Abstract Format

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Smart Energy House Project to aim at optimizing domestic energy consumption

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Abstract

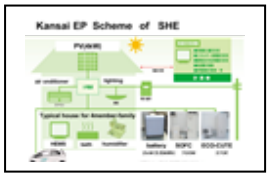
Installation of renewable energy resources, especially PV, has skyrocked and more and more attention has been attracted to improving the energy efficiency of domestic energy consumption in Japan since Feed-In Tariff or FIT was introduced in 2009 and The Great East Japan Earthquake broke out in 2011.

Kansai EP has been conducting various researches on individual domestic electric appliances like air conditioner, heat-pump water heater called ECO-CUTE etc. for some decades. Considering such energy related circumstances, Kansai EP built Smart Energy House(SEH) in Seika Town, Kyoto in 2013 to integrate the past individual research achievements and seek improving domestic energy use efficiency of the both of power and hot water as a whole house .SEH is equipped with PV, stationary battery, EV-PCS, SOFC cogenerator, ECO-CUTE and a complete set of ordinary domestic electric appliances like air conditioner, lighting,
etc. Such appliances are controlled according to the use schedule preinstalled on a PC and therefore SEH can reproduce the energy consumption pattern of a typical 4 member family(couple and their two children) in terms of the both of power and heat, even though no one lives there, unattended. The results of researches conducted at SEH are as follows

2014:basic evaluation of each appliance
2015:optimization of combined operation including PV, SOFC and ECO-CUTE
efficiency comparison between ECO-CUTE and SOFC
2016:evaluation of various V2H operation patterns
VPP simulation through Open ADR2.0b and ECHONET Lite

Combination of EV, PV and ECO-CUTE is a key element for domestic energy efficiency improvement and stabilization of power grids through VPP or virtual power plant in the near future and it is demonstrated at SEH that charging of EV and operation of ECO-CUTE in the daytime improve drastically the efficiency of domestic energy use. It is expected to apply the results of researches at SEH to VPP technology and proceed to the stage of commercialization of VPP in a few years.

SEH exterior



SEH diagram