REINER LEMOINE INSTITUT

The Energy Nexus Group – An Interdisciplinary Research Agenda

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Tlemcen, 8-10 March 2016

Reiner Lemoine Institut (RLI)

Overview

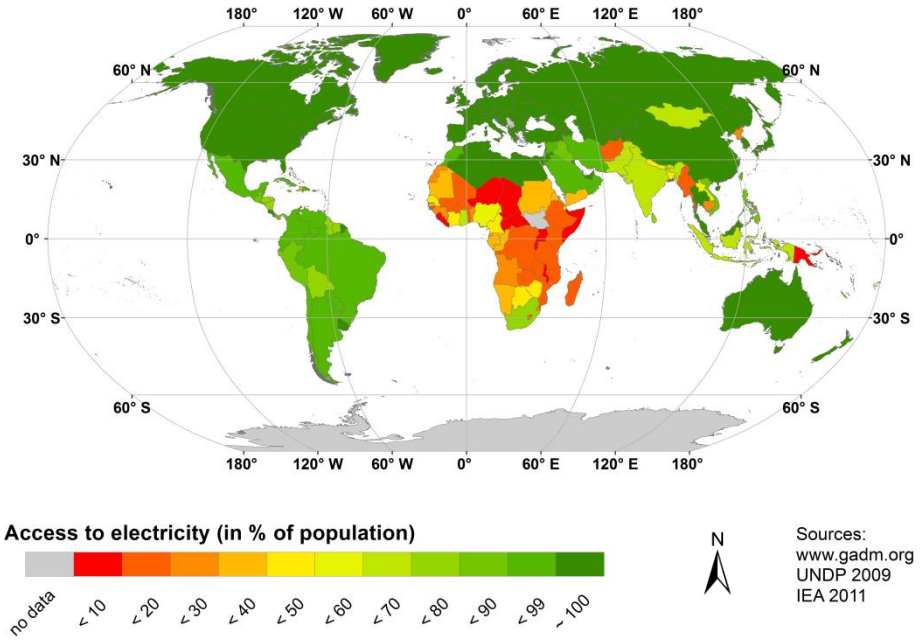
- Not-for-profit research institute
- 100 % subsidiary of Reiner Lemoine-Foundation (RLS)
- Established 2010 in Berlin
- Three research groups:
  - Transformation of Energy Systems
  - Mobility with Renewable Energies
  - Off-Grid Systems
- Member of: ARE, eurosolar, BNE, dena, EEA
- Managing Director: Dr. Kathrin Goldammer

Reiner Lemoine
Founder of Reiner Lemoine-Foundation

About me

- Bachelor studies *Environmental Management* at Justus Liebig University Gießen (2007-2010)
- Master studies in *Physical Geography: Systems, Interactions and Processes* at Philipps University Marburg, with exchange to University of Pécs, Hungary (2010-2012)
- Scientific researcher in the Off-Grid Systems Team at Reiner Lemoine Institut, Berlin (2012-2013)
- From 2014: PhD student in Geography at Justus-Liebig University Gießen in cooperation with Reiner Lemoine Institut: Working title: Off-Grid electrification versus grid extension: Geospatial electrification modelling in Nigeria
- Work experience in rural electrification projects in Nigeria, Cameroon, Tanzania and Myanmar

Research object: Access to electrification



- Many regions have no access to electricity
- High costs for energy supply are prevailing
- Fossil fuel based supply in spite of abundance of renewable energies

