

## Master/Bachelor Thesis

### “Community-based Mini-Grids: Challenges and Impacts”

#### Background

The number of people lacking connection to electricity in India is estimated to be around 305 million (Heynen et al., 2019). The government of India has pursued a policy of rural electrification through the provision of decentralized renewable energy mini-grids (Molyneaux et al., 2016). Mini-grids have gained recognition as a crucial intermediary between individual household solutions and large-scale grid extensions, facilitating widespread electricity access. Compared to individual household solutions, mini-grids are believed to offer more significant development benefits due to their capacity to support productive uses of electricity (Chaurey, Ranganathan & Mohanty 2004). We know that the reliability of electricity is pivotal for a nation's economic development and digital transformation, however, the introduction of new technologies into communities often overlooks the intricate web of social relationships within them (Hertel et al., 2021). These dynamics can significantly influence the ability of community members to realize the expected benefits of electrification, subsequently impacting adoption rates and overall outcomes (Saeed et al., 2021). While numerous studies delve into the business models and economic outcomes of providing energy through mini-grids in rural areas, there is a growing interest in understanding how informal community institutions interact with and are influenced by the establishment of mini-grids (Ambole et al., 2021). This aspect warrants further investigation to ensure that electrification efforts align with the social fabric of these communities, ultimately leading to more inclusive and sustainable outcomes.

#### Introductory Readings

- Gill-Wiehl, A., Miles, S., Wu, J., & Kammen, D. M. (2022). Beyond customer acquisition: A comprehensive review of community participation in mini grid projects. *Renewable and Sustainable Energy Reviews*, 153, 111778.
- Heynen, A., Lant, P., Smart, S., Sridharan, S., & Greig, C. (2019). Off-grid opportunities and threats in the wake of india's electrification push. *Energy Sustainability and Society*, 9(1). <https://doi.org/10.1186/s13705-019-0198-z>
- Saeed, M. H., Fangzong, W., Kalwar, B. A., & Iqbal, S. (2021). A review on microgrids' challenges & perspectives. *IEEE Access*, 9, 166502-166517.

#### Tasks and Goals

This thesis is closely related to the current research of the chair and implies close collaboration with the research team. The main tasks involve: 1) conducting a literature review relating mini-grids and community enterprises; 2) conducting field research in the form of semi-structured interviews and field visits to at least two rural communities in Kenya identified by the supervisor(s); 3) organizing, coding, and analyzing the semi-structured interviews.

#### Requirements

- Excellent English skills and interest in entrepreneurship, development, and sustainable energies.
- Independent, reliable, and diligent working style with the ability to work in multi-cultural settings.
- Eagerness to travel to India to collect data.
- Advanced Seminar *Sustainable Entrepreneurship* with a minimum grade of 2.0 (for Master Thesis)
- Course *Corporate Sustainability* with a minimum grade of 2.0 (for Bachelor Thesis)

#### Details

- Supervisors: Prof. Dr. Frank-Martin Belz and Dr. Alessia Argiolas
- Start: As of now/ first data collection field trip to Mumbai in November 2023.
- Working time: 6 months, with up to 4 weeks of fully funded research stay in India

#### Contact

If you are interested in writing your thesis at our chair or have questions about this topic, please contact Dr. Alessia Argiolas ([alessia.argiolas@tum.de](mailto:alessia.argiolas@tum.de)). To apply, send an email including your CV, and the current transcript of records (as one PDF file). We are looking forward to working together with you!