Alliance for Rural Electrification
Shining a Light for Progress

Credits : Trojan Battery Company

Practitioner Network webinar: Off-Grid Energy Storage

18 July 2013, 15:30 CET

Xavier Vallvé, *ARE Board Member, Trama Tecnoambiental*

Reasons to engage into off-grid RETs

- **Electricity fundamental** for socio-economic development (IEA, 2011)
  - 1,3 billion people un-electrified, most of them rural
  - 1 additional billion is under-electrified
- **Positive outlook** for off-grid clean rural electrification
  - 60% of new generation capacity to achieve universal access to electricity will be off-grid (UNF, EAPN, 2012)
  - Off-grid RET business models ready to be upscaled
- **Positive RET financing climate** in developing countries.
  - 2012: $112 bn out of $244 bn RET investment took place in the south with a focus on developing countries (sources: UNEP/FS/REN21).
- **Promising political momentum** as shown by post-2015 SDG agenda and numerous country electrification programmes.

Leveraging input through synergies

- The international business association in the world representing **off-grid renewable energies technologies for rural electrification**

- ARE serves as a global platform for sharing knowledge and best practices to enhance energy access and services

- More than **70 members** including:
    - Industry
    - Academia
    - Public Sector

- Promotion of members' interests by **three service lines**:
    - Business & Intelligence Support
    - Public Affairs Support
    - Administration Support

Access to intelligence worldwide

Selected features of ARE services

2013 (Focus on Africa & Latin America)		2014 (Focus on Latin America & Asia)		2015 (Focus on Asia & Africa)	
1st Semester	2nd Semester	1st Semester	2nd Semester	1st Semester	2nd Semester
Small Wind	Energy Storage	Small Hydropower	Hybridisation & Power Components	Biomass	Minigrids

Activities for 2013:

Business & Intelligence Support

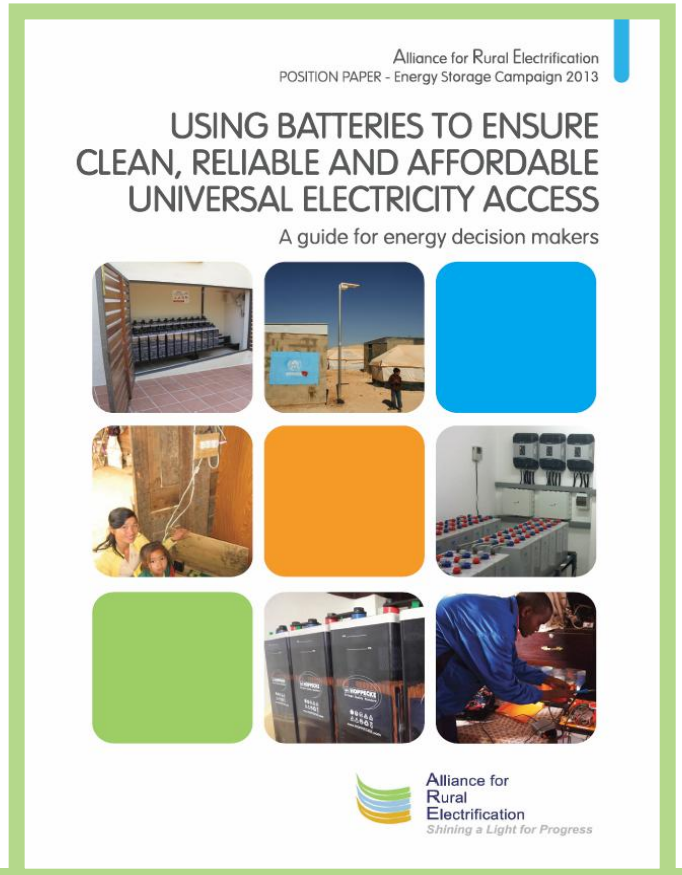
- Access to finance
- Assistance in procurements
- Conferences and Exhibitions
- Business Delegations, Workshops & Webinars

Public Affairs support

- Awareness creation for nascent rural markets
- Mini-grid policy toolkit in cooperation with REN21 and EUEI PDF
- Update of 2 publications: "Best practices of the ARE", "Hybrid mini-grid for rural electrification. Lessons learned"