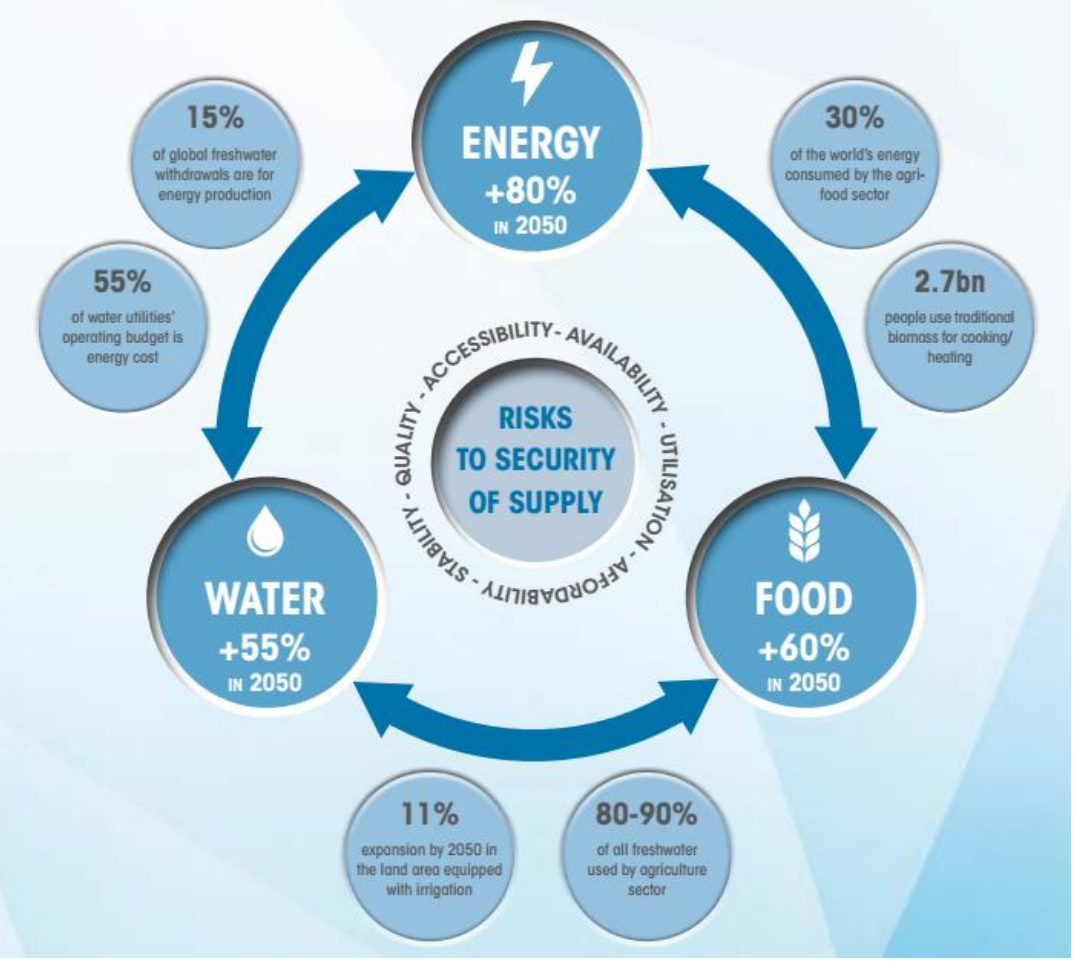
	Rural	Urban	Total	Share of population
Developing countries	1,081	184	1,265	24%
Africa	475	114	590	57%
Developing Asia	556	62	628	18%
Latin America	23	6	29	6%
Middle East	16	2	18	9%
World	**1,083**	**184**	**1,267**	**19%**

Source: Number of people without access to electricity by region (million). World Energy Outlook 2012, International Energy Agency,

Structure

- Introduction
- Energy Access Ladder
- Energy Nexus Research Focus
- Preliminary Case study: KUDURA
- Conclusion

