



A 100% renewable isolated μ -grid in Mafate

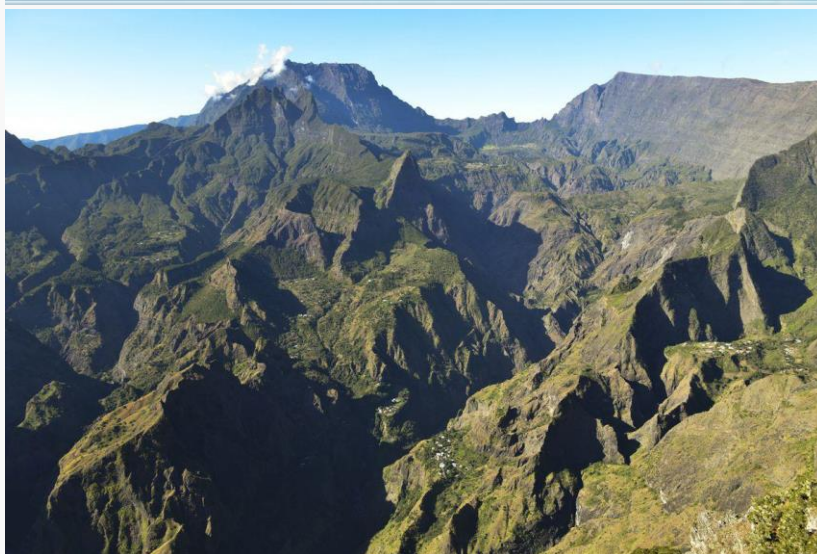
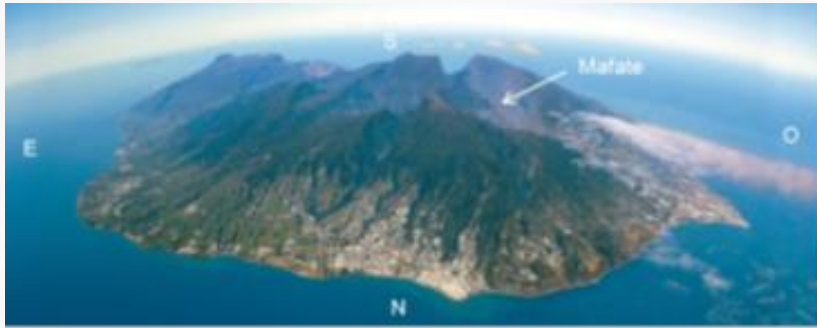
Session: 3.4 Presentation of Replicable Energy Storage Business Cases

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Ile de La Reunion - Mafate

A 100% RES, robust, resilient, non-pollutant remote isolated μ grid



Technical specs

Technical details:

- PV panels (8 kWc)
- Li-ion batteries (16 kWh) (**short term energy storage**, 1-2 days)
- Water **electrolyser** (3kW) + **Hydrogen storage system** for **long term energy storage** (1100 l@33bar, 3 kg of H₂, 80kWh almost 5 days)
- **Fuel Cell** (2,5 kW_e)
- Connections, inverters, sensors/measurement devices

Technical principle:

- PV panels primary source of energy.
- PV overproduction → batteries charge
- Batteries full → H₂ production (electrolyser)
- No PV, SoC<30% → fuel cell

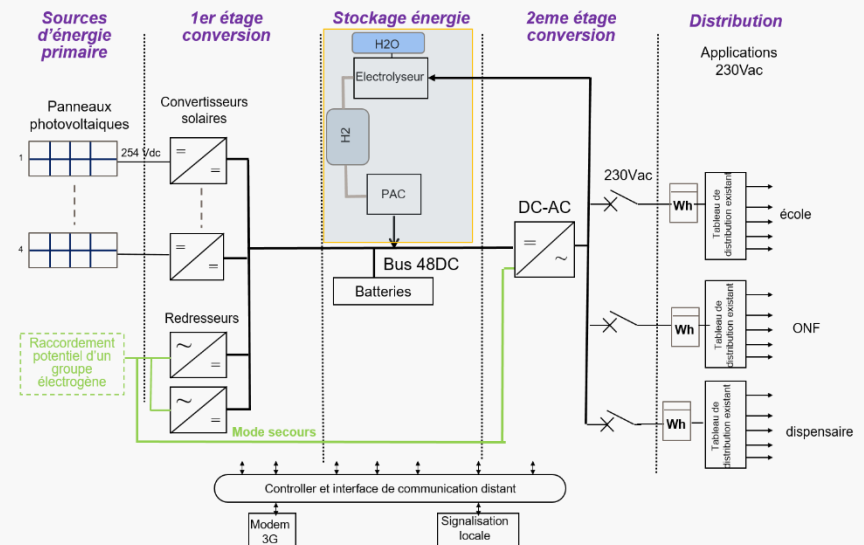
Financing: 40% EDF, 40% SIDELEC (syndicat d'électrification de La Réunion), 20% ADEME (3 year field test)

Technical partners:

