



Off-Grid and Renewable Transitions in Energy Livelihoods

LCEDN Conference

Durham University, 24th March 2015

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Image courtesy of SteamaCo

Project Aims

- Electricity networks for off-grid communities
 - Enable wealth-creating levels of power
 - Facilitate system evolution and growth
 - Improve service
 - Reduce cost



Intelligent Micro-Grid Control

- a. Reliability of energy supply
- b. Lower cost
- c. Longer system life

Decision Support Tool (DST)

- a. Control strategies
- b. Pricing structures
- c. System upgrades



Team Make-Up



- UK-based
 - Academic
 - ◆ De Montfort University (Lead Partner)
 - ◆ Newcastle University
 - ◆ Institute of Development Studies
 - Commercial
 - ◆ BBOXX
 - 3rd Sector/NGO/other
 - ◆ Practical Action
 - ◆ Ashden

- Kenya-based
 - Academic
 - ◆ University of Nairobi
 - Commercial
 - ◆ SteamaCo (formerly access:energy)



Funded by:



Progress So Far

- Technical

- System Control software (DMU)

- ◆ Time-related and tariff-enabled power availability
 - ◆ Off-the-shelf hardware (where required)

- e.g. Raspberry Pi + Energenie

- Decision Support Tool (DST)

- ◆ Scenario-sensitive Load Profile Prediction model

- Monte Carlo Simulation gives greater accuracy with small sample size

- Statistical methods (e.g. ADMD*) only work for large data sets

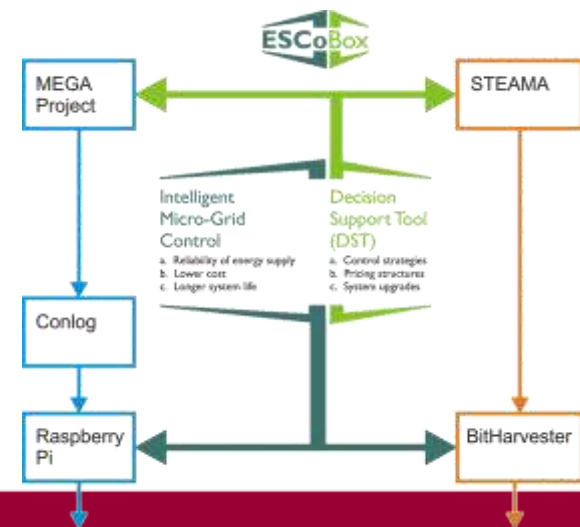
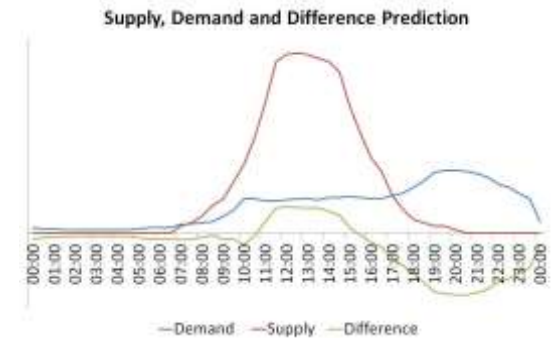
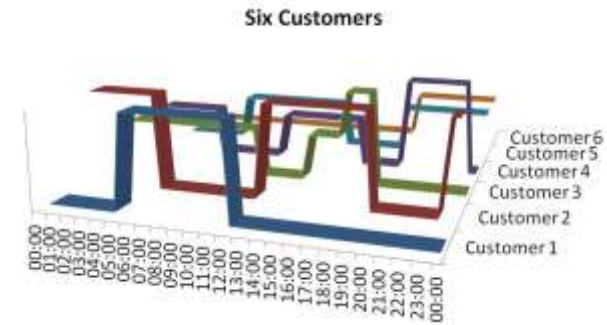
- Load disaggregation

- ◆ Battery state estimation (Newcastle University)
 - ◆ Appliance inventory (University of Nairobi)

- Social

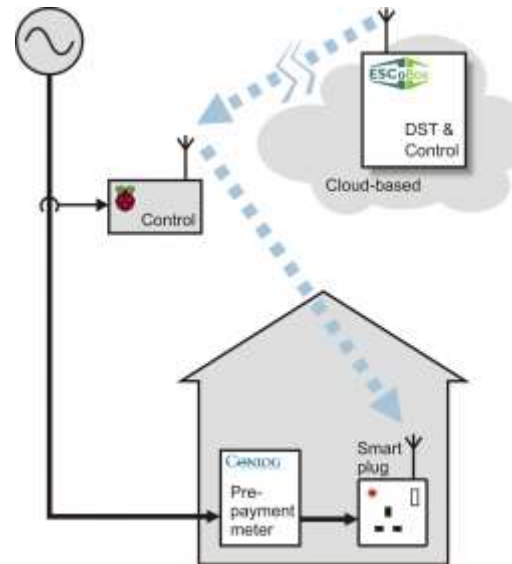
- Community surveys (IDS and UoN)

- ◆ Needs analysis
 - ◆ Impacts analysis

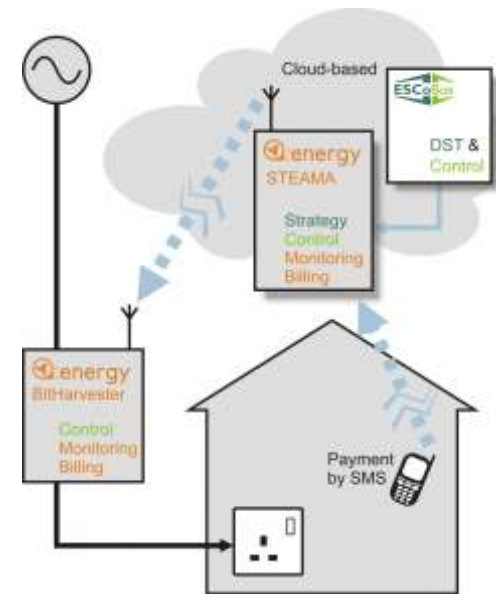


Major Challenges

- International and inter-sectoral collaboration
 - Practicalities of communication at distance
 - Commercial vs. research imperatives
- People, NOT technology
 - Behaviour, politics, culture, understanding, etc
- Diversity of approach
 - Power-limited vs. energy-limited systems
 - Cloud-based vs. local



Power-limited



Energy-limited