

# IREK: a study of technology transfer in renewable electrification AND inclusive structural change in Kenya

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A presentation at the workshop  
'Innovation pathways to inclusive structural change'

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# IREK

Innovation and Renewable Electrification in Kenya

*Will address the concept note question:*

How do different processes and structures determine the way in which domestic capabilities and local routines to innovate and induce structural change are created, acquired, accumulated and diffused in low income countries, in order to foster endogenous creativity and entrepreneurship?

*Through reflections from the IREK project*

**This presentation**

*Presentation sections*

An introduction to IREK

Thinking about domestic capabilities

Original IREK hypotheses

How our thinking has changed

# An introduction to IREK

## *The project focus:*

The project seeks to enhance knowledge on North-South and South-South cooperation in deployment of renewable energy.

The goal of the project is to examine how outcomes of international cooperation on low carbon technologies can be shaped and transformed to become efficient in terms of energy production and social inclusion.

## *Two underlying hypotheses:*

**H1:** The first hypothesis is that emerging economies are in a particularly strong position to advance relevant and affordable technologies because conditions in BRICS are more similar to those in poor countries.

**H2:** The second hypothesis is that even the most 'relevant' technologies developed abroad will need to go through a process of transformation in order to become both efficient and inclusive in the specific context of Kenya.

## *To investigate whether these hypotheses hold true we are studying:*

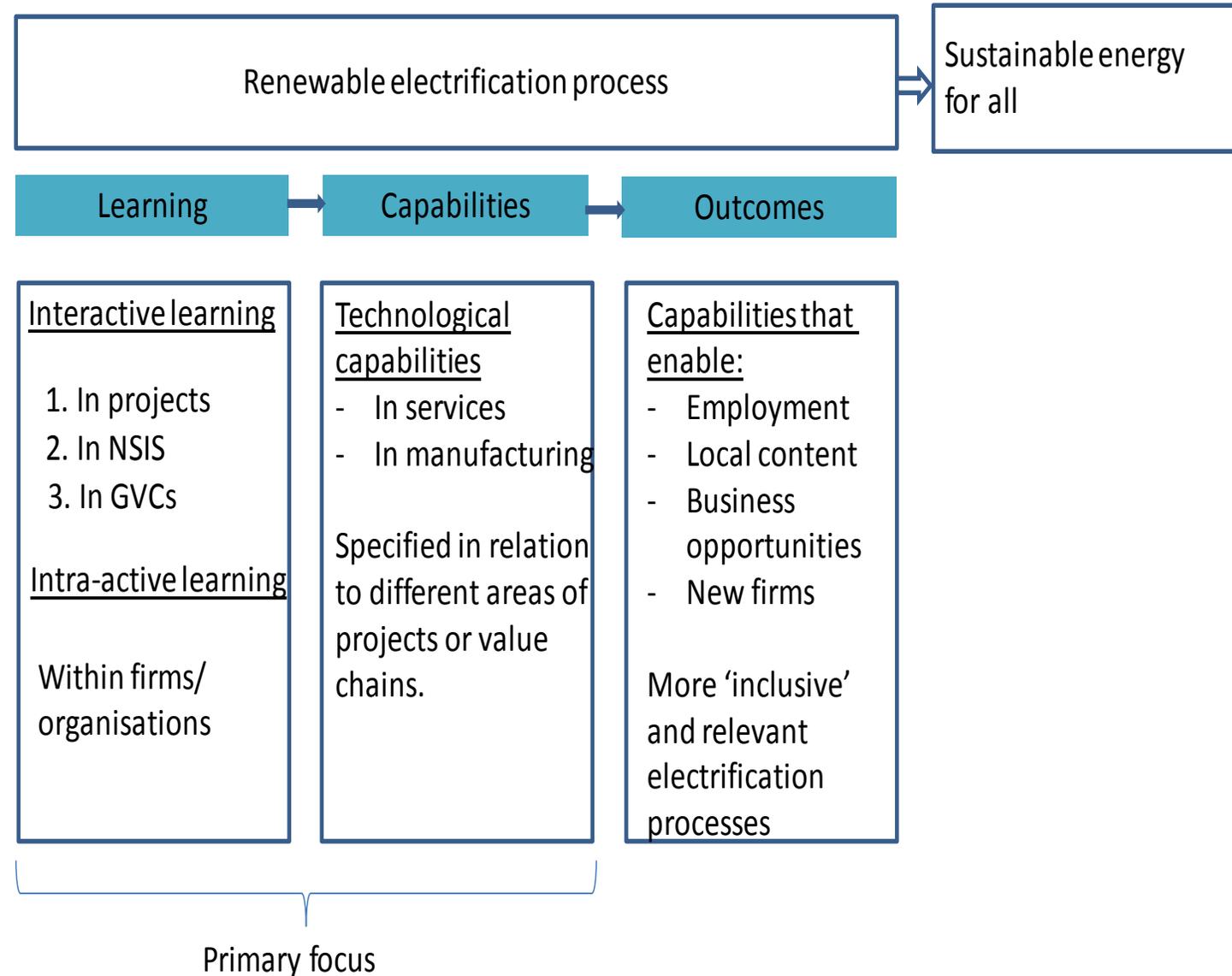
Local sectoral innovation systems for PV solar and wind in Kenya both on-grid and off grid/  
small and large