ARE technology-focused campaign on energy storage

- **Objective:**
  - Improve business framework based on ARE recommendations
  - Raise awareness on the potential of specific technologies
- **Concept**
  - Energy Storage TF consisting of members and the ARE Secretariat
  - Duration: July – Dec 2013
- **Activities and Services**
  - Access to network of practitioners and decision makers
  - Enabling private/public dialogue
  - ARE channels to place journalistic and research articles
  - Circulation of information and organisation of events and webinars where members can present their solutions



Alliance for Rural Electrification
Shining a Light for Progress

Energy Storage Position Paper

Using batteries to ensure clean, reliable and affordable universal electricity access

With the expertise of highly experienced collaborators from three continents

Authors

Photo credits

FIAMM, Fundación Acciona Microenergía, Hoppecke, IT Power, Mobisol, Phaesun, Rahimafrooz Renewable Energy Ltd, Saft, Studer Innotec, Sunlabob, Sunna Design, Trama Tecnoambiental, Trojan Battery Company

ARE Energy Storage Task Force

Objectives

- Improve business framework based on ARE recommendations
- Raise awareness on the potential of specific technologies

Contents of ARE's position paper

- Description of available energy storage technologies for rural electrification
- Explanation of competitiveness and sector trends
- Five case studies
- Recommendations to decision makers

Source: Studer Innotec

Definition of *energy storage*

The term *energy storage* refers to those technologies that enable storing energy derived from a primary source for its use at a later time.

Source: Sunlabob

Storage technologies

- **Electrochemical storage**: lead, lithium, nickel and sodium–based batteries; flow batteries
- **Chemical energy storage:** hydrogen, synthetic natural gas
- **Electrical energy storage:** capacitors, superconducting magnetic energy storage (SMES)
- **Mechanical energy storage:** flywheels, pumped hydro, compressed air
- **Thermal energy storage:** heat (hot water/phase-change material (PCM)), molten salt (concentrated power solar thermal)
- Market segmentation defined the European Association for the Storage of Energy (EASE)

The position paper focuses on **electrochemical energy storage**, particularly on **batteries**, as they remain the **main technology applied for off-grid, but also grid backup.**

Families of batteries

1. **Lead batteries:**
   - The most mature technology, with proven safety, performance and low cost
   - The most commercially viable technology in the off-grid renewable energy market (home / residential mini-grids)
2. **Lithium-ion batteries:**
   - Most widespread technology for small portable applications
   - Increasingly becoming cost-effective also for short term management in bigger applications such as mini-grids
3. **Nickel batteries:**
   - Nickel-Cadmium system: well-suited for rural electrification systems under extreme environmental conditions
   - Nickel-Metal Hydride system: remote small PV applications such as buoys, navigation aids, or solar street lighting, where their high energy density levels
4. **Sodium batteries:**
   - For large scale grid stabilisation (power quality and peak shaving)
   - Maintenance-free, immune to high temperatures and less sensitive to application conditions

Lead batteries
Source: Trojan Battery Company

Lithium-ion batteries
Source: Saft

Nickel batteries
Source: Hoppecke

Sodium batteries
Source: FIAMM

Selected case studies from ARE members

1. Spice Village Resort, Trojan Battery Company, India

2. Rural Electrification Board Head Office, Rahimafroomz Renewable Energy Ltd, Bangladesh

3. Bringing off-grid PV LED Street Lights to the refugee camp Zaatari, Sunna Design, France

4. "Luz en Casa"-"Light at home" project , Fundación ACCIONA Microenergía, Peru

5. E3 Mozambique, Phaesun GmbH, Mozambique

Source: Fundación Acciona Microenergía

Main conclusions

Energy storage plays a key role to achieve universal access to clean, reliable and affordable electricity services

- The stand-by battery market is expanding rapidly in developing countries and emerging markets.
- Will facilitate deeper penetration of intermittent renewables.
- For grid backup and off-grid systems and can play two major roles: short-term and/or long-term energy management.
- Different chemical battery families to perfectly fit local conditions.
- By proper design and maintenance the system's performance can be improved and this also leads to economic savings over its lifetime which puts higher upfron costs into perspective.
- It is of utmost importance to use certified equipment and observe international standards while designing, installing and operating the system in order to ensure its longevity.

