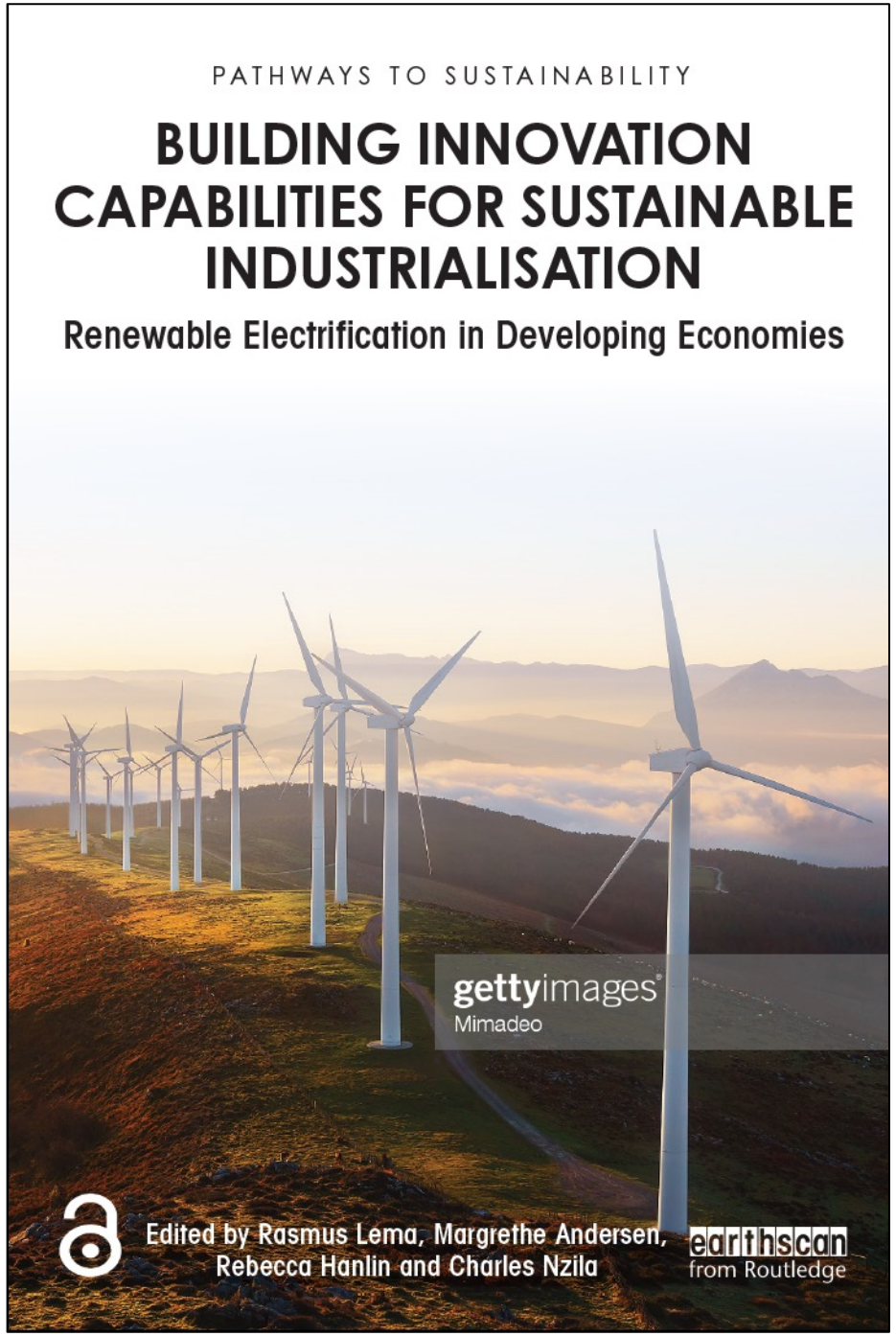
The forthcoming book

- Published in the ‘Pathways to sustainability’ series from Earthscan/Routledge
- 12 chapters summarising key findings from the IREK project and a few related research activities
- Edited by Lema, Andersen, Hanlin and Nzila
- Currently in production, expected publication in October or November



