



Energy storage
Where is the market moving?
The rationale for non interconnected areas

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Clean Horizon serves clients across storage technologies and value chains in the US, Asia and Europe


Utilities

-  European Utility (France)
-  European Utility (France)
-  European Utility (Switzerland)
-  Utility (Israel)
-  European Utility (Germany)



Project developers

-  Renewable energy project developer (US and Europe)
-  Gas storage project developer and operator (France)
-  Project developer (Japan)

Local Governments

-  Local economic development agency in Nord Pas de Calais Region (France)

Corporates and investors

-  European aerospace tier 1 supplier
-  European venture fund

Storage Vendors

-  Battery storage vendor (Korea)
-  Battery storage vendor (USA)
- Confidential Storage integrator (Germany)
- Confidential Battery storage vendor (Japan)
- Confidential Battery storage vendor (Korea)
-  Flywheel Storage vendor (USA)
-  Redox battery manufacturer (USA)
-  Redox battery manufacturer (Australia)
-  Liquid Air Energy Storage vendor (UK)
-  Hydrogen storage vendor (France)
-  Flywheel storage vendor (Germany)
-  Storage integrator (France)



Introduction

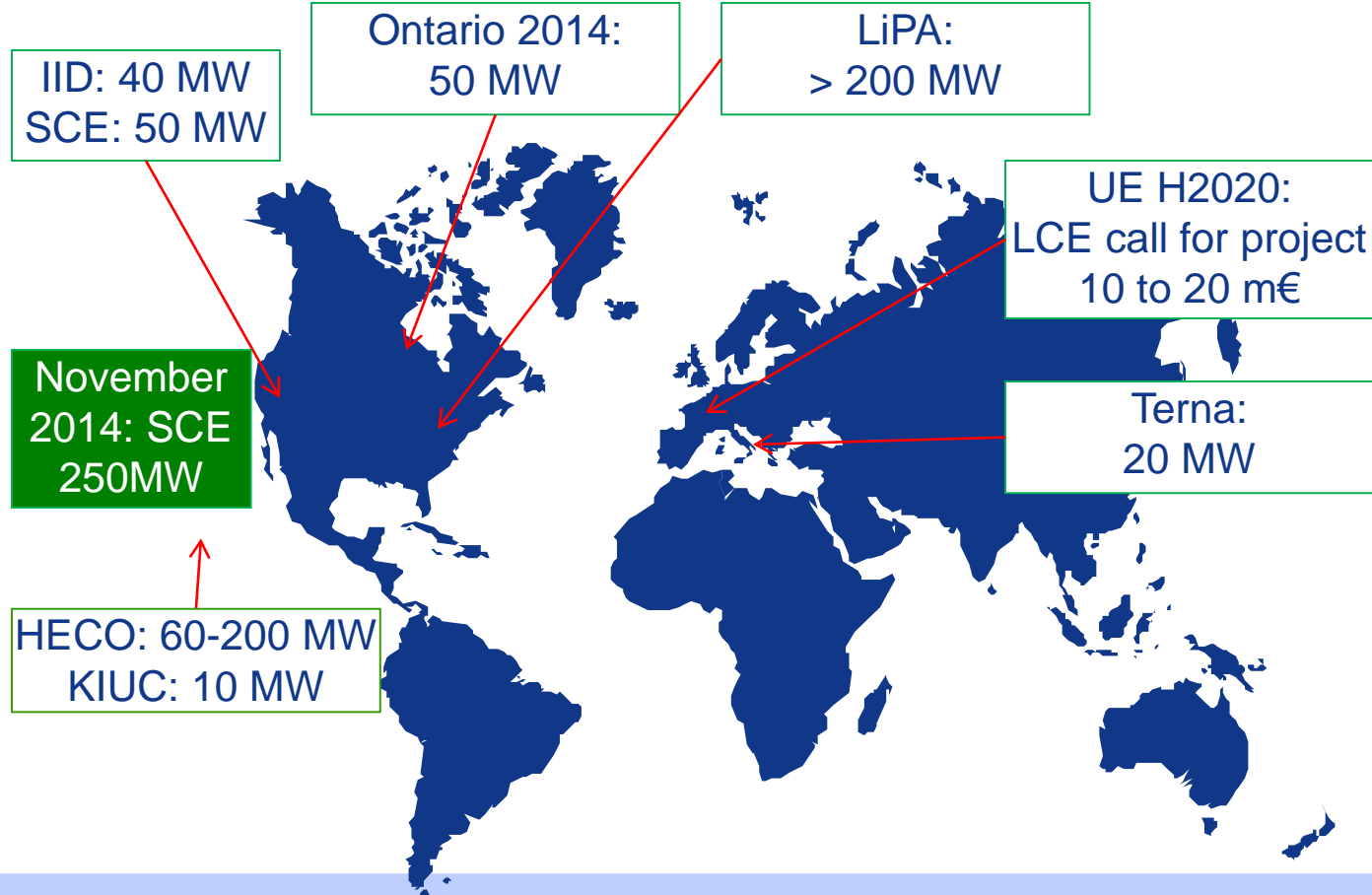
What do this year RFPs tell us on the industry maturity and what should we expect for the coming year?

