

Foundational capabilities in the off-grid solar PV sector in Kenya and Tanzania

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Methods and data

- Two independent researchers
- Literature review
- Environmental analysis and horizon scanning (trends, weak signals)

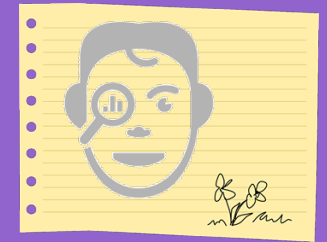
- Data collected (2007-2014)
- Field and desk-based work
- Over 100 hours of interviews, two workshops

- Data collected (2014-2019)
- Database of off-grid solar PV firms
- Selected case studies and interviews
- Categorisation of firms in a typology

- Reflection of the analysis and interpretation of the findings
- Consideration of key uncertainties

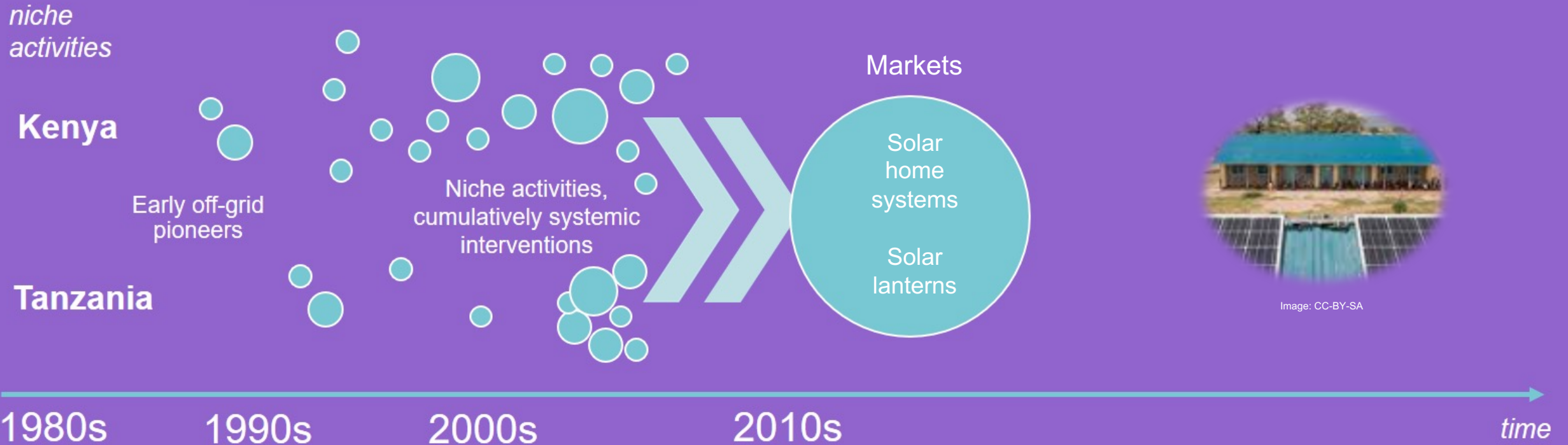
Research framework

- Building on past and recent history, the learning revealed by off-grid solar PV firms was studied. We also reflected on the economic value.
- Multiple primary data (fieldworks, participatory observations, sector and niche interviews). Secondary data (industry, media, market and development reports)
- Innovation capabilities of firms a proxy for learning in industry / market contexts. Established a typology of off-grid solar PV companies' (n=92) innovation capabilities



