



OPTERRA
ENERGY SERVICES

BOSTON GREEN TOURISM

3/9/17

OpTerra Energy Services



- EPC firm specializing in energy efficiency, power generation and renewable power
- OpTerra Advantage Financing
- 22 Offices, 16 States
- Two Major Divisions – C&I and Public Sector
- C&I Division HQ in Norwell MA – Formerly Bluestone Energy Services
- In 2016 – OpTerra Energy Services Acquired by Engie



OpTerra Energy Services - C&I Division



- LED Lighting Upgrades and Design

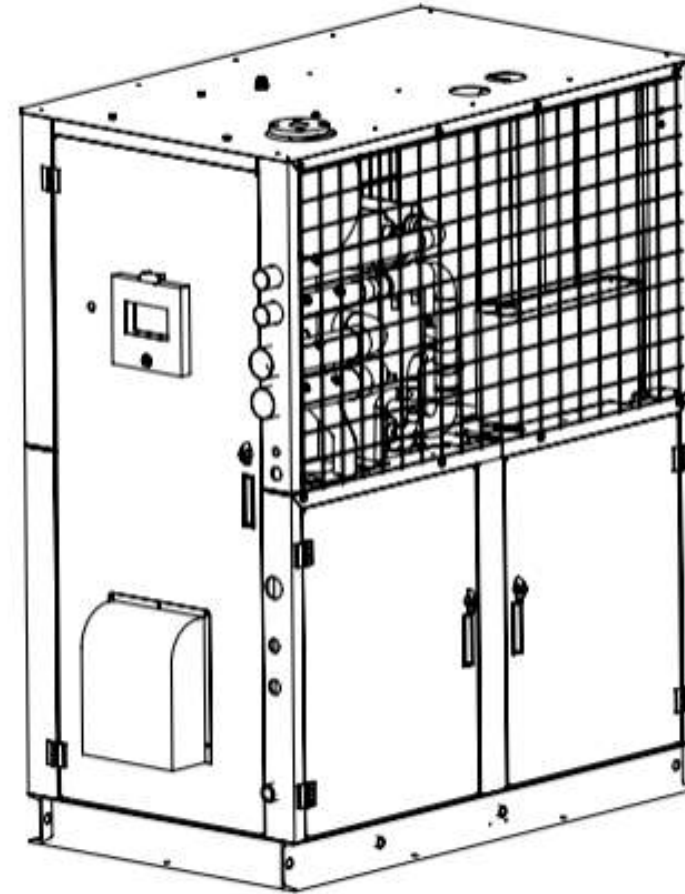
- Prescriptive and Custom Mechanical Systems (Commercial & Small Industrial)
 - Chillers, Boiler & Towers Replacements
 - HVAC Upgrades, air- and water side
 - VFDs
 - Controls

- Engineered Systems - Electrical & Mechanical (Large Commercial & Industrial)
 - On-site Power Generation
 - Gas Engine Driven Chillers, Compressors & Heat Pumps
 - Desiccant Dehumidification
 - Centrifugal Air Compressors
 - Advance Controls