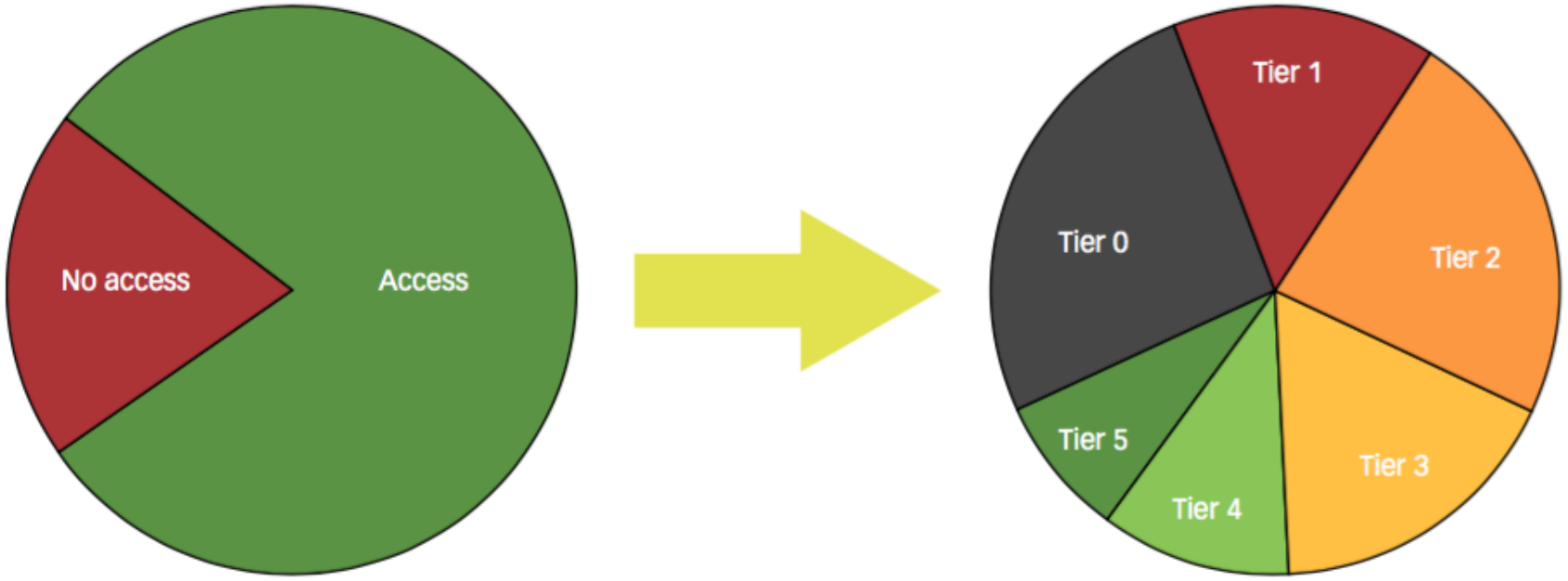
Introduction – WEF Nexus



Source: IRENA (2015):RENEWABLE ENERGY IN THE WATER, ENERGY & FOOD NEXUS.

The Water Energy Food Nexus.

