Batteries – recent movements

Recent (last 18 months) changes in the battery market

- Chemistry changes: Move away from NMC to LFP
- What's available: Split between domestic (sub 100kW) and industrial (>1MW)
- What's being built: Lots of talk about Giga factories, but pinch point is material sourcing and scaling
- What happened to LG ES & SamsungSDI: Are they going to be able to catch up with CATL?
- Could BYD be a solution?: Need to be able to maintain as support is still limited
- Who's Coming in: Northvolt, Britishvolt: Lower transport for end user, but tough for new companies to source materials
- Shipping costs and raw material costs are up: a lot (~500% increase)

So what can be done:

In order to do anything, the following must be known:

- Electrical connection to site: what is the capacity (kVA/MVA), is there the ability to export, what is the current usage, what is peak demand
- What does future demand look like: Are there any expansion plans? What about Electric Vehicles (EVs)? How will demand change if heating is moved to electric over gas? Are other plant changes scheduled?
- Ability for renewable generation: Is there space for solar or other?
- Where is it going to go: A 1MW / 2MWh system will fit (currently) in a 20ft container with a second for the ancillaries.

With the above, the following can be looked at:

- Best fit for consumption: A system that will avoid peaks from a wholesale and distribution cost prospective
- Best fit for revenue: Play in local (DNO led) flexibility markets, support grid services etc,
- Best fit for renewables: Utilise the system for self consumption and maximum impact

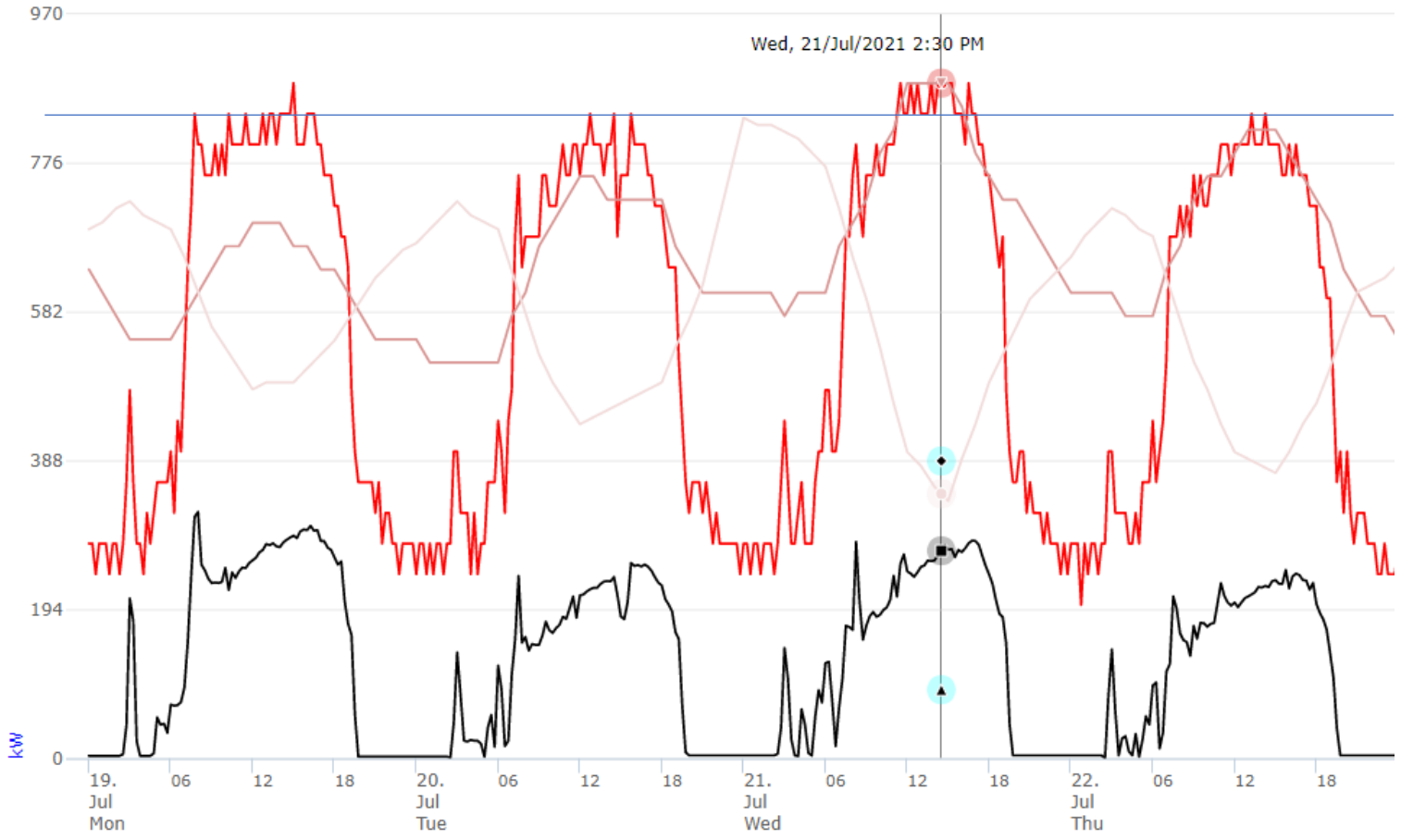
A quick example:

With HVAC being a major consumer:

Peaks can be managed by a battery. In the example below the HVAC on a hot day (~29 deg) is pushing the demand above the agreed capacity.

Given that a hot day will more often mean greater renewables on the system, electricity prices historically have been lower.
In this situation a battery that is used to trade & generate revenue would be used instead to ‘peak lop’ the building load while not missing a revenue opportunity.

The key here is the kWh or MWh of the battery.



How it works: Behind-the-Meter Solar & Storage

SOLAR PV & BATTERY

Solar PV generation consumed directly onsite
Or stored in battery

SITE

Any demand not met by solar continues to come from grid as usual.
Battery used for trading when / where useful and possible

GRID

Solar / Batt Design & Install

Solar PV O&M

EDF renewables — PPA — Client

Electricity Supply

EDF or Third Party Electricity Supplier

Grid Connection Agreement

Distribution Network Operator (DNO)

Benefits of BtM Solar & Storage

Financial Benefits

- ✓ Significant savings on your electricity bill - avoiding both energy and non energy costs of the electricity supply price
- ✓ Long term budget certainty
- ✓ Protection against volatile wholesale market
- ✓ Increased asset value

Sustainability Benefits

- ✓ Significant reduction on carbon and other green house gas emissions
- ✓ Additionality - you are supporting the creation of new renewable generation by providing a route to market
- ✓ Local generation
- ✓ Improves buildings green credentials
- ✓ REGO's transferred as standard

EDF Approach Benefits

- ✓ No upfront capex requirement
- ✓ EDF R gift the asset as standard at the end of the PPA term
- ✓ Hassle free – EDF R carry our all the work required from feasibility and development to construction and operation
- ✓ Long term warranty – EDF R are responsible for the asset for the lifetime of the PPA and will guaranteed a level of generation throughout the PPA, effectively giving you a 20 year warranty on the whole system!