Global Value Chains of PV solar and wind technologies and their interaction with Kenyan  
renewable energy projects

# Thinking about domestic capabilities

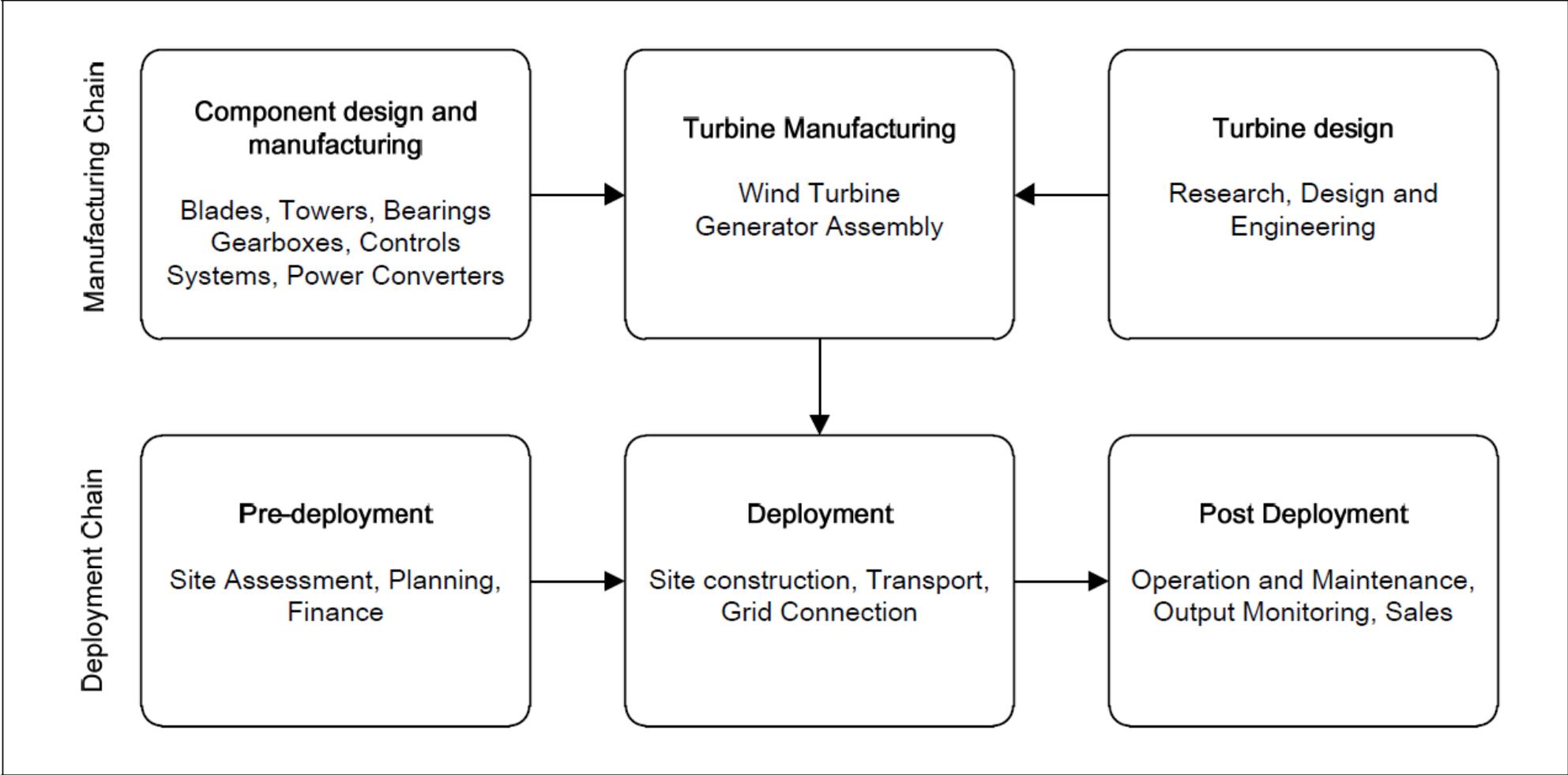
In projects, innovation systems or value chains:

1. What is the nature and extent of technological capabilities?
  - Who has these capabilities?
  - What relevant actors do not have these capabilities?
2. How were these capabilities developed/acquired?
  - What was the role of different types of learning?
  - What were the learning constraints?



# Thinking about domestic capabilities [2]

**Figure 2.1 Basic wind industry value chain**



## Thinking about domestic capabilities [3]

### Examples of capabilities:

- Capital embodied capabilities – introduction of a new technology into the organisation
- Human - disembodied capabilities e.g. capturing and creation of new skills base in a company
- Organisational capabilities e.g. systems improvements in a company or in the system more widely

## Thinking about domestic capabilities [3]

*As an example... One work package focuses on projects...*

*Core question: What is the relationship between imported technology, the development of new technological production and innovation capabilities plus upgrading in firms involved in renewable energy electrification projects in Kenya?*

In order to answer this question we need to answer the following sub-questions:

- Do Southern based inputs build stronger capabilities?
- Have the developed capabilities led to upgrading and, if so, what type of upgrading?
- Does it matter where in the project business cycle a firm is in terms of the type and level of capabilities that are built?
- What contextual factors impact on the ability for a firm to build capabilities and upgrade within project business cycle?

# Thinking about domestic capabilities [4]



In-depth case studies of different projects



Source: <http://renews.biz/105033/feet-up-for-vestas-in-kenya/>;  
[http://www.the-star.co.ke/news/2016/10/18/lake-turkana-wind-farm-to-light-up-one-million-homes-by-june\\_c1439711](http://www.the-star.co.ke/news/2016/10/18/lake-turkana-wind-farm-to-light-up-one-million-homes-by-june_c1439711)

<http://solarpv.tv/index.php/2016/08/11/powerhive-at-kisii-county-kenya-resilient-energy-infrastructure-for-off-grid-communities/>

# LTWP



## History of construction project (post award and contract negotiations)

- 25<sup>th</sup> October 2014 construction starts
- Feb 2016 completion of 207km off-site roads and site village, offices, workshops
- March 2016 first turbine delivered and erected
- April 2016 on-site roads completed
- September 2016 Electrical networks completed (stage 1)
- October 2016 Completion of first 155 turbines (50-70mw)
- April 2017 Expected completion of internal electrical networks and sub-station
- **July 2017 All 365 turbines/ 310mw online**
- [First 90mw of power integrated to grid by June 2017?]