Introduction – Energy Access Ladder

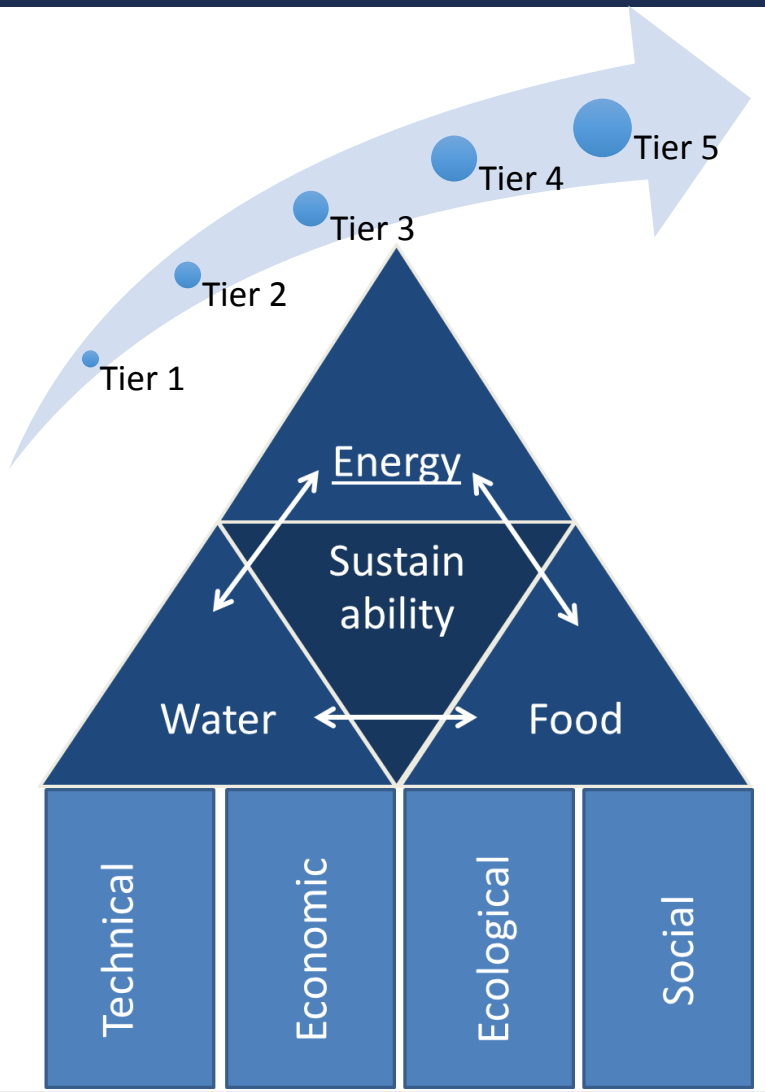


Source: ESMAP (2014):A New Multi-Tier Approach to Measuring Energy Access

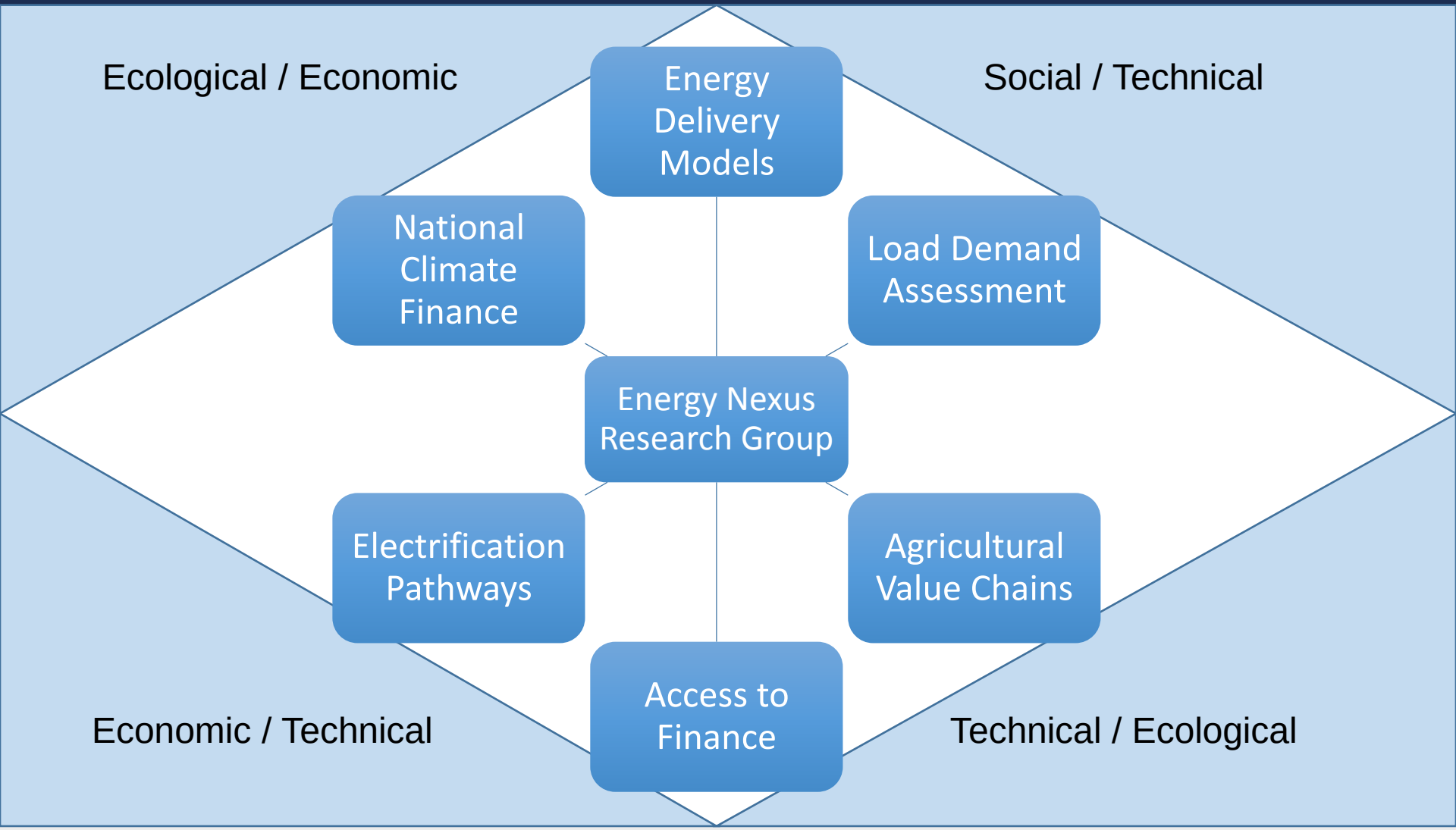
Moving from binary electrification metrics to an Energy Access Ladder

