Using VisNet® Hubs to detect Distributed Energy Resources

Background

The transition to a low carbon economy is a prominent goal for many modern day societies, and marks a new age for the energy industry. As such, the widespread uptake of distributed energy resources (DER) has continuously grown over recent years with no signs of stopping. Typically, we are seeing the following types of DER being installed on low voltage (LV) networks:

- Photovoltaics (PV)
- Electric Vehicles
- Batteries

Whilst these technologies represent a welcome change, embedded generating technologies, such as domestic PV, introduces reverse power flow, which is important for network planners and asset managers to be aware of.

EA Technology have developed the VisNet Hub monitoring platform, which provides measurements and insights into LV distribution systems. The VisNet hardware is complemented by a software package, enabling network operators to manage their LV networks in real-time. Alarms, historical data and the dynamic status of equipment for the entire LV network can be managed from one web application.

In this case study, we show how the VisNet Hub can be used to provide visibility of electrical networks by detecting the impact that PV has on power flow at substations.

Our Approach

Traditionally, power flows from transformers to consumers. However, on networks with a high number of PVs, power can flow from the network to transformers; this is referred to as reverse power flow. The graph on the right demonstrates this behaviour. During the day time, when the PVs are generating power, the power taken by the circuit is negative. Whereas at night, when PVs are inactive, the power flow returns to positive values.

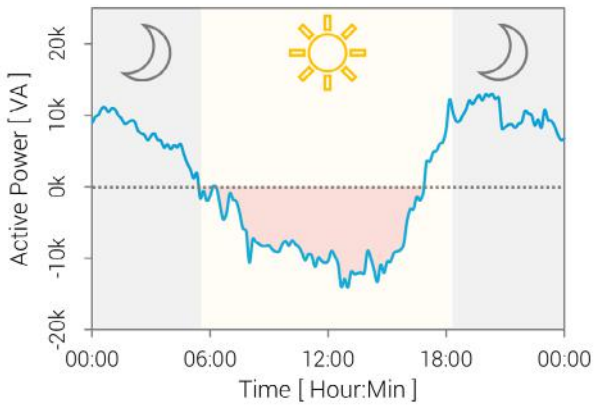
The number of PVs connected to LV networks is not always known by network operators, however identifying and characterising reverse power flow is a clear indication of significant PV penetration. This is useful for a number of reasons. For instance, when design engineers are looking to install new connections on the network, there may appear to be plenty of headroom on the substation for more load. This is misleading if there is undetected PV on the network, and the substation would possibly be at risk of overloading when the PVs are not generating power, in particular in the colder months with shorter daylight hours.

Photovoltaics on a residential property

Asset managers, or asset owners, should also be interested in this information. Understanding what is connected to LV networks provides better insights into asset health projections.

Client Benefits

Visibility of the LV network is an essential commodity for network operators to have in order to appropriately prepare for increased DER penetration. Monitoring substation data and understanding behaviours and trends provides insights into what is connected to networks. This further provides insights for both network designers and asset owners.



Reverse power flow behaviour demonstrated by a substation circuit with a high number of PVs

Global Footprint

At EA Technology we specialise in asset management solutions for owners and operators of power network assets.

Founded in 1966 we have over 50 years' experience in the industry and 5 regional offices around the world to support our global customer base.

We work with a lot of our clients on a long-term basis to help them safeguard their power networks.

We advise our clients on strategy and implementation of a range of technology solutions to manage power assets, delivering maximum life and minimise cost.

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Safer, Stronger, Smarter Networks

EA Technology Pty Ltd
381 MacArthur Avenue Hamilton
QLD 4007 Australia

t +61 (0) 7 3256 0534
e au.sales@eatechnology.com
www.eatechnology.com/australia