## Project partners (deployment chain)

- KP&P Africa – holding company; owns ‘LTWP Ltd’ a project company
- Aldwych International – construction and ops management
- Worley Parsons – consultant engineer (ED Review and Construction Mgt)
- Vestas – turbines EPC contractor
- RXPE – transmission system/ power control EPC contractor
- EGMF – site contractor (foundations)
- Civicon – site contractor (roads)
- Seco – site contractor (offices etc.)
- Seimens – site contractor (power lines)
- Bollore logistics – contractor specialised transport
- [Ketraco and Isolax – transmission lines]

# Potential learning, capabilities building

- Kenyan/ EA companies

- Civicon – site contractor (roads)
- EGMF – site contractor (foundations)

- International companies with local offices

- Seco – site contractor (offices etc.)
- Seimens – site contractor (power lines)
- Bollore logistics – contractor specialised transport

- International companies

- Vestas – turbines EPC contractor
- RXPE – transmission system/ power control EPC contractor
- Worley Parsons – consultant engineer
- (Alwdych Int)

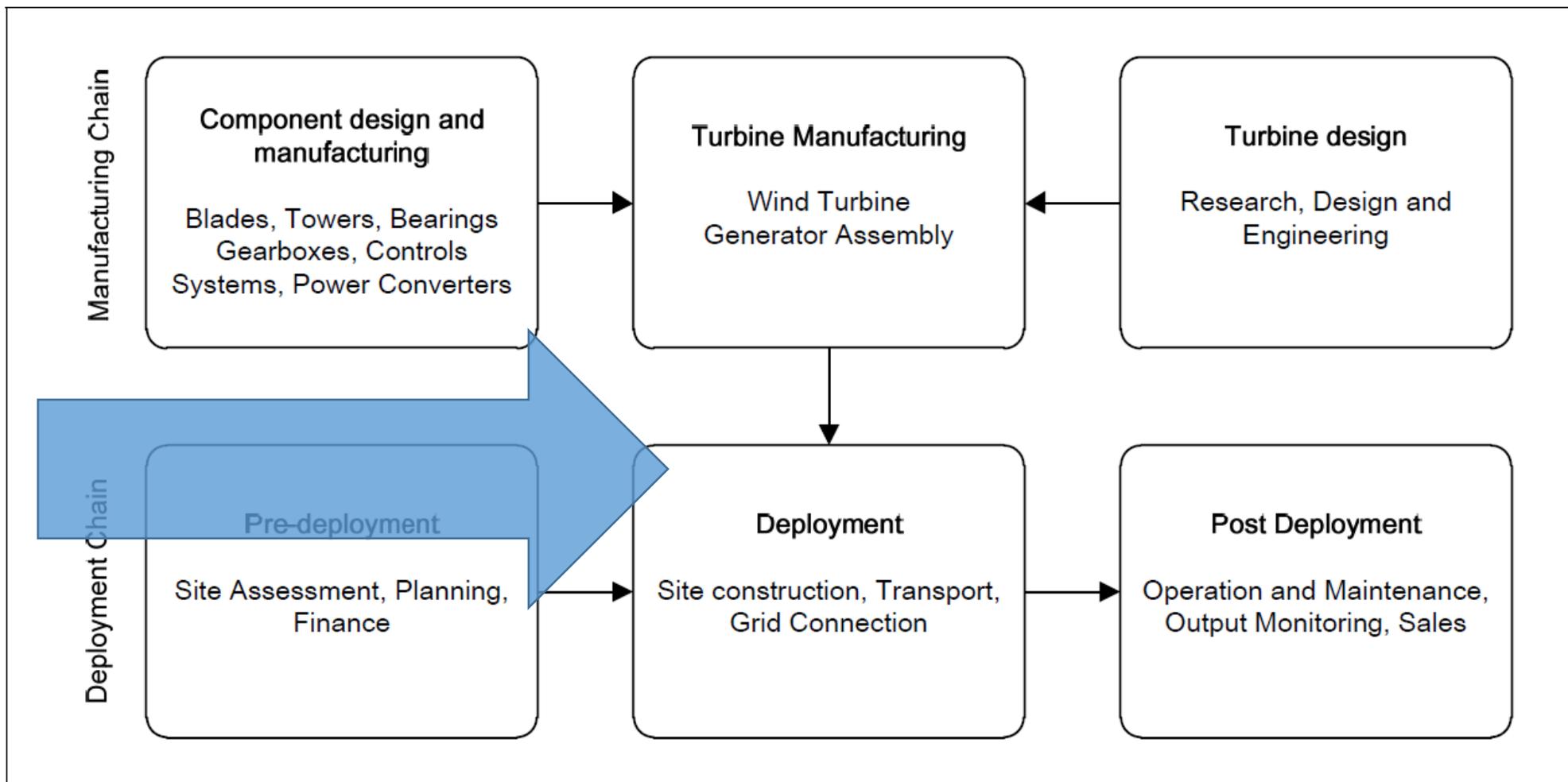
Learning – DEPC know-how  
Process and business innovations at  
firm level/ at project level

