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Possible Amount of Frequency Regulation Reserve by V2G in Japan

Shigeru Tamura
Meiji University, Japan

As several countries and cities announced that they would ban sales of petrol and diesel cars in the years to come, electric vehicle (EV) will prevail in the near future. On the other hand, many EV's are expected to be parked all day or almost all day according to a survey in Japan. They can contribute as vehicle-to-grid (V2G) to frequency regulation in power systems.

In this presentation, a survey of car trip distance in Japan is introduced at first. It shows that the number of cars parked all day is around 36% in the total and 93% of cars run a distance less than 100 km, which means that great many cars are parked all day or run a short distance a day. If all the cars are changed to EV's in the future, many EV's will also be parked all day or almost all day. The survey also includes the trip-start and trip-end time of each car in 147,879 cars.

Assuming that those cars play a role of V2G for frequency regulation from plug-in time to plug-out time through charging, possible amount of frequency regulation reserve by V2G can be envisaged. The possible frequency regulation reserve of each car can be figured by the available state-of-charge (SoC) for V2G along the EV battery charging curve which depends on V2G control method.

The possible amount of upward and downward frequency regulation reserve of each hour in a day is presented for the different V2G control methods after they are introduced. As EV battery can also be applied to operating reserve, its possible amount is also described.

Please send the Abstract to **dsobajic@gridengineering.com** by April 12