

# Innovation and Renewable Electrification in Kenya

## Introduction

As the global climate change regime moves ahead towards fulfilment of the Paris Agreement, there are increasing investments related to climate change mitigation and adaptation in poor countries. Ensuring that the most adequate technologies are selected and that they are diffused and used in a way that utilises the potential for economic development is a major challenge.

The IREK project has studied the deployment of low-carbon technologies in Kenya – in particular solar photovoltaic and wind power – and the creation of local (business?) linkages and learning. As a first step it has taken as its starting point the role international sources of knowledge can play for Kenya. It has explored whether or not foreign actors have the potential to provide relevant low carbon technologies that bring economic benefits to local actors and organisations. As a second step it has studied what kind of public policies, institutional settings and participatory organizational forms are necessary to realize such a potential and thereby contribute to fulfilling the imperative sustainable energy for all. By combining expertise in engineering, technology studies, economics and policy analysis the project provides new insights concerning deployment of green technologies that are highly relevant to policymakers and other stakeholders in developing countries and international organisations.

## Results

The main results of the project fall into three categories: research capacity building in and between partner organisations, new original research and engagement in advisory work with key stakeholders.

*Capacity building:* The project has had several direct and indirect beneficiaries from the research and PhD training capacity building activities: First, three PhD students have benefitted from direct and targeted training in innovation and development and associated research methods. Students have benefited from access to existing Ph.D. training programs and supervision by project staff. Second, institutional capacity has been enhanced at ACTS, Moi University and Aalborg University in the general field of innovation and development research, associated survey and case methodologies and specifically in research related to the green transformation. For example, the project has enabled the building of Kenya's first nationwide database on renewable energy projects. Third, there has been direct impacts that extend beyond partner institutions through involvement and mutual learning involving the Kenya Climate Innovation Centre, The Stockholm Environment Institute in Nairobi and the UNEP-DTU partnership.

*Original research:* The project adopted the approach of developing an overall conceptual framework which could be applied in various empirical studies in different work packages. The project thus added value both in terms of an enhanced understanding of theoretical frameworks that are useful for analysing innovation and development issues in Africa and by shedding light on possible co-benefits from renewable energy projects and in terms of substantive research findings in different technology domains, sectors and countries. Our research builds on a combination of surveys in Kenya and internationally with in-depth case studies of critical projects on renewable electrification and PhD research focusing on wind and solar energy mainly in Kenya, but also in Ethiopia and other African countries. The research has also included studies on global value chains and China's engagement in renewable energy in Africa in particular. The project has thus been prolific in creation of research outputs. The main consolidated output is the book entitled 'Building Innovation Capabilities for Sustainable Industrialisation - Renewable Electrification in Developing Economies', which was published in the Pathways to Sustainability Series by Earthscan/Routledge. The project also generated at least 11 articles in high-quality journals with 3-4 more journal articles on their way and 8-9 working papers, all available at the [project website](#).

*Stakeholder engagement:* Interactive learning with policy makers and other stakeholders was an integral part of the project design. The main value added of the research is an enhanced knowledge on how capabilities for renewable electrification in African countries may or may not develop and what policies may help enhance capability building. A key aim was to provide a better foundation for selecting and deploying available technologies in a way that increases local economic and social development. Through interactions with policy-makers and other key stakeholders from the energy sector (researchers, civil society, private sector), the project has contributed to enhanced understanding of how local content requirements and improved educational policies can help support local capability development. The project also directly contributed to Parliamentary debates on the 2019 Energy Bill.

## **Conclusions and Recommendations**

Identifying economic opportunities, including learning opportunities, involved in the process of renewable electrification in developing economies was the overriding research aim of the project. We are particularly focused on the economic co-benefits that can be attained from renewable electrification efforts in developing economies. Specifically, how these can be used to build long term learning and capabilities that have broader relevance for the economy than simply through the provision of green electricity. It is clear, however, that achieving these opportunities is not an automatic process. Instead, it requires appropriate policies. The results generated in the various elements of the project have a range of important policy implications.

However, these suggestions are all underpinned by one central idea running through this project, namely the need to make economic co-benefits a requirement of green transformations in developing economies. This necessitates persistent expansion of the policy focus from primary benefits (provision of clean energy) to economic co-benefits (green dividends, including technological learning, supply chain development and job creation). It also entails that production and innovation capability development is put centre-stage in all aspects of green transformation policy, such as those dealing with local firms, projects and organisations relevant for renewable electrification.

Below are some of the key recommendations coming out of the project. We call these steps key ‘pointers’ for policy-action because they need to be carefully interpreted, assessed and shaped depending on circumstances, local industrial context, specific features of the technologies in question etc.

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., 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 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.