Energy technology  
induced OR project  
induced??

# Thinking about domestic capabilities [6]

Figure 2.1 Basic wind industry value chain

**Types of capabilities being built?**  
Project / construction management  
Process innovation in firms  
Skills building of engineers, construction workers, CSR teams etc.



# What about another project?

- Kisii

- Powerhive first private utility to be granted ability to sell electricity in Kenya
- Pilot project in Kisii since 2012, 4 villages – 300 connections; 1500 people
- Plans to upscale to 200,000 connections
- Actors: Powerhive and First Solar and local community
- Using First Solar PV modules with Powerhive e-systems (US)



Local engineers at powerhive, O&M by community members, social innovation?

<http://solarpv.tv/index.php/2016/08/11/powerhive-at-kisii-county-kenya-resilient-energy-infrastructure-for-off-grid-communities/>

# Original IREK hypotheses

## *Two underlying hypotheses:*

**H1:** The first hypothesis is that emerging economies are in a particularly strong position to advance relevant and affordable technologies because conditions in BRICS are more similar to those in poor countries.

**H2:** The second hypothesis is that even the most 'relevant' technologies developed abroad will need to go through a process of transformation in order to become both efficient and inclusive in the specific context of Kenya.

# How our thinking has changed

**H1:** The first hypothesis is that emerging economies are in a particularly strong position to advance relevant and affordable technologies because conditions in BRICS are more similar to those in poor countries.

- China and India are NOT as dominant in renewable electrification beyond the solar home system market than we thought (notwithstanding Garissa project and interaction with minimal amounts of one-off use of Chinese technologies e.g. large power surge protector in LTWP)
- The issue isn't so much about appropriate technologies from S-S or N-S transfer as it is about how any technology is taken up

**H2:** The second hypothesis is that even the most 'relevant' technologies developed abroad will need to go through a process of transformation in order to become both efficient and inclusive in the specific context of Kenya.

- This is the key hypothesis!
- Building domestic capabilities is key

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Development of a third hypothesis

**H3:** The third hypothesis is that 'small is beautiful'; that you get more domestic capabilities built with small scale projects than large scale (on-grid) projects.



## Take home points

*Have discussed the concept  
note question:*

How do different processes and structures determine the way in which domestic capabilities and local routines to innovate and induce structural change are created, acquired, accumulated and diffused in low income countries, in order to foster endogenous creativity and entrepreneurship?

*Through reflections from the  
IREK project*

*What can we take from  
this...*

Need to think about the type of domestic capabilities

Need to consider the role of govt and education in developing capabilities

Check out:

- [www.acts-net.org](http://www.acts-net.org)
- [www.irekproject.net](http://www.irekproject.net)

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**More information**