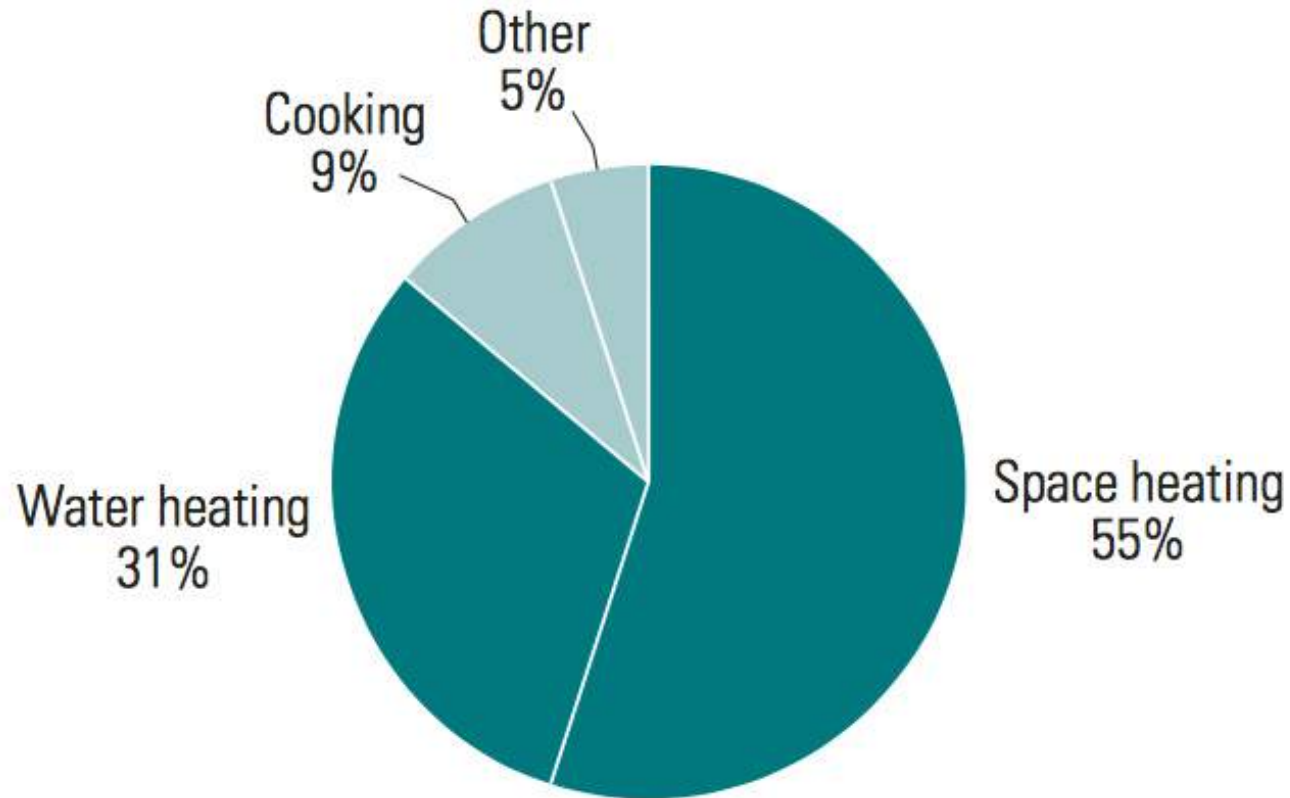
Cost Saving Opportunities in Hotels

- Gas Heat Pump Water Heaters



Typical Hotel Gas / Thermal Profile

A. U.S. lodging, natural gas use



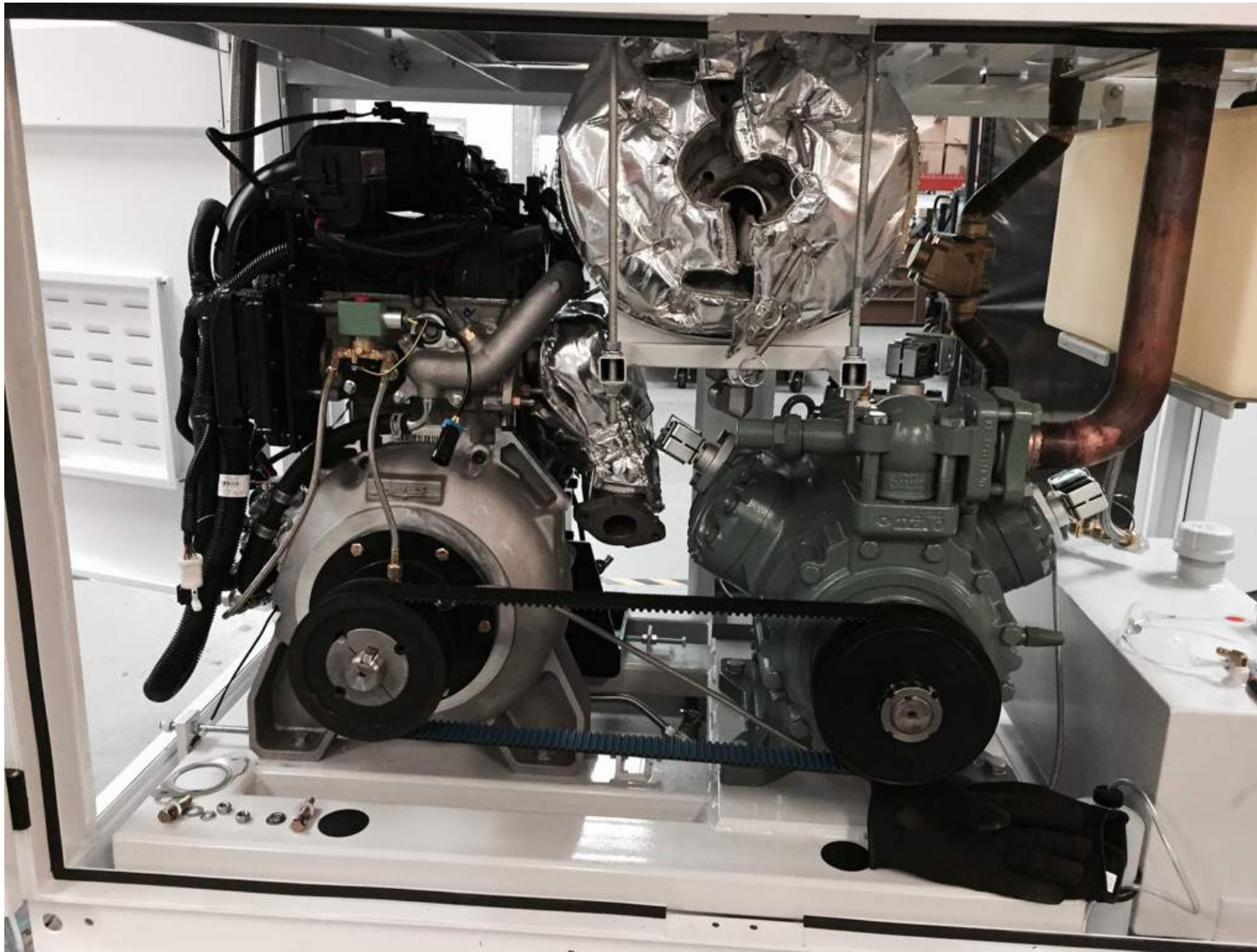
HPWH Rigging



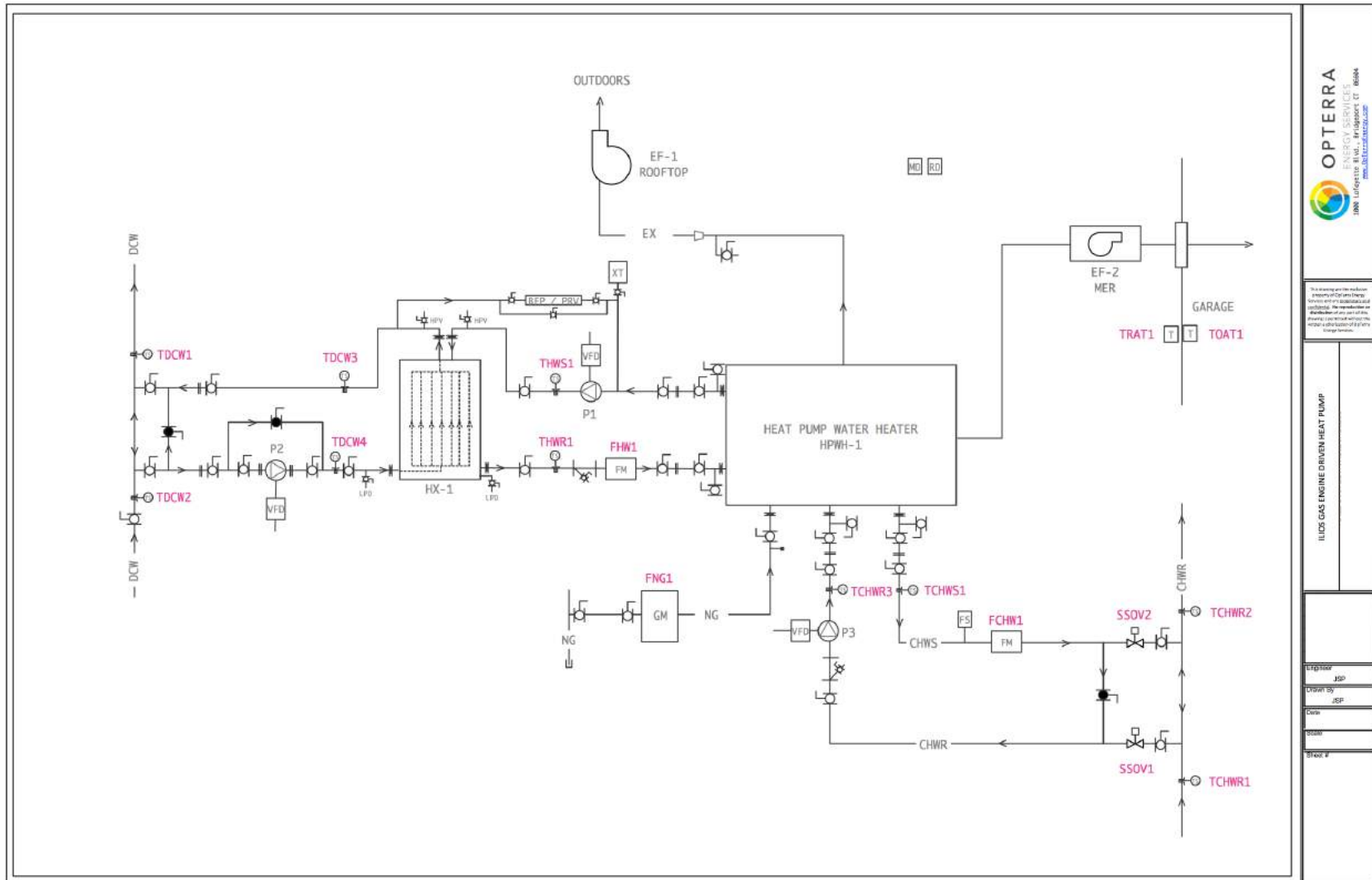
OES Engineered Systems - Pump Module



HPWH Engine & Compressor



Gas Heat Pump One-Line Piping Schematic



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ILDS GAS ENGINE DRIVEN HEAT PUMP

1st Floor	gsm
2nd Floor	gsm
3rd Floor	gsm
4th Floor	gsm
5th Floor	gsm

HPWH Performance

Date	02/10/16	
Time	12:34:55	
