

H. Baba LAB.

[Demand Side Electric Power System Utilizing IoT]



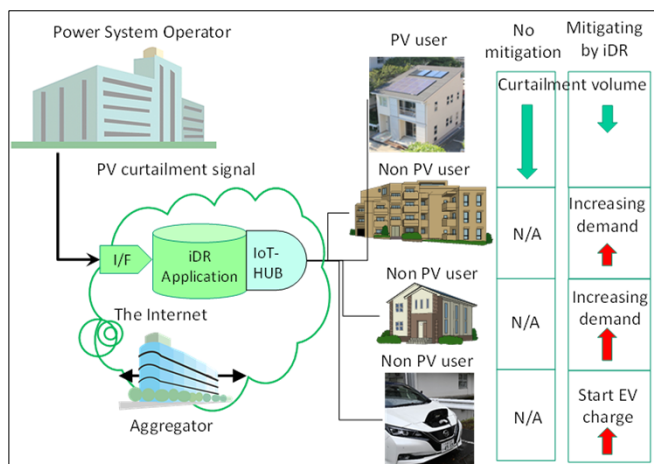
Department of Human and Social Systems

Engineering of Distributed Energy Resources Utilizing

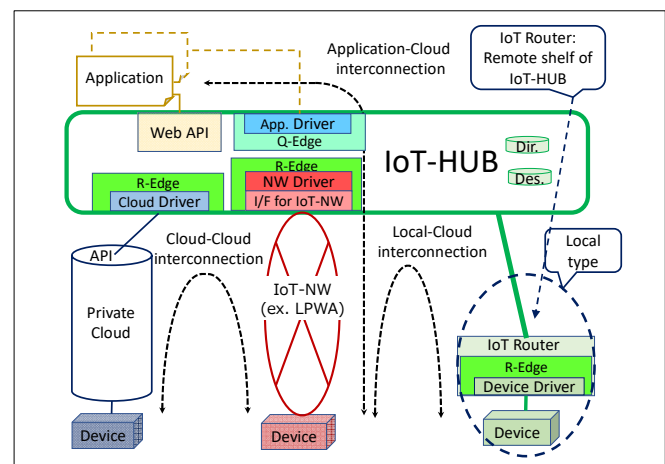
Currently, climate change has become a big issue globally, and the concrete plan of building a so-called decarbonized society is gathering interest. Of course, solar power and wind power will play an important role of it. There are various types of renewable energies, however, especially, solar and wind power generation does not obey human order as it is called "Variable Renewable Energy (VRE)". It is just up to the weather or wind and fundamentally different power sources from the conventional thermal power generation.

At present, VRE output fluctuations are compensated mainly by changing the output of thermal power generation in the reverse pattern and the frequency is maintained. But it is approaching the limit. In fact, in the Kyushu area, the output of solar power is frequently curtailed because the output is greater than the demand at that moment. In the future, in order to increase VRE more, it will be necessary not only to increase these facilities, but also to change the structure of the demand side, i.e., user of electricity. Socio-economic activities are not conducted according to the convenience of energy now, but it seems that we need to change mind now and act for the convenience of energy. Of course, it is also necessary to introduce a low-cost system so that socio-economic activities are not affected. A paradigm shift is required for us right now.

For example, we will need a new mechanism such as charging a battery electric vehicle (EV) according to the VRE status, even when we are away from home. Since it is possible that the places where a lot of VRE power is generated is not require additional power, these balancing mechanism should work in wide area like entire Kanto area. Fortunately, a technology called IoT (Internet of Things) has been developed, and it seems that we can create a power system that can introduce more VRE using IoT. Building up an EV charging testbed utilizing IoT in the campus, my laboratory will proceed with research and development of elemental technologies and social implementation method while assuming such a mechanism.



Increase and Decrease of the Demand by Aggregator according to the Output status of Variable Renewable Energy Resources



Design of a Protocol-free Infrastructure Mechanism for Interconnecting and Controlling all Demand Equipment



Social Implementation of Infrastructure for Interconnection among any IoT Systems
(Press Conference in May 29, 2019)
https://www.u-tokyo.ac.jp/focus/ja/articles/z0205_00056.html



Building up an EV charging testbed utilizing IoT
(at Parking Lot of Komaba Research Campus)