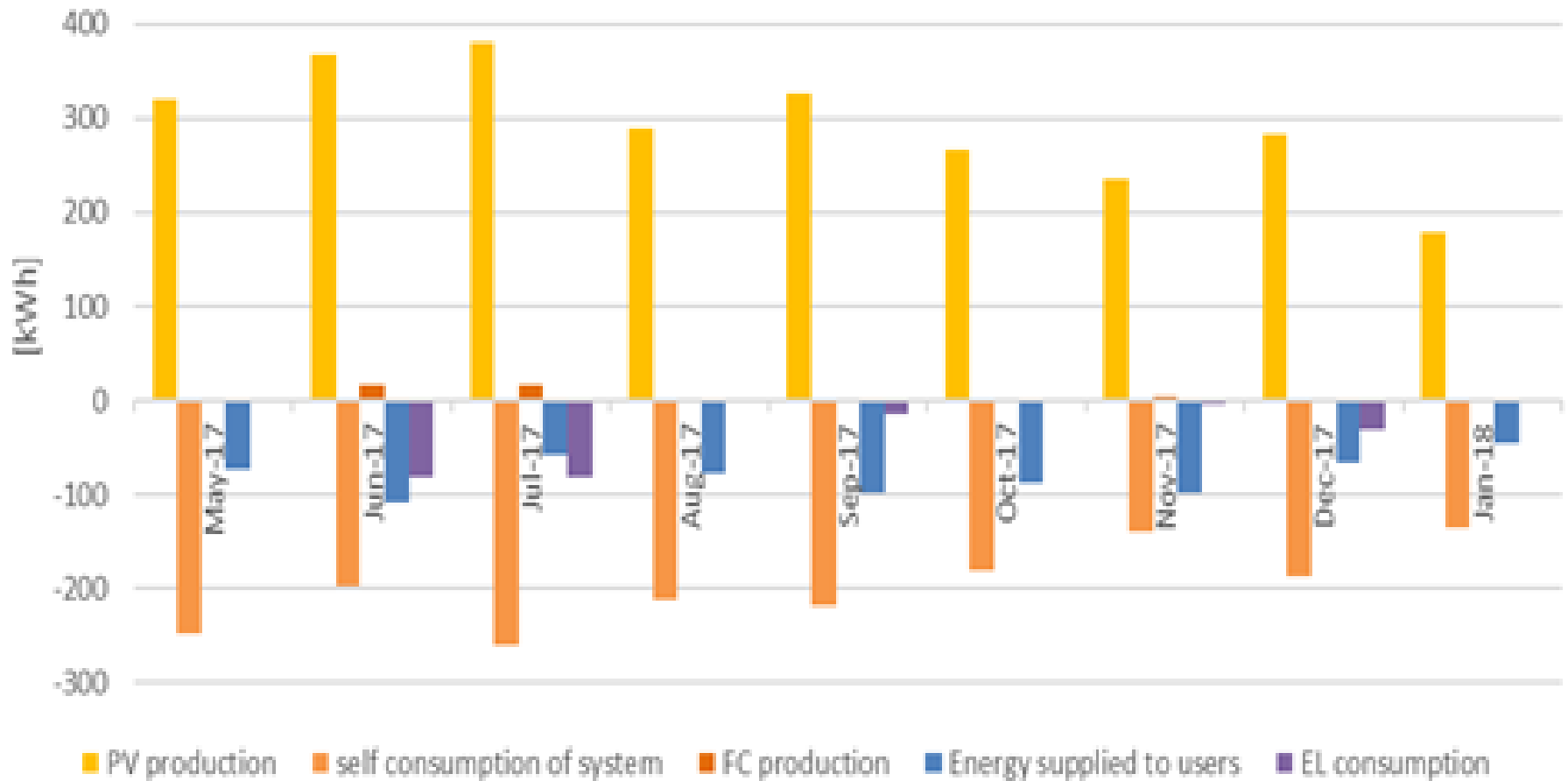


Users: school, dispensary and the building of the "Office National des Forêts"

MAFATE: schéma bloc



Energy balance



Remarks

- ✓ This project has to be seen as a prototype
- ✓ The objective is to deliver continuity of supply to sensitive buildings in an area where:
 - fuel transportation is not an economical option (no road, transportation by air)
 - environmental reasons (UNESCO Protected Area)
- ✓ This “niche market” exists in many areas around the world (high costs)
- ✓ Small equipments, main complexities (size of H2 storage and LI-ion transportation) are manageable
- ✓ Prototype has required a common understanding/basis between the local electricity syndicate (SIDELEC) in charge of development and the utility (EDF) in charge of exploitation.



Conclusions

- ✓ A complete remote site has been retrofitted with a complete 100% renewable energy chain (initially supplied with old individual PV/Storage solutions, no security of supply leading to the use of private Genset).
- ✓ This solution avoids the very high operational cost of the “diesel” scenario assuring a resilient and reliable μ grid (servicing public buildings).
- ✓ The operation showed that the batteries cover almost the entire demand, minimizing the operating durations of the fuel cell and the electrolyzer.
- ✓ Feasibility of a completely renewable μ grid and the technology solution provided have been demonstrated
- ✓ Continuous electricity supply is guaranteed
- ✓ The slightly oversized solution assure the possibility to increase the number of final users.

