



By Consolidated Energy Design, Inc.

FADRS® Controls Only



Mgmt: NAI Emory Hill Real Estate Group
7250 Parkway Drive, Hanover, MD

Project: FADRS® Controls Only (pronounced faders)
Smart Grid Technology Showcase utilizing
patented Artificial Intelligence, Prediction &
Human Centric Technology.

Contractors:
Consolidated Energy Design (Patent Holders)
Third-party BAS contractor (Fab & Installation)

Funding Agency:
Maryland Energy Administration (MEA)
Grant 2015-05-517S5
“Novel Demand Response & Advanced
Energy Management System”

PRE Conditions: 5 Story Tenant Occupied Office Building; 81,000 square feet
85 Water Source Heat Pump System
Typical Building Automation System (BAS) for space heating/cooling.

POST Conditions: **CONTROLS ONLY Energy Conservation Measures (ECMs) – No New HVAC Equipment**

- **FADRS® Painless Demand Response®**
- **FADRS® Enhanced Building Automation System**
- **~100 Power Quality Sub Meters** (Deep granularity) + KYZ Pulse meter

ALL the ECMs were overlaid on top of the existing BAS and others were installed over a new BAS.

FULLY AUTOMATED control (No Human Intervention). Bidirectional control in real-time.

Completion Date: **FADRS® Enhanced Building Automation System Performance:**
HVAC Energy Savings from April 1, 2018, through March 31, 2019

Year Three Normalized Baseline (NBL) for HVAC = 1,627,934 KWh (\$177,119)

Year Three HVAC Normalized Energy Savings = 454,715 KWh (\$ 49,473) **27.9%**

Year Three Carbon Reduction (CO2e EPA Calculations) = 318 Metric Tons

FADRS® Painless Demand Response® Performance:
(8/2/18 Summer Capacity Test)

172 KW down to 118 KW = **31%** DR Reduction

IPKeys is the Curtailment Service Provider for this project and their **PJM formula**.
Calculations are found on the reverse side.

**EXHIBIT A****ELECTRIC SAVINGS AT MEA PROJECTS AFTER 3 YEARS****Building 7250**

	KWh (NBL)	Dollars	Dollars/SF (81,000 SF)	KWh W/FADRS®	Dollars W/FADRS®	Dollars/SF (81,000 SF)	KWh Saved	\$ SAVED	% SAVED	CO2e Reduction in Metric Tons
YEAR ONE 4/16-3/17	1,584,444	\$ 171,754	\$ 2.12	1,235,550	\$ 133,934	\$ 1.65	348,894	\$ 37,820	22.0%	244
YEAR TWO 4/17-3/18	1,516,320	\$ 168,615	\$ 2.08	1,161,769	\$ 125,936	\$ 1.55	354,551	\$ 39,426	23.4%	248
YEAR THREE 4/18-3/19	1,627,934	\$ 177,119	\$ 2.19	1,173,219	\$ 127,646	\$ 1.58	454,715	\$ 49,473	27.9%	318
Achieved energy savings of 27.9% at the end of Year 3 because our patented FADRS® AI system learned how to run the building more efficiently over time.						TOTAL SAVED OVER 3 YEARS	1,158,160	\$ 126,719		

DEMAND RESPONSE TEST**PJM Customer Usage Review**

Customer	Emory Hanover
Utility Acct #	
Nom ICAP	121.26
FSL	130
Zone	BGE
Cap Loss Factor	1.089
PLC	262.83

Test Results
Pass

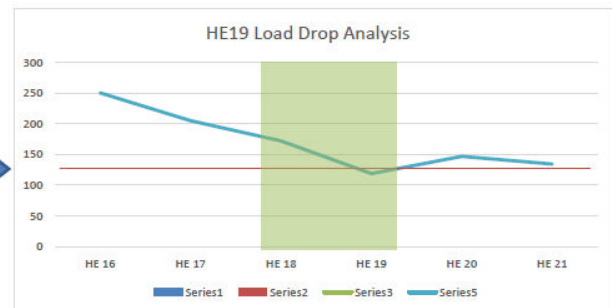
Customer required to reduce usage to or below this level.

TEST
2018-08-02

August 2, 2018
18:00:00 PM Test Event Start
19:00 PM Test Event End

HE 1	110.9
HE 2	110.2
HE 3	111.2
HE 4	110.2
HE 5	113.8
HE 6	112.6
HE 7	168.8
HE 8	218.0
HE 9	255.2
HE 10	255.5
HE 11	263.6
HE 12	272.5
HE 13	273.2

Target FSL 130kW



HE 14	272.3
HE 15	279.6
HE 16	250.4
HE 17	204.8
HE 18	172.2
HE 19	118.8
HE 20	146.8
HE 21	134.4
HE 22	108.3
HE 23	108.1
HE 24	107.8

FSL ANALYSIS			
		HE 19	Average Across Event
Nom ICAP	121.26		
Comm ICAP	121.26		
FSL (MW)	130		
Metered Load	118.80		
PLC (MW)	262.83		
DR Factor	0.957		
FPR	1.0892		
Cap Loss Factor	1.09		
Reduction ICAP MW	133.45669		133.457

Shortfall ICAP	-12.1967	110%
Shortfall UCAP	-13.2846	Pass

Tested HE19 kW Value	118.8
Load Reduction	53.4
Percentage of Reduction	31%

Reduction (MW) = PLC - (Metered Load * Capacity Loss Factor)

Shortfall ICAP = Committed ICAP - Reduction MW

Shortfall UCAP = Shortfall ICAP * DR Factor * Forecast Pool Requirement