Study Committee C6

Active Distribution Systems and
Distributed Energy Resources

11044_2022

Active Network Management (ANM) Experiences in i-DE Networks

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Motivation

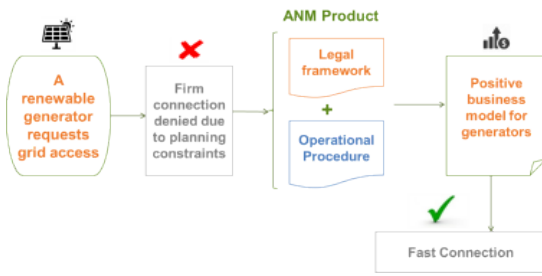
- i-DE is encountering **high volumes of renewable generators connection requests**.
- Occasionally, these requests cannot be accommodated in the distribution grid due to lack of **available capacity**.
- When a request cannot be accommodated, developers are required to build **grid upgrades** that usually take a long time (maybe years) to complete.
- Delays in renewable generators connection to the distribution grids impact environmental goals negatively.

Objects of investigation

- Analyze the suitability of the ANM scheme as a **flexible grid connection** for renewable generators.
- ANM is a **non-firm** connection alternative that allows generators to get immediate grid access by **curtailing** their generation some hours per year according to the hourly grid hosting capacity.
- This solution promotes a **more efficient use of the existing distribution grid** infrastructure.
- Generators will be able to **connect faster**, since they will not have to wait for costly grid upgrades to be built.

Method/Approach

- i-DE has deployed **two pilots** in an area of the Spanish geography with plenty renewables resources and **lack of enough hosting capacity** to accommodate renewable generators' requests.
- In order to capture the **variability** of different renewable resources, these pilots include a solar PV and a wind farm generator.
- Both generators face the same **capacity issues**.
- Established **operation protocol** that enables real time communication between Control Rooms and generators to modulate their output.



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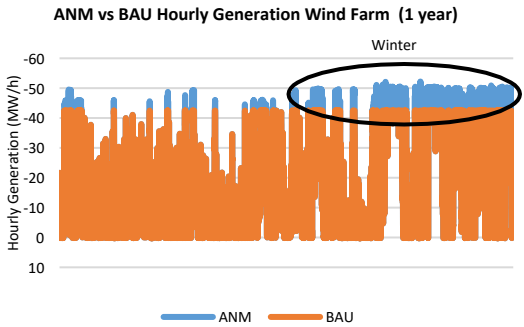
Pilot Results

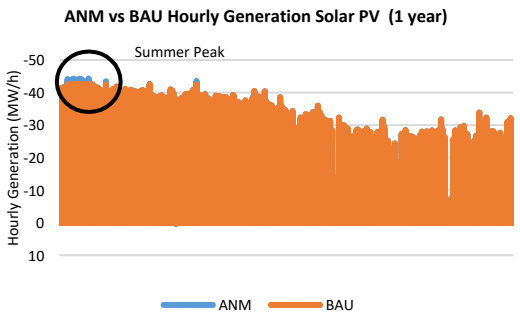
Wind Farm

- The **wind farm** (50 MW rated capacity) involved in this ANM scheme has injected **extra + 5 % energy** in the distribution grid during the first year of operation versus the Business As Usual (BAU) situation, where it would have been capped at 42.5 MW due to lack of hosting capacity.
- The ANM effect has been remarkable during the **winter months** due to the **high availability of wind resource**, achieving higher rates of extra energy injected into the grid and extra profits.
- This generator has **increased its revenue by 6%** thanks to the ANM scheme.



Solar PV Generator

- The **nameplate capacity** of these solar panels is equal to **50MW** and the **firm capacity** the systems grants is **42.5MW** (like the wind farm).
- PV generator **converters** are rated at **43.5MW,** which only leaves **1.5 MW extra output margin** versus the BAU solution.
- This means the PV generator's output will never go beyond 43.5MW and explains why the results of this pilot are **very moderate**.
- The **summer** months show a **moderate increase in exported energy**.



Conclusions

- This approach has multiple benefits for all the stakeholders:
  - Generators will get **faster grid connections** in areas where planning constraints would hamper them and would make them wait for grid upgrades to be built.
  - Society will benefit from **efficient infrastructure management** and **increased renewables penetration**. Efficient grid use will be translated into reduced expenditure in networks upgrades, which reduces the impacts on taxpayers.
- From a regulatory perspective, the success of these pilots will justify investments in **new control platforms** that help coordinating renewable generators massively.
- These pilots have shown how ANM is especially beneficial in the case of **wind generators**. This is because they are more likely to achieve their **rated power** compared to PV technologies, on an hour-by-hour basis.
- This project demonstrated the **complementarity** of wind and solar technologies participating in an ANM scheme.