Off-grid solar photovoltaics in Kenya and Tanzania

Establishment of foundational capabilities

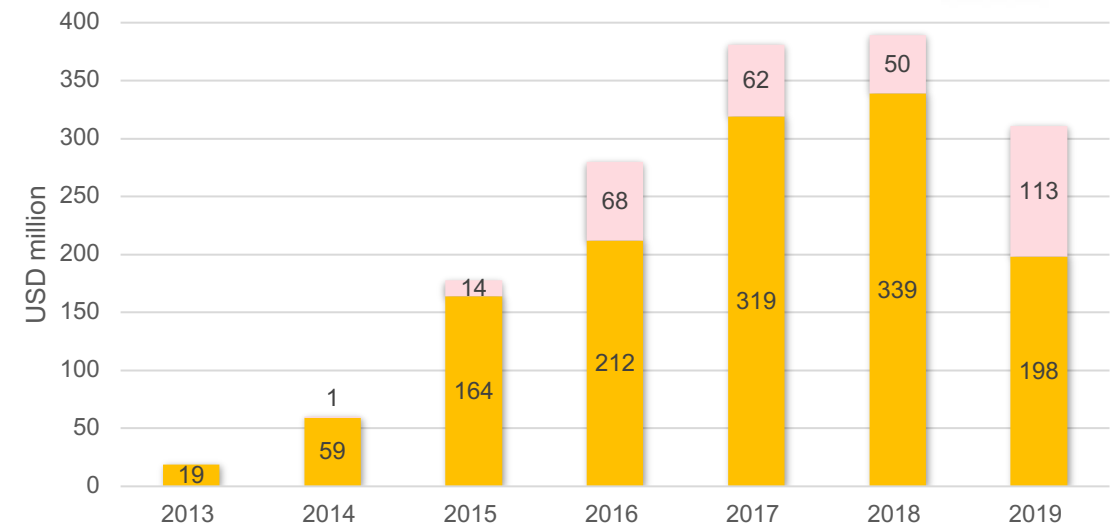


Off-grid solar photovoltaics sector in 2010s

- Considerable evolution especially in the pioneering off-grid solar PV niche(s)/ markets of Kenya and Tanzania
 - From pico-products (solar lanterns, solar home systems) to niche divergence (mini-grids), adoption of the pay-as-you-go model
 - **Kenya** a continental / global leader in off-grid solar PV, and with **Tanzania**; as mobile money forerunners; begin to attract diverse investment
 - Expansion into new geographies, also Lighting Africa's pilot in Kenya replicated in around 40 countries across the continent and the globe (Lighting Global, GOGLA, ESMAP 2020)
- Globally, the off-grid solar sector has grown into a US\$ 1.75 bn annual market, claims to serve hundreds of millions of people



REN21 EAC Regional Status Report



Global investment, debt and equity, in off-grid electricity access start-ups (Data: REN21 2019; 2020)

Snapshot of firm capabilities in Kenya and Tanzania

n=92 (2019 update)





Innovation capabilities of solar PV firms	Illustrative elements of capabilities	Examples of firms
 <p>Limited innovation capabilities</p>	<ul style="list-style-type: none"> Limited innovation activities Adapt to novelty, but few business model changes Attract little to no investment 	Multiple firms (distribution, retail, supply, installations)
 <p>Experimentation, build-up and international partnerships</p>	<ul style="list-style-type: none"> Perform search activities, scaling up takes time Local actors, SMEs, some start-ups Emerging access to global innovation networks Seed finance for demonstrations and experiments 	Baraka Solar, Boma Safi, Ensol, Helvetic Solar, Juabar, Sikubora, SolAfrique, SolarWorks, SunTransfer
 <p>Advanced capabilities and technological sophistication</p>	<ul style="list-style-type: none"> Incremental innovation, technological sophistication Use pay-as-you-go model May build local skills and train entrepreneurs Attract substantial investment 	Angaza, Deveryg, JUMEME, Powergen, Powerhive East Africa, Steama.co, Strauss Energy
 <p>Leading frontier capabilities</p>	<ul style="list-style-type: none"> Complex problem-solving Push the innovation frontier Set benchmarks Attract large-scale venture capital 	Azuri, d.light, BBOXX, M-KOPA Solar, Mobisol, ZOLA Electric