- 1 Large RFPs worth GWs are emerging but not at the expected speed
- 2 On the other hand of the spectrum, small RFPs with smaller systems (but higher margins?) appear in developing countries, off grid and island situations



1 Large RFPs worth GWs are emerging but not at the expected speed

Sample of large RFPs from September 2013 to September 2014



Large RFPs are impressive, but not numerous enough to support the whole storage industry

HECO selected 3 potential winners out of the 60 respondents, the former being renowned and established names of the industry.



2 On the other hand of the spectrum, small RFPs with smaller systems (but higher margins?) appear in developing countries and off grid situations

Projects sample

Size indication

Details and Rationale

1700 2 kW batteries

Supply and delivery of 1.700 Solar Home Systems made of a 80 kWp PV panel, a battery and three LED lamps each; in South America

1600 kW

Supply and installation of stand-alone solar systems in 50+ agricultural facilities in Africa

~1 MW

A PV-Storage project developed by a private local utility for a hotel company in Asia

500 kW / 250 kWh

A pilot project ordered by a local utility in Asia with advanced Lead Acid, Lithium ion or flow batteries

Hundreds of kW

Large variety of RFPs for lead acid batteries in developing countries with sizes anywhere from a few kW to hundreds of kW

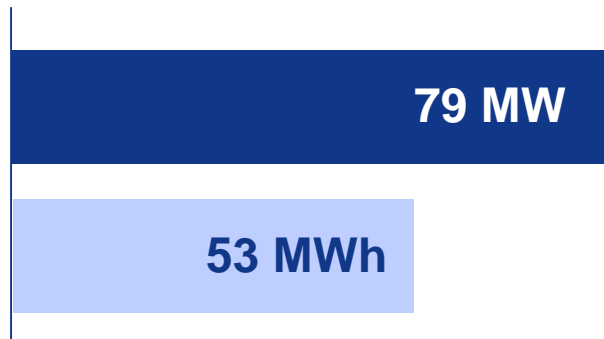
- Storage serves various purposes including:
 - Rural electrification
 - Integration of renewables
 - R&D for grid testing
- A lot of RFPs are under the MW size
- A large market share still goes to cheap lead acid batteries



A quick word on our data set: 49 “project leads” represented at least a total of 53 MWh and 79 MW

Some project leads/RFPs do not specify a storage power or duration, usually because the storage provider has to assess the size

Data available on storage capacity and energy for the identified project leads



Number of leads communicating power and/or energy value



The market for small RFPs does not add up to the market induced by larger programs (>10s of MW)... but our data set is far from extensive!



One example real case study : a tropical island powered by gensets trying to integrate PV

Context

- Small grid (approx 40 MW)
- >90% of load provided by diesel gensets
- The rest of generation is provided by PV

Two generic reasons to deploy storage

1. **Avoid general blackout due to fast PV ramp down (real case)**
 - - 4 MW 30 minutes before blackout (10% peak load)
 - - 2 MW 5 minutes before blackout (5% peak load)
 - Catastrophic frequency drop
 - Blackout !
2. **Decrease L.C.O.E** : cycling diesel is expensive !
Especially as used for primary reserve !

