

Research group SCOM-UPC



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Rural electrification with renewable energies



<https://scom.upc.edu/en/research-lines/diseno-de-redes>



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Research lines

1. METHODOLOGIES FOR MULTICRITERIA EVALUATION

Objective:

- Go in depth into the study of electrification projects and plans
- Characterise aspects to be improved, not previously included

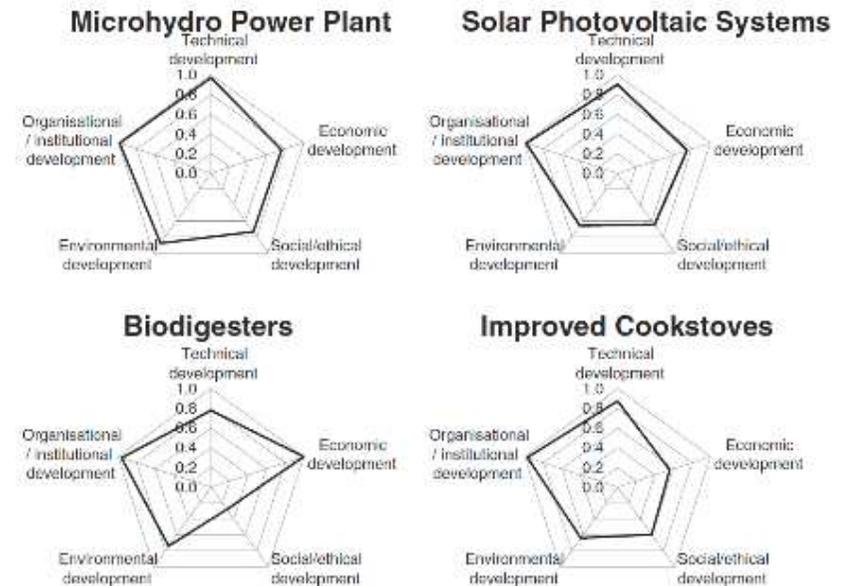
Characteristics:

- Technical performance and management models
- Scope: electrification projects and plans
- Criteria: technical, economic, social and environmental
- Stakeholders: users and project promoters



Results

Papers	14 JCR (11 Q1)
Other publications	1 book 4 book chapter 6 international conferences
Master/Degree projects	3 / 2



Research lines

2. OPTIMISATION OF SYSTEMS' DESIGN

Objective:

- Develop **exact** procedures based on mixed integer linear programming (MILP)
- Design and develop **heuristic** procedures to accelerate the solution of large-size instances

The models are adapted to different contexts:

- Technology: wind, solar, micro-hydro, diesel
- Constraints: economical, technical, social and management
- Area: available resources, energy policies
- Microgrids: isolated, connected and/or compatible

Results

Papers	17 JCR (13 Q1)
Other publications	2 book chapters 15 international conferences
Master/Degree projects	5 / 0

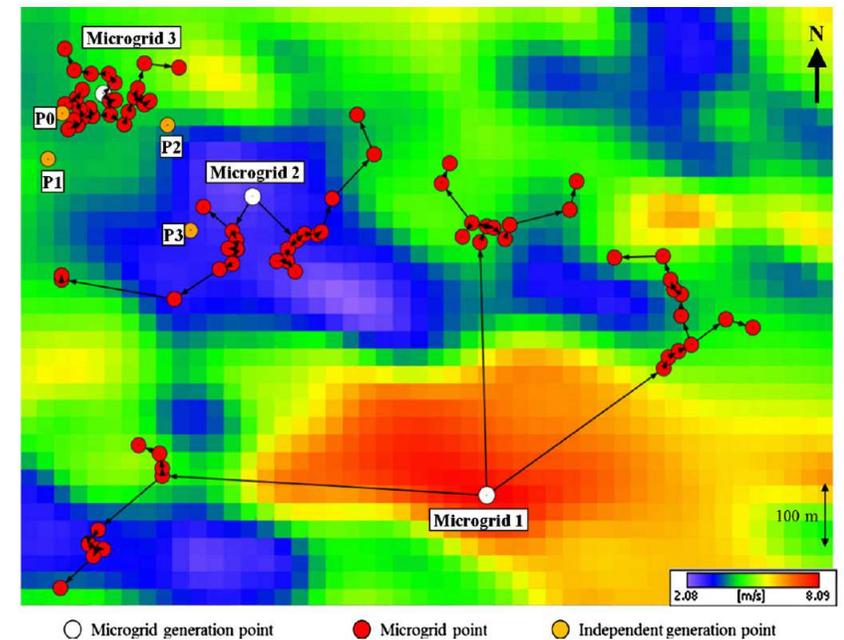


Fig. 9. The intermediate costs configuration (Scenario 2).

Research lines

3. METHODOLOGIES FOR MULTICRITERIA DESIGN

Objective: design a multicriteria methodology that...

- Selects the best **electrification solution**, among the different feasible options
- Considers **technical, economical, social and management** criteria

Structure in decision levels:

- According to the importance and time horizon of the decision
- At each level, the alternatives are generated, evaluated and prioritised, considering the weights of the criteria
- Iterative global process to progressively adjust decision-making

