

1 National Grid's Headquarters in Waltham, MA was used as an evaluation site.

2 Carpet plot generated by FirstFuel from National Grid energy data.

Fraunhofer Center for Sustainable Energy Systems CSE

Massachusetts Office
25 First Street
Cambridge, MA 02141

Contact



Jeff McAulay
Fraunhofer TechBridge™
Tel: +1 617 575-7265



Dr. Peter Engelmann
Building Enclosures
Tel: +1 617 714-6524

www.cse.fraunhofer.org

Product Tested

FIRSTFUEL
BUILDING ENERGY ANALYTICS

PROJECT RESULTS: REMOTE BUILDING ENERGY ANALYSIS

Introduction

Fraunhofer CSE researchers evaluated the accuracy of remote building energy audits performed by FirstFuel Software. The project was funded by the US Department of Energy through a U-Launch award announced in the spring of 2011.

FirstFuel has developed a building energy consumption-reporting platform to remotely analyze the energy performance of building. The platform is based on proprietary analytical algorithms that disaggregate whole building consumption data into its end-use components - without requiring on-site visits, devices or questionnaires.

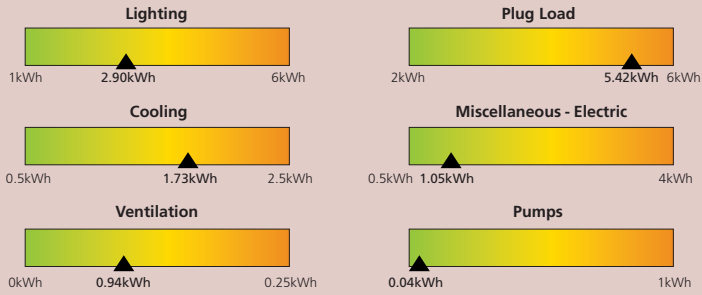
Fraunhofer CSE has performed a comparison between the disaggregation data obtained by FirstFuel and measured data from submeters installed at National Grid Headquarters in Waltham, MA to determine the FirstFuel platform's accuracy. End uses were grouped into the categories of HVAC, lighting, plug loads and miscellaneous.

Building Test Site

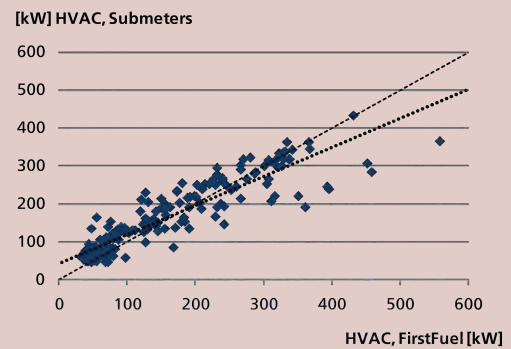
Testing took place at the National Grid headquarters building in Waltham, MA. This 312,000 ft² office building was constructed in 2009, and is LEED Platinum certified by the USGBC. The building is outfitted with more than 50 submeters measuring electricity broken out by specific end uses. Lighting circuits, cooling, ventilation, data center and miscellaneous loads were identified based on electrical drawings of the building and best-available information from facilities managers. Space heating is fueled by natural gas.

FirstFuel was provided with a full calendar year of utility-level energy consumption in fifteen-minute time steps and the building address. In a timed evaluation, FirstFuel took 19 hours to complete their analysis of the National Grid building. During this time period, the FirstFuel Software team also gathered weather data and satellite images of the building.

FirstFuel End-Use Disaggregation and Benchmarking

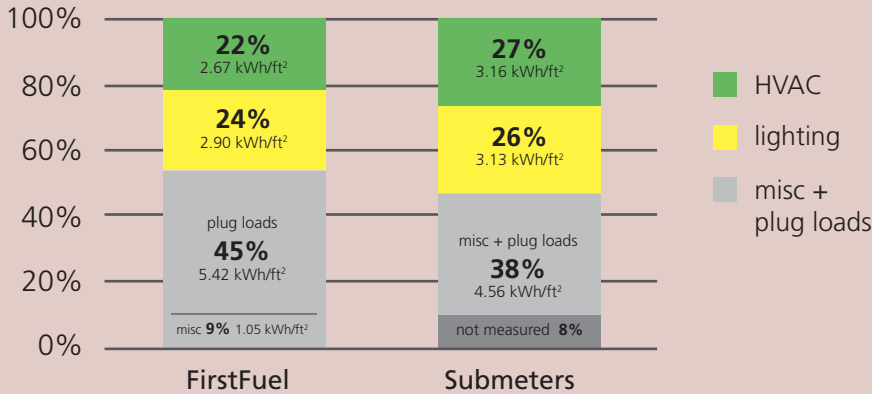


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4

Overall Energy Usage at National Grid HQ 2010, By Category



5

Results

Submeter data was grouped by category and compared to the FirstFuel disaggregation data. Comparisons were performed to identify accuracy for daily average values, weekday vs. weekend and seasonal values. The temperature-dependent loads identified by FirstFuel showed strong correlation with the submeters for HVAC systems (Figure 4). The disaggregation results were generated with close similarity to submeter values in the three broad categories described. The annual values are shown normalized to building square footage in Figure 5. Lighting values include parking garage and exterior lighting.

A portion of the total energy used at the National Grid building was not measured due to submeters that did not record data or loads that were not metered.

Conclusions

As demonstrated in this study, the remote disaggregation technique developed by FirstFuel has the potential to be a valuable engine for large scale benchmarking of buildings and to identify energy-saving opportunities without on-site audits. Further tests should be performed to identify statistical accuracy across a larger sample set of buildings. A full report will be available online at:

cse.fraunhofer.org

3 FirstFuel energy end use data with benchmark building energy consumption, normalized by ft².

4 Daily average power comparison between FirstFuel disaggregation and submeter data for total HVAC weekday values.

5 Disaggregation comparison by major submeter categories versus FirstFuel predictions for calendar year 2010.

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