The project

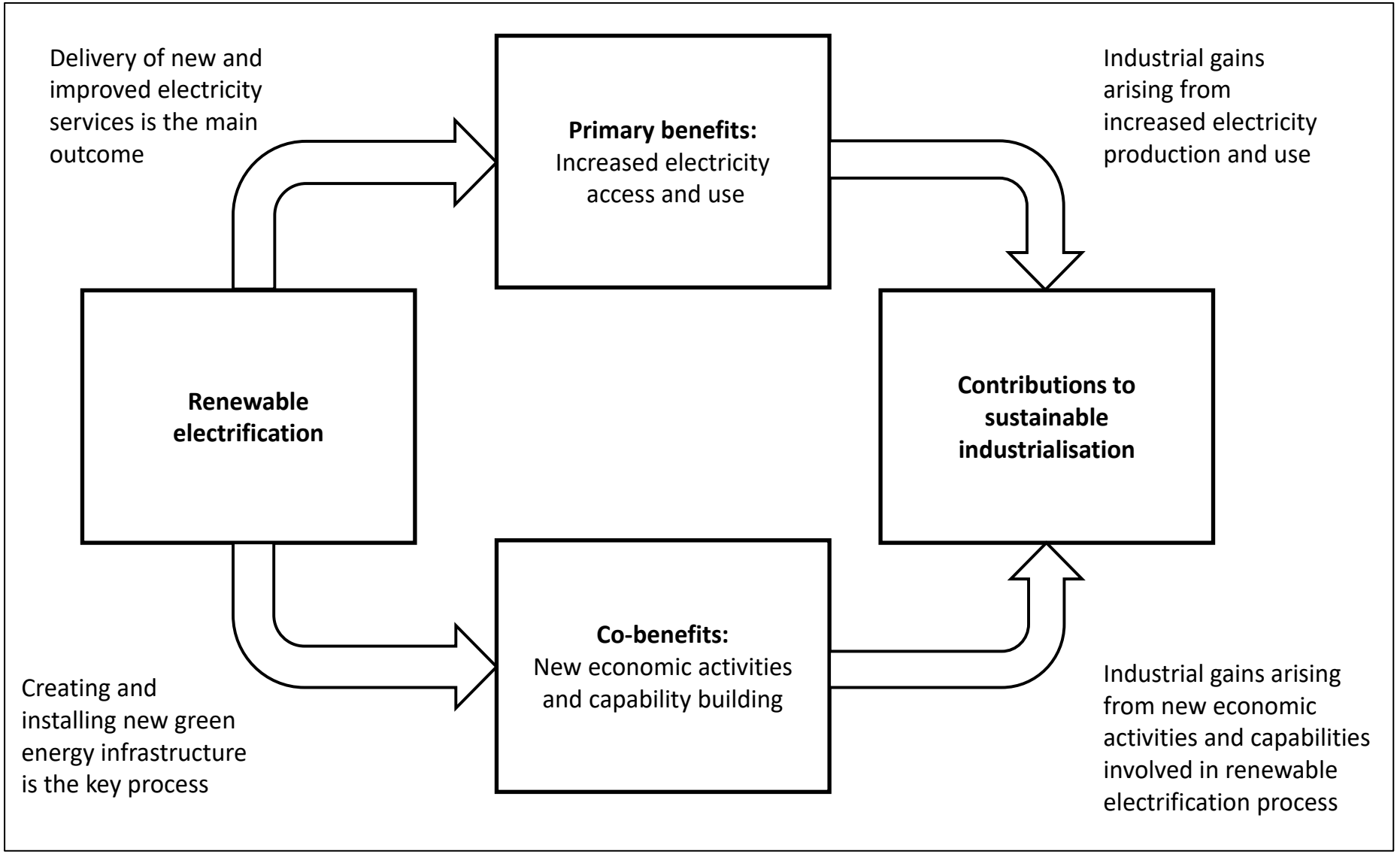
Innovation and Renewable Electrification in Kenya (IREK)

- Five-year project funded by Danida, ending this year
- 3 participating institutions:
  - Aalborg University (Department of Business and Management)
  - African Centre for Technology Studies (ACTS)
  - Moi University (Department of Engineering and Department of Business)

The starting points

- *Renewable electrification (RE)*: includes both the creation of access to electricity to formerly non-electrified communities as well as transformation of existing energy systems with renewables. Ongoing process across countries SSA.
- *Sustainable industrialisation (SI):* has a double meaning, (a) it is environmentally friendly and (b) it can be sustained in the long run. Contributes directly to the process of economic restructuring and adherence to planetary boundaries. Innovation capabilities are key.
- Does the former contribute to the latter? To what extent, where and how? *How do we shape RE pathways to maximise the SI outcomes?*
- This project/book seeks evidence mainly from Kenya, but also from Ethiopia, Uganda and Tanzania

Focus on economic co-benefits



The key themes and questions

- *Project design, organisation and linkages*: RE is typically a project-based activity and projects have different anatomies.
  - How are local actors involved? How much local content is provided and what is the nature? What is the nature of linkages between local and foreign actors, and to what extent do they include elements of knowledge transfer and capacity-building?
- *Deployment model and choice of technology*: RE involves different types of technology (e.g. solar and wind) and modes of deployment, e.g. centralised and decentralised.
  - How do such characteristics matter for the associated opportunities and outcomes in terms of local industrial activity and capability-building in and around the project?
- *Policies and political actors:* Multiple policy domains are important at local and global scales.
  - What policies are in place to foster SI gains? How do they affect the realisation of SI outcomes? What opportunities and obstacles are important for maximizing these outcomes?