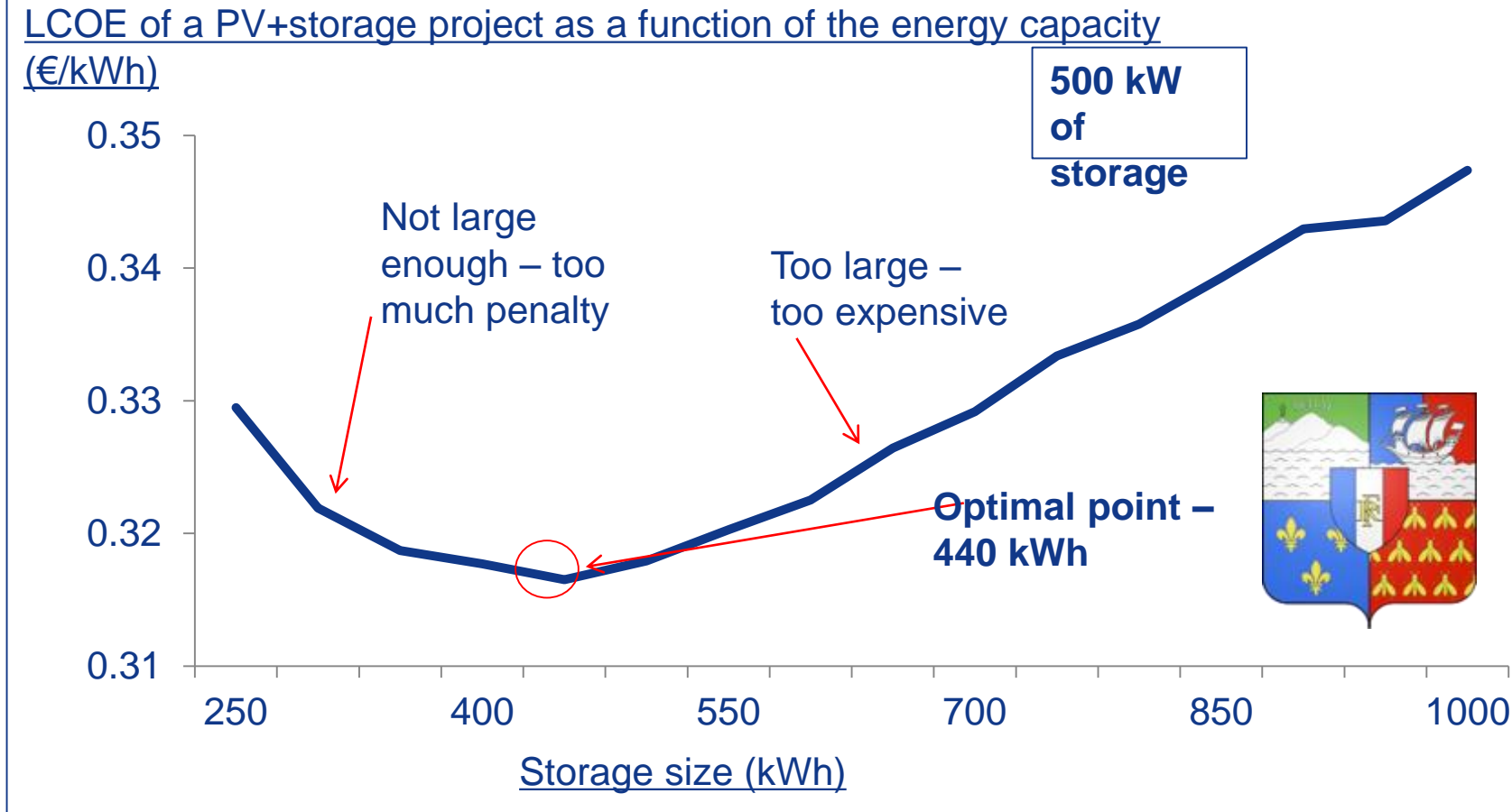
Solution

- **Local utility currently sourcing 2MW of batteries**

This case is quite generic !!

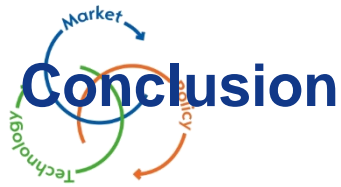


A French example: French islands call for tender, and achievable Levelized Cost of Energy



Assumptions:

- PV yield data coming from la Réunion
- 1 MWp PV plant
- Specifications: ramp rate,



While expecting large RFPs worth GWs of storage, storage suppliers have to survive.

While large RFPs are widely advertised, smaller ones can be harder to find, and come from previously unforeseen players.

In the meantime, we need to seek L.C.O.E !!!! Islands and non interconnected areas are a prime target for storage