

## Battery selection for PV-Hybrid and mini-grid criteria and assessments

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The aim of the presentation is to draw a list of criteria and methodology to take in account to assess the most adapted choice of batteries for PV-Hybrid and mini-grid (nano-grid or micro-grid) projects development.

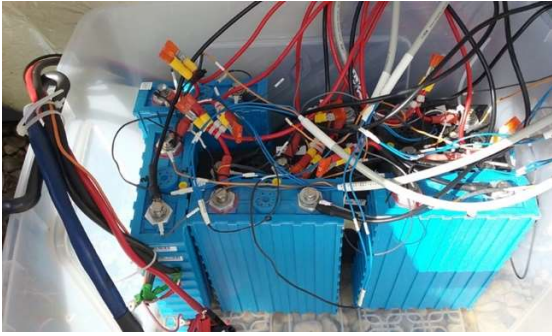
Generally speaking, energy storage technologies in solar autonomous plants can fulfil two main functions:

**Short-term power stability (seconds to hours):** The battery absorbs or supplies power to maintain a balance between instantaneous power production and consumption thereby contributing to power quality and reliability. This ensures stability of voltage and frequency in the plant. Energy storage must be capable of operating at high discharge rates the stored energy .

**Long-term energy management (hours to days):** The battery stores electricity at a period of peak production and supplies energy when the intermittent renewable energy resources are unavailable. Energy management solutions require storage systems with large storage capacity that is provided at a relatively low discharge rate.

The assessments of major electrochemical battery technologies based on lithium, lead or nickel materials are described from different experiments of 3C Projects testing lithium technologies off-grid or grid connected plants, as well as more than 20 years of experiments with lead-acid or nickel based batteries. Feedback collection and analysis issued from close professional network is another pillar of the assessments. Highlighted criteria are self-discharge, cycling, efficiency, power and energy performances, degradation mode including ageing and recycling as well as integration, installation, commissioning and maintenance constraints. At least the consideration of these different criteria should tend to help to select the most economically suited solution according to project developer's goals

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Orange labs – Lihtum batteries test (With Orange Labs Agreement)