FIELD STUDIES FOR MINI-GRID OPTIMIZATION

(FS4MGO Research Group)

Corsini
Naso
Micangeli
Del Citto
Tacconelli

Da Silva
Odera
Bundi

Strizke

Endreny
Volk
De Marco

Giglioli
Poli
Fioriti
Cherubini
Gambino

Mackay
Munjii

Arriaga
Duenas
Lee

Sisul

Stenico
Barelli

Ntagwirumugara
Ushizimpumu

Brenes

Trejo

About us

- Along with the Universities of Italy, and US, Rwanda, Uganda, Tanzania and Kenya, in East Africa, as well as Honduras and Costa Rica in Central America, are supporting the Field Data Collection and Analysis:

  - *M. Sisul* , Columbia NYC, US, **Socio-economic impact evaluation guidelines**
  - *D. Poli, D. Fioriti, P. Cherubini, V. Gambino, R. Giglioli,* Pisa, IT, **Load forecasting models**
  - *T. Endreny, T. Volk,* State University of N.Y, US, **Environmental Impact and Communities**
  - *I.P. Arriaga, P. Duenas, S. Lee,* MIT, US, **Optimized sizing for financial plan viability**
  - *A. Micangeli, R. Del Citto, C. Tacconelli , Italy,* **Need assessment methodology**
  - *E. Ntagwirumugara, C. Ushizimpumu, F. Mujjuni, X. Da Silva,* **Field Data Collection**
  - W. Henriquez, M. Ricci, E. Brenes, Brenes, Central America **Supporting Data Analysis**

Results

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Stochastic sizing of isolated rural mini-grids, including effects of fuel procurement and operational strategies

Davide Fioriti [a,*], Romano Giglioli [a], Davide Poli [a], Giovanni Lutzemberger [a], Andrea Micangeli [b], Riccardo Del Citto [b], Ignacio Perez-Arriaga [c], Pablo Duenas-Martinez [c]

[a] DESTEC, University of Pisa, Largo Lucio Lazzarino, 56122 Pisa, Italy
[b] DIMA, University of Rome "Sapienza", Via Eudossiana 18, 00184 Roma, Italy
[c] MIT Energy Initiative, Massachusetts Institute of Technology, 77 Massachusetts Avenue, 02139 Cambridge, MA, United States

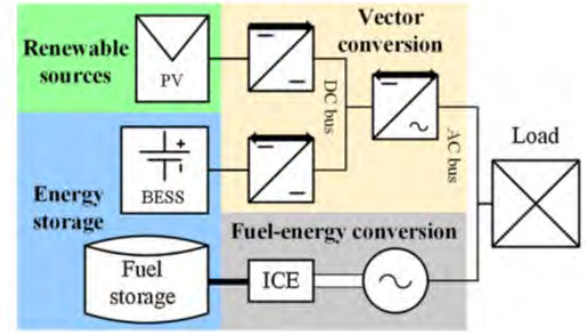

Fig. 1. Typical design of a rural mini-grid.

MISTI

MIT International Science & Technology Initiatives

MITei

MIT Energy Initiative

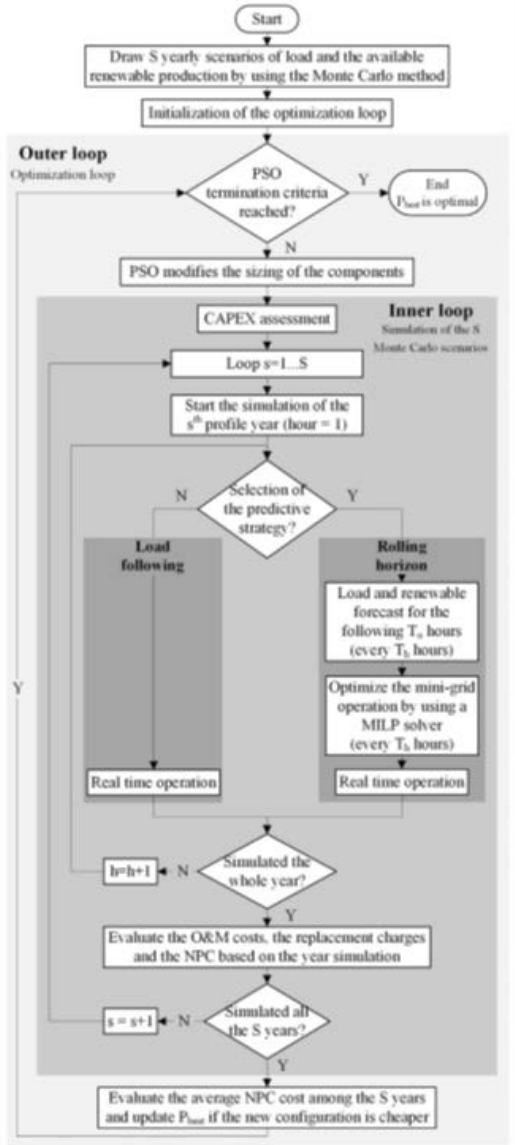

Fig. 3. Scheduling and operation of resources.

FS4MGO

- The FIELD STUDIES FOR MINI-GRID OPTIMIZATION (**FS4MGO**) is an **informal academic research group** born in 2018 among international universities with the purpose of **enhancing the global access to energy,** in line with the United Nations SDGs, and fostering a sustainable economic growth in developing countries through clean and productive energy.
- The research group investigates renewable energies systems in different aspects.

- The goal is that **of bridging "traditional" academic research, devoted to the development of robust design criteria and optimization models, with evidences coming from the field.** These include both technical data – not limited to the electric parameters but always viewing **the community plus microgrid as an energy system** as a whole – and the communities needs and experiences, rigorously assessed with specialized methods.

Community Model

We try to view the rural, off-grid communities holistically and considering their energy needs related to:

- water supply
- machines for productive activities (agribusiness, fishing…)
- cooling and heating
- communication

Current and upcoming activities

- Field Studies for **Micro-grid Life Cycle**: from Greenfield to Commissioning, Demand Ramp-Up, O&M and Business Plan.
- **Data Collection and Analysis** with Universities in East Africa, Central America, USA.
- **Load Assessment** in Communities (MISTI Project Task WP1).
- **Effective data collection methodology for energy need assessment** in rural areas.
- New technologies such as **flywheel** for hybrid and smart storage systems
- Installation of remote **monitoring** devices in non-monitored plants
- Structuring a **database** of rural minigrids (taking as a reference the **inputs for REM**, by MIT Energy Initiative).
- Use of **commercial and established software** like Homer, RETScreen, for simulations and comparisons.
- Develop a **control logic validation model** (comparison of REM/Pisa/Rome SW).
- Development of **stochastic optimization models** for the operation of minigrids
- Assessment of **best practices** for the design and business models of minigrids based on case studies
- **Demand evolution** in rural communities
- **Capacity building** for the viability and sustainability of minigrds