

Green Synchronization System for Electric Vehicle Supply Equipment Omair Farooqui (CpE), Alex Ramirez (CSE), Emon Sahaba (CpE), Krishan Solanki (EE)

Background & Objectives

The EVSE Smart Charging System is an engineering project that aims to tackle the mass adoption of Electric Vehicles (EVs) as the standard for transportation for California, causing load on the grid to worsen. Aiming to align with the California Zero Net Energy goal by 2020, this project approaches the mass transition through the angles of the user, utility, and the state.

Research Questions

- 1. How can we help ease the load on the energy grid (Fig. 1) in a way that promotes the wellbeing of the state, providers, customers, and the environment?
- 2. How can we take advantage of the Internet of Things to assist in the development of the solution?
- How can this solution add minimal disruption to the user's everyday life?



Project Advisors: Dr. Michael Klopfer, Prof. G.P. Li California Plug Load Research Center (CalPlug)

Planned Hardware/Software Solutions



Acknowledgements







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Current Progress

{"message": "Connected to Smart EVSE API"}

Figure 5. Initial work on backend API

20181023_20181024_SLD_REN_FCST_N_20181023_22_32_6_v1											
R_HR	OPR_INTERVAL	INTERVALSTARTTIME_GMT	INTERVALENDTIME_GMT	TRADING_HUB	RENEWABLE_TYPE	LABEL	XML_DATA_ITEM	MARKET_RUN_ID_POS	RENEW_POS	MW	MARKET_RU
13	0	2018-10-23T19:00:00-00:00	2018-10-23T20:00:00-00:00	NP15	Solar	Renewable Forecast Actual Generation	RENEW_FCST_ACT_MW	3	3	936.94645	ACTUAL
19	0	2018-10-24T01:00:00-00:00	2018-10-24T02:00:00-00:00	NP15	Solar	Renewable Forecast Actual Generation	RENEW_FCST_ACT_MW	3	3	1.75312	ACTUAL
12	0	2018-10-23T18:00:00-00:00	2018-10-23T19:00:00-00:00	NP15	Solar	Renewable Forecast Actual Generation	RENEW_FCST_ACT_MW	3	3	836.98037	ACTUAL
16	0	2018-10-23T22:00:00-00:00	2018-10-23T23:00:00-00:00	NP15	Solar	Renewable Forecast Actual Generation	RENEW_FCST_ACT_MW	3	3	688.33152	ACTUAL
11	0	2018-10-23T17:00:00-00:00	2018-10-23T18:00:00-00:00	NP15	Solar	Renewable Forecast Actual Generation	RENEW_FCST_ACT_MW	3	3	813.20029	ACTUAL
1	0	2018-10-23T07:00:00-00:00	2018-10-23T08:00:00-00:00	NP15	Solar	Renewable Forecast Actual Generation	RENEW_FCST_ACT_MW	3	3	-2.60269	ACTUAL

Figure 6. Analysis of state energy data

Figure 7. Working firmware and IoT communication

Conclusion & Future Developments

As the project continues to be developed, we hope to develop a full-stack, user-friendly IoT solution to help alleviate grid load during peak charging times and to promote renewable energy sources. Further

- Front-end web application
 - Enhanced optimization based on energy supply and demand trends
- Industry hardware security standards compliance