RPM / ECM RPM	1851	1794
RPM Setpoint		1800
MAP / Barometric ("Hg)	21.9	29.6
Cylinders		6.0
Capacity [%]		81
Hourmeter		23.0
Starts		6
Setpoint Heat / Source (F)	150.0	45.0
Gas (BTU/hr)		258078
Heat / Source (BTU/hr)	449740	174182
COP Heat / Total	1.74	2.42
Flow Heat / Source (gpm)	79.6	87.2

COP = Coefficient of Performance

Calculated as: Thermal Output (BTU) / Fuel Input (BTU)

COP of 2.42 = 242% Efficiency

Sample HPWH Economics - Investment



	COST	SAVINGS
Pre HPWH		
Annual DHW Fuel Cost	\$ 121,955	
Average Daily Cost	\$ 334	
# Guest Rooms	245	
Average Cost / MMBTU	\$31.92	
Post HPWH		
Steam		\$ 105,800
Electric		\$ 4,100
Nat. Gas Fuel	\$ 20,000	
Maintenance	\$ 8,500	
HPWH DHW Savings		\$ 81,400
HPWH Space Heating Savings		\$ 12,000
Total Savings		\$ 93,400
Project Cost		
	\$ 400,000	
Payback		
	4.28	Years
COP		
	2.07	

Sample Cash Flow – OpTerra Advantage Leasing



100% of Equipment, Installation, Engineering and Construction Management

Years	Lease Payment	Annual Savings / (Costs)	% Savings
3	\$140,649.98	(\$47,250)	-38.7%
4	\$107,308.81	(\$13,909)	-11.4%
5	\$87,320.38	\$6,080	5.0%
6	\$74,008.31	\$19,392	15.9%
7	\$64,511.28	\$28,889	23.7%



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