Key recommendations

Need of support from public authorities, particularly regulators, as well as power sector technical bodies such as rural electrification agencies and public utilities

- Developing and enforcing a well fitted regulatory framework is critical to ensure the market's sustainable development and consumer's trust
- Awareness creation campaigns
- Technical assistance to the operations sector (manufacturers, installers, operators, recyclers)
- Establishing policy targets for batteries
- Establishment of specific support schemes and assistance to the financing sector

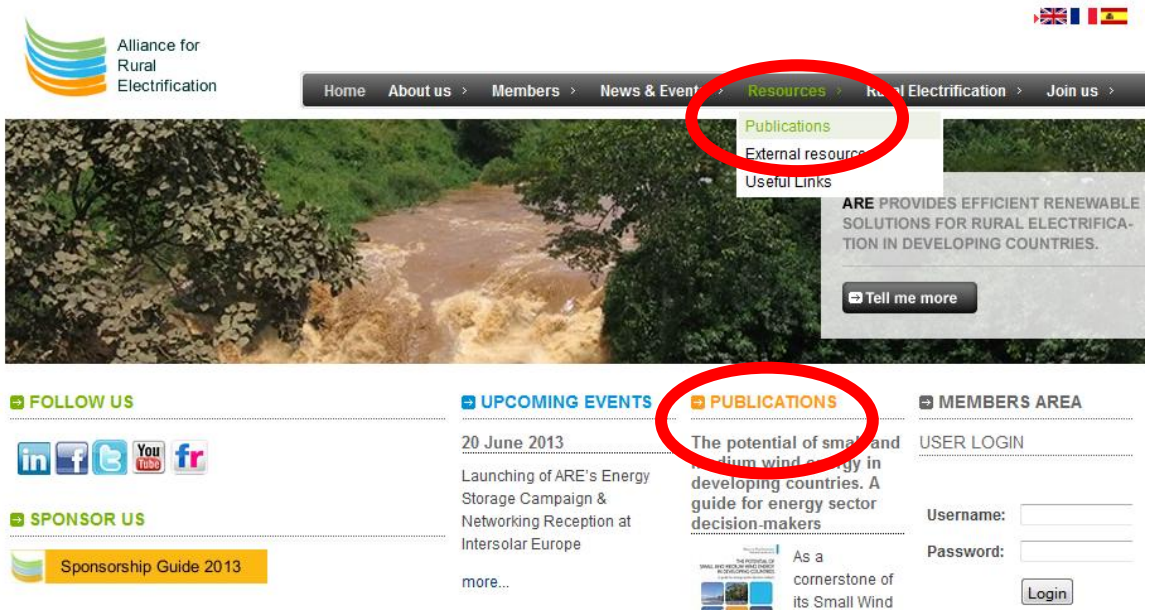
Source: IT Power

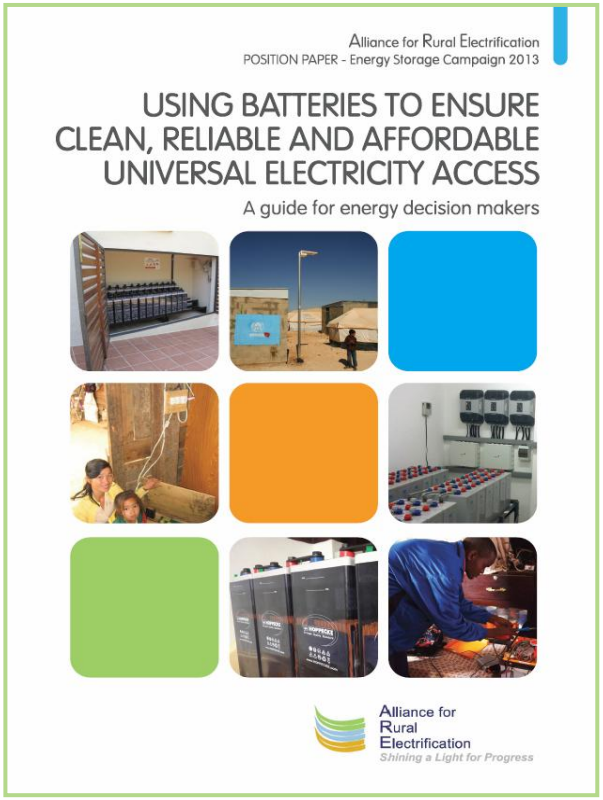
ARE is looking forward to continuing its work with the public sector.

Available on www.ruralelec.org

To download:

- Home – Resources – Publications





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Source: Trama Tecnoambiental

Questions & Answers