



# Demand Response

## Energy management infrastructure for aggregation of households



As the penetration rate of Renewable Energy Sources increases, new solutions are needed to relieve the grid from the stress created by the supply and demand imbalance. In the frame of the EU project SEMIAH, a novel ICT infrastructure for the implementation of automated Demand Response in households is proposed to enable shifting energy consumption of high-consuming loads to off-peak periods.

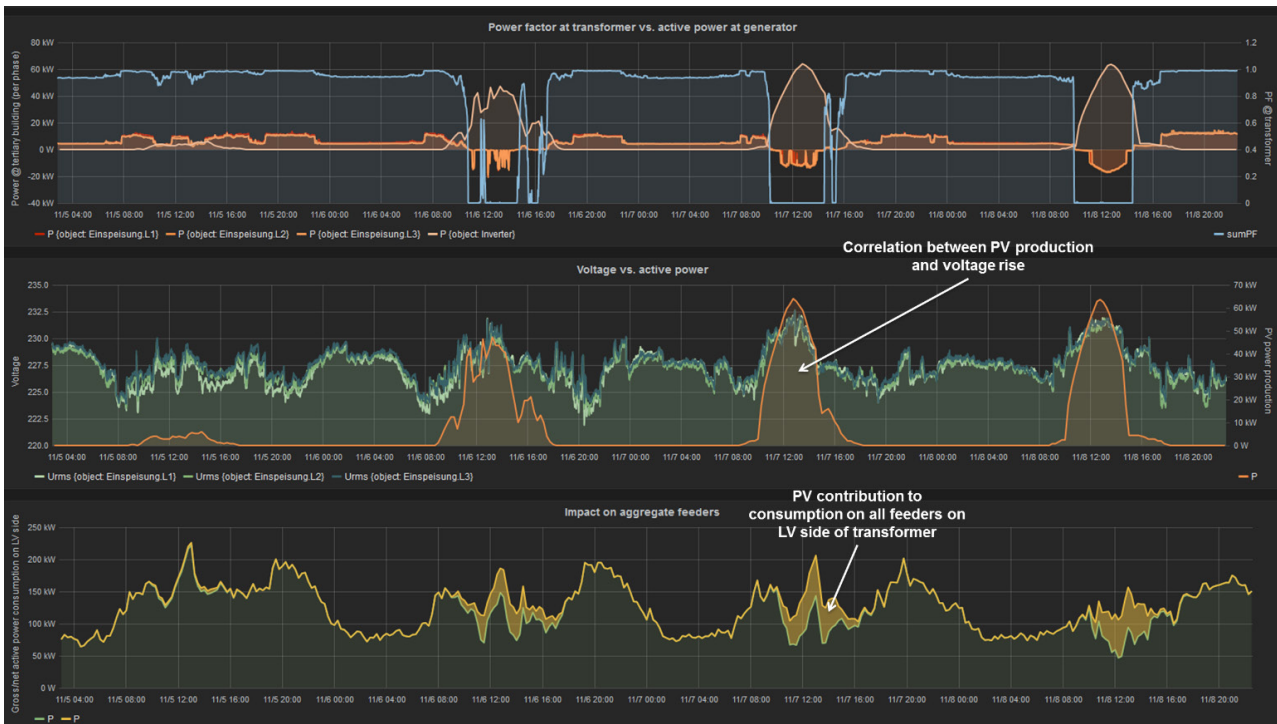
- ❖ FRONT-END SYSTEM—Home Energy Management Gateway with standardized data models and services for home automation.
- ❖ BACK-END SYSTEM—Community based aggregator function, including algorithms for loads forecast, planning and scheduling.

The economic and environmental potential of the solution has been computed by scaling up the results obtained on the test-sites, where the power consumption

of boilers was shifted without compromising the occupants comfort. For 1000 households we could show that 450 MWh can be shifted annually. Extracted to the scale of Switzerland, it was shown that around 16.5% of the consumption could be shifted to renewable energy produced by photovoltaic systems<sup>[1]</sup>.

The analysis of the impact of load-shifting on the low-voltage network based on power quality measurements on a representative test network showed that in Switzerland the grid quality is mainly affected by reverse power flows and power factor fluctuations. Within the project we showed that the SEMIAH technology is neutral for the latter and can be exploited in a beneficial manner to reduce reverse power flows, which results in an active contribution to maintain the power quality of the grid.

<sup>[1]</sup> <http://semiah.eu/service/semiah-for-business/>



This work is supported by the European Commission under the FP7 program with contract number FP7-ICT-2013-11-619560.