Project design, organisation and linkages

- Foreign dominated modes of project organisation is the norm, often marginal or less ‘strategic’ involvement [10, 7].
- It matters greatly how projects are organised: Most EPC contracts are ‘full package’ models that leave little room for significant local participation in higher-value and learning intensive tasks [10].
- The main economic co-benefit is jobs directly involved (but temporarily) in construction [4]. Currently, local learning-by-doing is limited in most projects – it does not occur extensively as a natural by-product project deployment activities. (add 8?)
- Projects with less capital intensity and complexity provide better economic co-benefits [9, 4]
- Upfront planning for enhanced economic co-benefits is key (add 8 ?)

Deployment model and choice of technology

- Evidence that local learning and industrialisation gains (local service and manufacturing inputs) tend to be higher in small projects as compared to large ones [4].
- Small projects may have local EPC provision, which can also have a bearing on backward linkage formation, but foreign firms still tend to design them [7].
- Local capabilities are higher in Solar PV (including home systems [9]) and small hydro compared to wind and geothermal [6].
- Choice of technology matters in this respect, but the choice is also about organisational modes [4].

Policies and political actors at the national and global level

- There is unequal policy attention and active innovation system formation across technologies, influencing both deployment levels and industrial gains [5]. Limited attention to ‘economic arrangements’ for deployment [9]
- Overall, deliberate policies towards capability development are rarely formulated and implemented [11]. But some interesting exceptions exists [8].
- Policies for larger local involvement and linkage creation – in particular local content policies (LCRs) – are becoming more pronounced, but not fully implemented and enforced [11].
- LCRs difficult because of internal capability constraints and external competition [9]. And sometime circumvented during implementation [10].

Pointers for policy

- Expand persistently the policy focus from primary benefits to economic co-benefits
- Align and co-design energy and industrial policy
- Seek to attain bargaining power, e.g. in auctions
- Find niches in attainable spheres, depending on local context, for active industrial/innovation policy
- Capability development needs to be centre-stage in policy design, across industry policies, education system development etc.
- National agencies, involving other actors, need to facilitate knowledge transfer between successive and otherwise unconnected projects

Key pointers for policy action

1. Combine plans of energy system greening with industrial development and technological development strategies. This requires that policy domains that typically develop separately – i.e. i.e., the energy-environmental and industrial development domains – are aligned, co-designed, and developed in conjunction.
2. Ensure frameworks for project selection, such as auction systems, and increase accountability and selection criteria across a broader set of industrial development goals as opposed to just energy production.
3. Make local co-benefits a key criterion for selection of projects. Devise and use impact assessments for skilled jobs, local content, and capability development prior to any project decision.
4. Re-balance the emphasis in on capability development in energy projects away from the conventional focus on renewable energy project service delivery (operation and maintenance) to pay more attention to renewable energy project infrastructure delivery (particularly project design and execution).
5. Create in-depth maps of renewable energy supply chains and focus on capacity and capability- building in 'zones of proximate development' (capabilities that are within reach, but not yet acquired/built locally) in both the manufacturing and deployment chains of sustainable energy projects.
6. Create learning spaces such as experimental projects (sustainability experiments), that try out not only different types of technologies, but also different new types of project management, localised supply, and community involvement. Document and use the experience in revising project selection and design criteria.
7. Create national agencies that can function as vessels of domain expertise, enable systematic learning, and facilitate knowledge transfer between different successive and otherwise unconnected projects.
8. Create a network of national '"centres of excellence'" in universities and vocational training institutions and make sure to insert national education institutions into renewable energy projects as partners/learning consultants.
9. Help national consortia to bring together finance from impact investors with local and global companies for projects that meet the multidimensional sustainability criteria and related learning objectives.
10. Build multi-stakeholder global coalitions to define and implement mission-oriented innovation programmes with the aim to use greening transformation initiatives to foster structural change. Make finance from progressive institutional investors a cornerstone .

Overview of chapters

1	*Renewable electrification and sustainable industrialisation*	Hanlin, Andersen, Lema and Nzila
2	*Conceptual framework*	Andersen and Lema
3	*Challenges and opportunities for the expansion of renewable electrification in Kenya*	Ogeya, Osano, Kingiri and Okemwa
4	*Centralised and decentralised deployment models: Is small beautiful?*	Hansen, Gregersen, Wandera and Hanlin
5	*Understanding the diffusion of small wind turbines in Kenya*	Wandera
6	*Are the capabilities for renewable electrification in place?*	Nzila and Korir
7	*Interactive learning and capability-building in critical projects*	Rebecca Hanlin and Josephat Okemwa
8	*Interactive learning spaces: Insights from two wind power megaprojects*	Gregersen and Gregersen
9	*Building foundational capabilities in Kenyan and Tanzanian off-grid solar PV firms*	Karjalainen and Byrne
10	*Chinese green energy projects in sub-Saharan Africa: Are there co-benefits?*	Bhamidipati, Gregersen, Hansen, Kirchherr and Lema
11	*Capability development and local content: policy process and stakeholder perspectives*	Kingiri and Okemwa
12	*Lessons learned and their implications*	Lema, Andersen, Hanlin and Nzila

Thank you!

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