B. Domenech et al. / Renewable and Sustainable Energy Reviews 51 (2015) 182–196

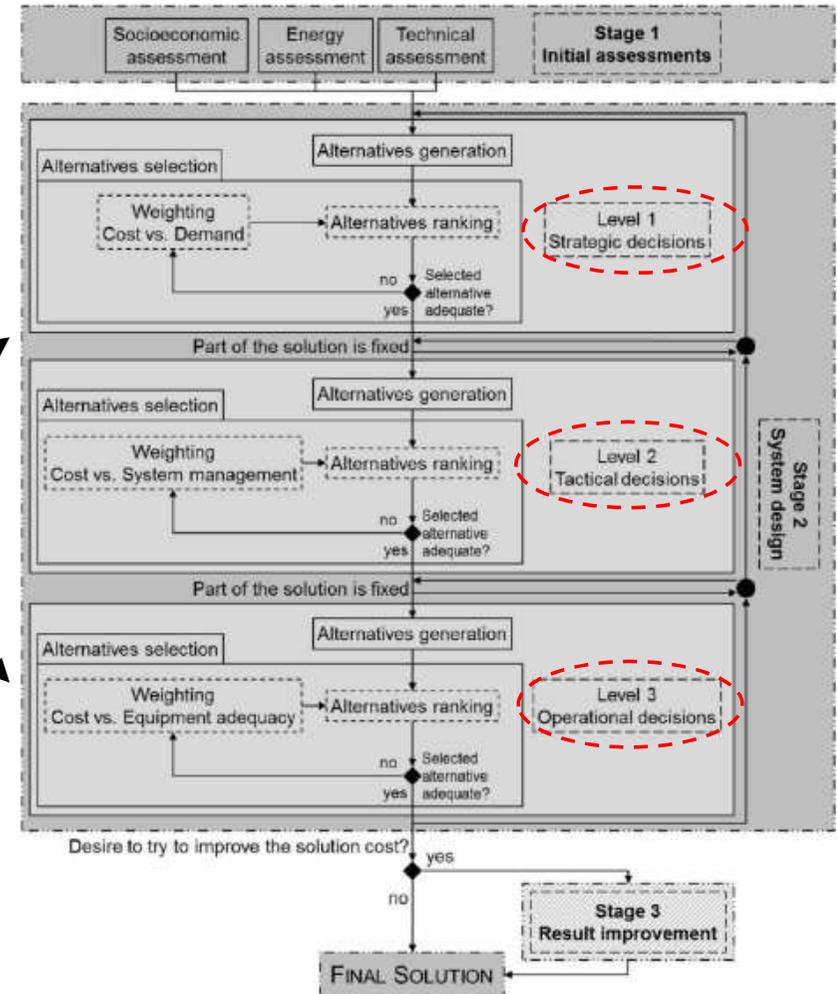


Fig. 2. Structure of the methodology to design stand-alone electrification systems.

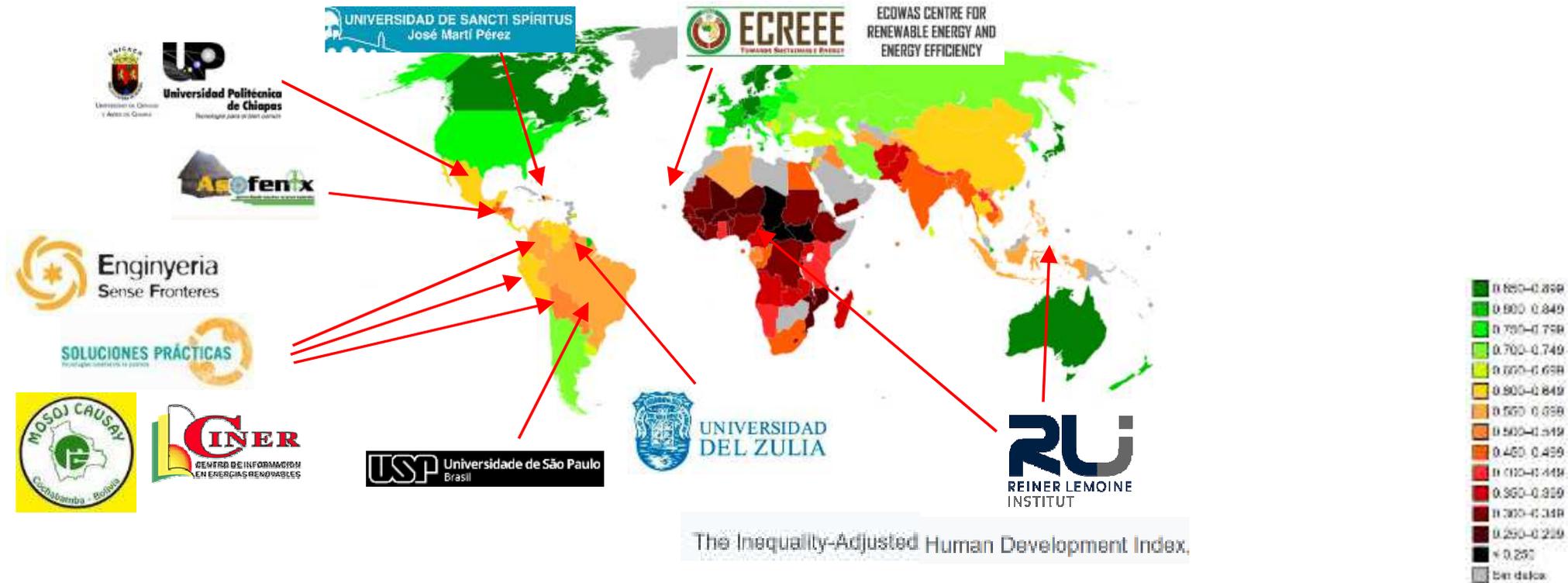
Results

Papers	6 JCR (5 Q1)
Other publications	8 international conferences
Master/Degree projects	2 / 0

Collaborations

COLLABORATIONS:

- Promoter institution: provides real data from case studies underway or to be implemented.
- SCOM group: evaluates and proposes solutions to design new electrification projects.
- Together: prioritise the new characteristics to be included into the research.



The Inequality-Adjusted Human Development Index,

using data from the 2018 report.