06-Off-Grid Life Cycle

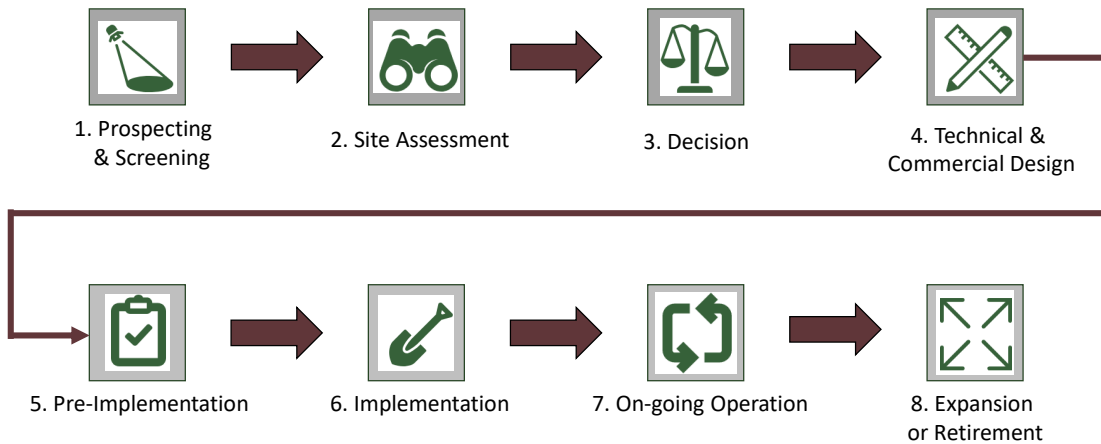*Off-Grid Electrical Systems in Developing Countries*
Chapter 12.1

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Learning Outcomes

At the end of this lecture, you will be able to:

✓ describe the lifecycle of an off-grid project, from a pre-feasibility study to expansion or retirement

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Off-Grid System Life Cycle

1. Prospecting & Screening

2. Site Assessment

3. Decision

4. Technical & Commercial Design

5. Pre-Implementation

6. Implementation

7. On-going Operation

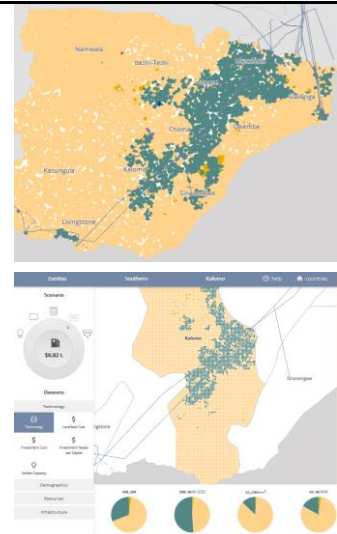8. Expansion or Retirement

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1. Prospecting & Screen

- Which community to chose?
- Success depends on location
- Quickly and inexpensively screen potential communities
  - Distance from existing grid
  - Resource availability
  - Other demographics
- Create short list of promising communities

Electrification Pathways

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2. Site Assessment 🔭

On-site data collection
- Observe community firsthand
- Meet with local officials
- Confirm secondary data are reasonable
- Conduct surveys/focus groups
- Collect preliminary energy resource data
- Identify possible location for assets

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3. Decision ⚖️

- Prioritize communities based on organizational objectives
- Decision methods
  - PESTLE (political, environmental, social, technological, legal, economic) analysis
  - Risk Matrices
  - Theory of Change
  - Others

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Attractive Community Characteristics for Electrification

✓ national grid is located far away with no credible plans for it to be extended to the community

✓ no other off-grid systems installed or planned

✓ demand for electricity is high and the planned uses are productive or improve the quality of life

✓ ability and willingness to pay for electricity

✓ one or more energy resources are suitable for electricity generation

✓ dense population

✓ there is basic infrastructure (e.g. roads, cellular network)

✓ community is politically stable

✓ low risk of theft and vandalism

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4. Technical & Commercial Design

- Detailed technical and commercial plan design and development
- Iterative and inter-related process
- If design is not projected to meet certain technical or business targets, consider next community on list
  - Capital expense
  - Operating expense
  - Access tier
  - Average Revenue Per User (ARPU)

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5. Pre-Implementation

- Permitting (if applicable)
- Vendor identification and contracting
- Procurement
  - Importing equipment (may take many months)
- Community/customer identification and orientation

(Courtesy A. Stewart)

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6. Implementation

- Construction of energy production, distribution and end-user system
- Implementation can be quick--- as few as several days
- Commissioning and verification

(Courtesy PowerGen)

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7. On-Going Operation ⟳

- Serving users
- Maintenance and repair
- Technical data collection
- Commercial data collection
- Social data collection

(Courtesy PowerGen)

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8. Expansion or Retirement ⤢

- Expansion
  - Serve additional users
  - Improve access tier

- Retirement
  - Restore land and environment to original condition
  - Dispose, re-use or re-cycle equipment in a responsible way
  - Community relations

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