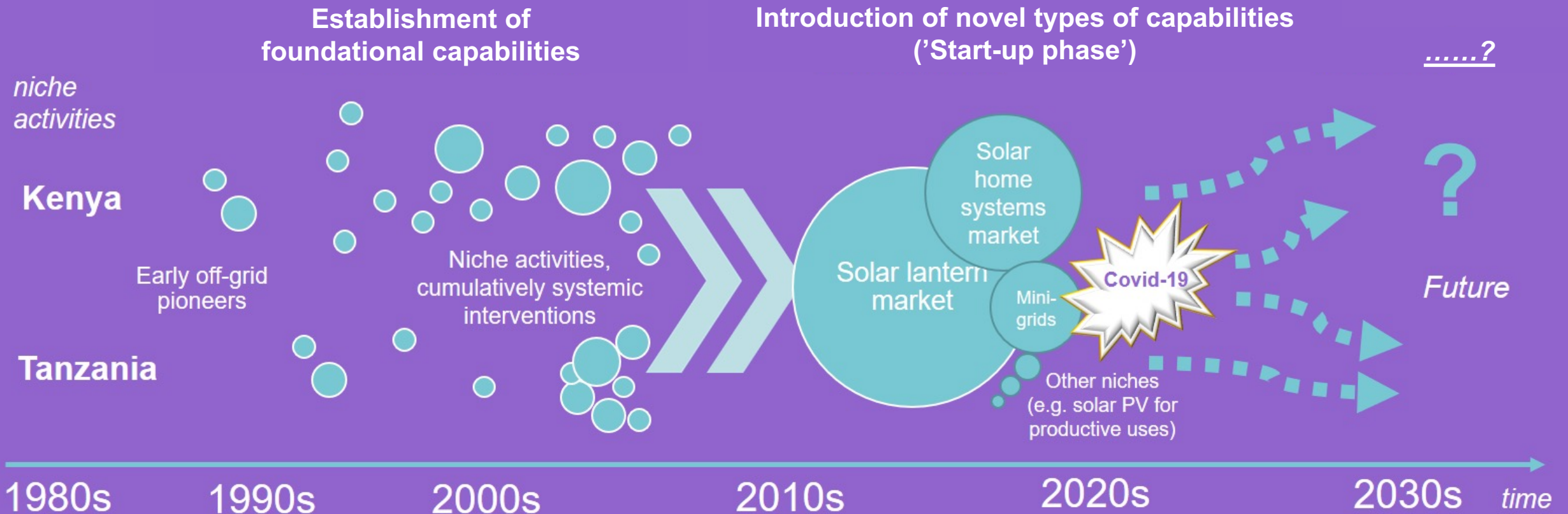
Table. Innovation capabilities of off-grid solar PV firms, Karjalainen and Byrne, *forthcoming*, building on M. Bell & Figueiredo (2012); OECD (2018)

The local Kenyan firms could be placed within the first two 'levels' of capabilities, except for Strauss Energy, with its technological capabilities

In Tanzania, most firms at the basic (or the intermediate) level, and no Tanzanian firm seemed to possess advanced or world-leading capabilities.

PV module assembly and battery manufacturing, both located in Kenya, seem to be the only production capabilities.

Off-grid solar photovoltaics in Kenya and Tanzania



- We call as **'the pre-latecomer phase'** significant efforts over about 30 years in both countries to build foundational capabilities relevant to the evolution of their off-grid solar PV markets
- Years of **interactive learning** may have enabled subsequent market development(s)

Learning from the pioneering developments in the off-grid solar PV sector in Kenya and Tanzania

- The development of foundational capabilities (“pre-latecomer phase”) as an evolutionary, long-term process would seem to precede any subsequent developments
- Building on these gains, how to encourage systemic efforts toward (a “latecomer phase” and) sustainable industrialization?
 - E.g. How to fund innovation capability building interventions while relying on finance from development partners in this sector?
 - Of what type? How to build resilience against both gradual (4IR) and sudden changes (cf. COVID-19)?



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