The Energy Nexus Research Focus

- Some Nexus themes: Energy, Water, Food
- Goal: Defining sustainable energy access strategies which incorporate local water and food needs while encouraging movement up the energy access ladder
- Pursuing a holistic and action-oriented research approach combining technical, economic, ecological and social dimensions
- Utilizing an interdisciplinary compilation of methods including qualitative and quantitative surveys, statistical analysis, financial analysis, complex system analysis, supply chain analysis and GIS analysis, alongside energy delivery systems modelling and empirical case studies



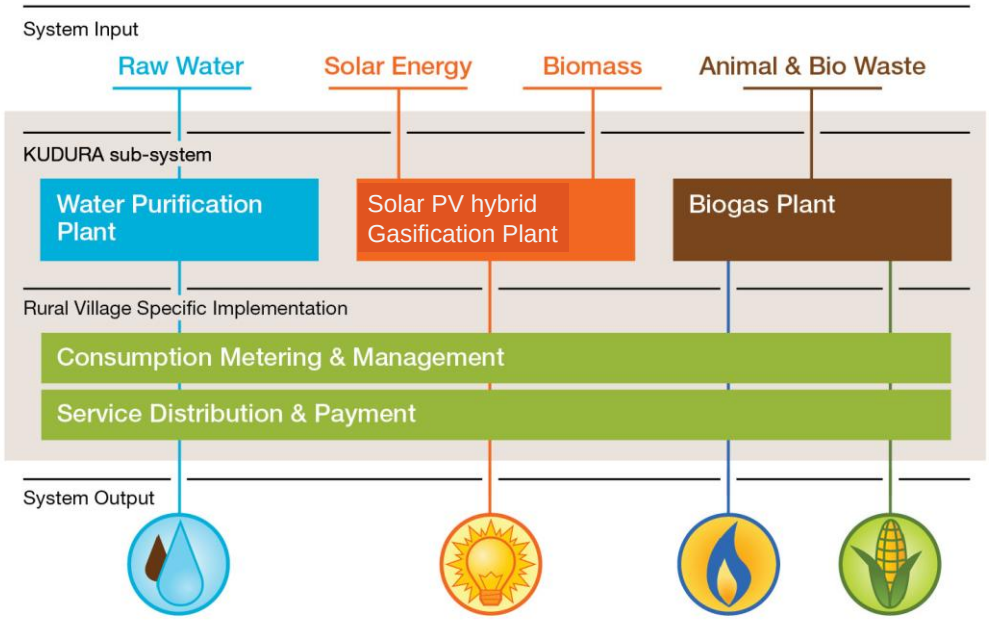
Six interdisciplinary research themes related to the Energy Nexus



Preliminary Case study: KUDURA[1] by RVE.SOL

Multi-utility mini-grid in Sidonge, Western Kenya, built in 2011.

2kWp AC
5000L Purified Water / Day
5m^3 Cooking Biogas / Day



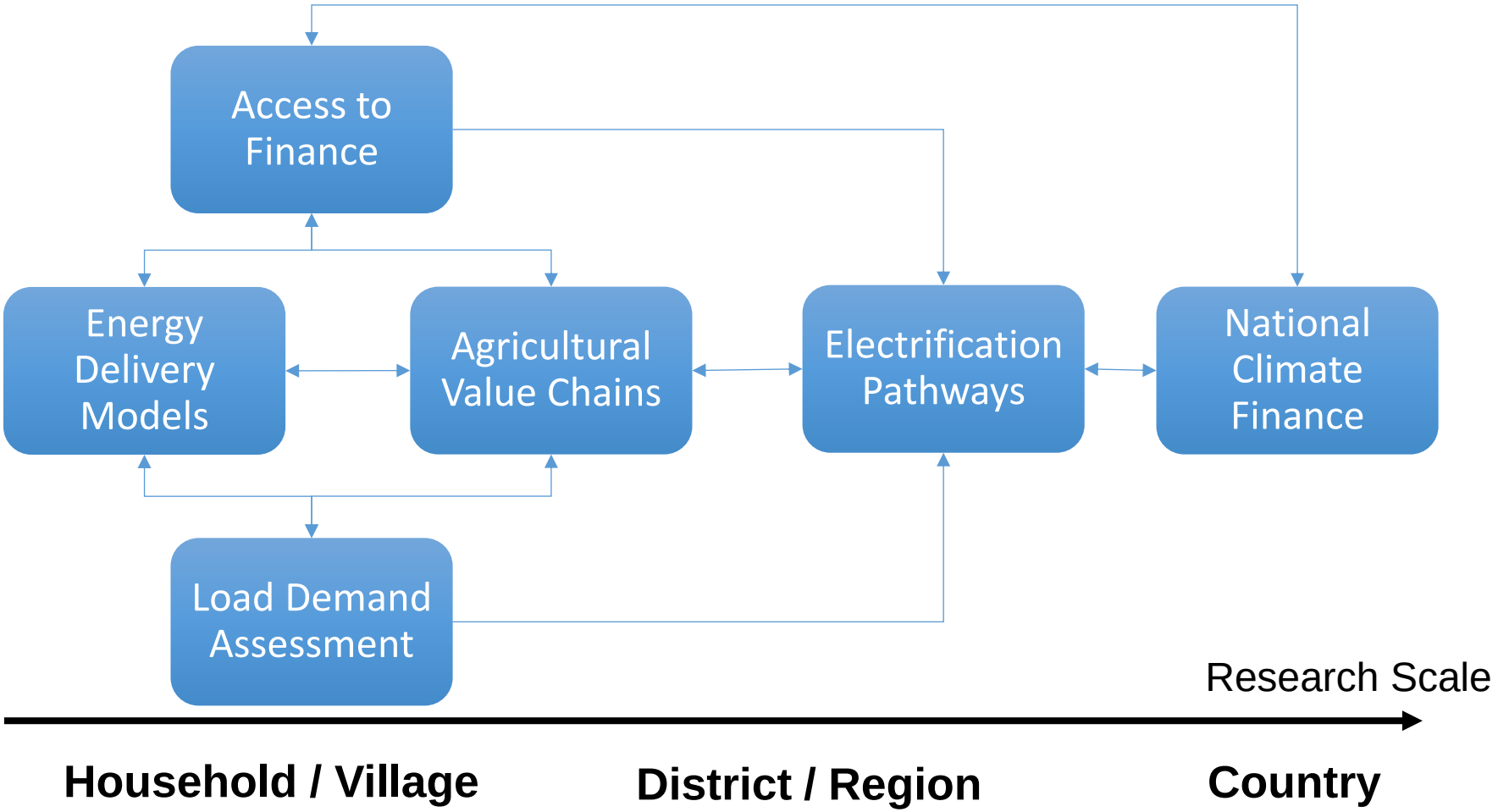
Initial Site Visit Outcomes:

Delivery of filtered potable water alongside energy consumed <5% of annual energy generation while delivering ~20% of project revenues.

The local health clinic indicated that cases of malaria were eliminated for families consuming KUDURA drinking water.

[1]A registered trademark of RVE.SOL Lda, patent pending (www.rvesol.com)

Six interdisciplinary research themes related to the Energy Nexus: Research scale



Conclusion

- Many dimensions are important to consider when addressing Nexus topics from an electrification perspective:
  - Spatial scale
  - Relation between nexus themes
  - Temporal scale

- Focusing on the challenges from a nexus perspective can respond to several challenges at the same time

- A change in thinking is required from one best solution for electrification to an individual holistic solution which accounts for local livelihoods and resource potentials in contrast to solely providing electricity

„Why wait for the grid if resources such as sun or biomass and financing mechanisms are available?“

Thank You!

Get in touch with us

- Questions
- Discussion on further opportunities
- Research collaboration

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