Legrand

Fuel Cell Installation Decision & Initial Results

Jim Young
Corporate Energy Manager
IS THE GLOBAL SPECIALIST IN ELECTRICAL AND DIGITAL BUILDING INFRASTRUCTURES

Facilities in over 80 countries

2015 SALES $5.3B

OF GROUP SALES CAME FROM NEW ECONOMIES 36%

OF SALES CAME FROM NEW BUSINESS SEGMENTS 31%

Products marketed in nearly 180 countries

over 36,000 EMPLOYEES

Legrand
Legrand North America

- Headquartered in West Hartford, CT
- Organized in 5 divisions based on markets served
- ~70% Commercial, ~25% Residential & 5% Industrial
- 3500 US employees; ~30 site locations in US & Canada
- Manufacturing in both US and low cost countries

**ELECTRICAL WIRING SYSTEMS**
Wiring Devices, Cable Mgmt & Home Systems

**BUILDING CONTROL SYSTEMS**
Automated Controls

**COMMERCIAL AV**
Audio/Video Applications

**DATA COMMUNICATIONS**
Enterprise, IT

**POWER DISTRIBUTION & CONTROL FOR DATACENTERS**
PDUs
LNA Operations - 15 Manufacturing Plants

- **DENVER**
  - Manufacturing
  - Size: 95,000 sq. ft.
  - Headcount: 275

- **OREM**
  - Manufacturing
  - Size: 11,000 sq. ft.
  - Headcount: 125

- **ANAHEIM**
  - Manufacturing
  - Size: 46,000 sq. ft.
  - Headcount: 120

- **PENSACOLA**
  - Manufacturing
  - Size: 85,000 sq. ft.
  - Headcount: 101

- **MASCOUH**
  - Manufacturing
  - Size: 76,000 sq. ft.
  - Headcount: 186

- **FAIRFIELD**
  - Manufacturing, Distribution
  - Size: 418,000 sq. ft.
  - Headcount: 857

- **WEST HARTFORD**
  - Manufacturing
  - Size: 274,000 sq. ft.
  - Headcount: 464

- **SLEC**
  - Dongguan City, PRC
  - Manufacturing
  - Size: 197,000 sq. ft.
  - Headcount: 1,810

- **ROCOM**
  - Shanghai, PRC
  - Manufacturing
  - Size: 43,000 sq. ft.
  - Headcount: 1,810

- **TALIAN**
  - Manufacturing
  - Size: 11,000 sq. ft.
  - Headcount: 25

- **TAIYIAN**
  - Manufacturing
  - Size: 50,000 sq. ft.
  - Headcount: 440

- **TIJUANA, MEXICO**
  - Manufacturing
  - Size: 325,000 sq. ft.
  - Headcount: 800

- **CUIDAD JUAREZ, MEXICO**
  - Manufacturing, Distribution
  - Size: 23,000 sq. ft.
  - Headcount: 49

- **LASTAR**
  - Hickory, North Carolina
  - Manufacturing
  - Size: 225,000 sq. ft.
  - Headcount: 269

- **CONCORD**
  - Manufacturing
  - Size: 42,000 sq. ft.
  - Headcount: 139

- **OREM**
  - Manufacturing
  - Size: 46,000 sq. ft.
  - Headcount: 120

- **MASCOUTAH**
  - Manufacturing
  - Size: 197,000 sq. ft.
  - Headcount: 1,810

- **FAIRFIELD**
  - Manufacturing, Distribution
  - Size: 418,000 sq. ft.
  - Headcount: 857

- **WEST HARTFORD**
  - Manufacturing
  - Size: 274,000 sq. ft.
  - Headcount: 464
Electrical Wiring Systems (EWS)

Wiring Devices
- Wall Plates
- Switches
- Outlets
- Dimmers
- Sensors
- Plug Load Controls
- GFCI

Wire & Cable Management
- Raceway
- Poke Thru
- Floor boxes
- Cable Tray
- Ladder Tray
- I Tray

Home Systems
- Data Networking
- Intercom
- Lighting Controls
- Security Cameras
- Wireless Audio System
Building Control Systems (BCS)

Lighting Controls

Home Automation

Lighting Control
Audio
Video
Climate
Integration
Commercial A/V (CAV)
Commercial Data Communications (LDC)

Enterprise
- Racking Systems
- Power Distribution
- Thermal Management
- A/V Solutions
- Cable Management
- Pathways
- Accessories
- Connectivity & Cabling
- Solutions

IT
- Copper Solutions
- Fiber Solutions
- PC Cables & Adapters
- A/V Connectivity
- Networking
RARITAN – Power Distribution and Control for Datacenters

Outlet Metered & Switched
Rack Transfer Switch
Environmental Sensors
Smart Controllers
Branch Circuit Monitoring

Enterprise KVM over IP
Secure Console
Analog KVM
AV over IP
PINNACLE – ARCHITECTURAL LIGHTING & LED LUMINAIRES

Specification Indoor
- Recessed
- Linear Suspended
- Asymmetric
- Surface (Ceiling)
- Surface (Wall)
- Pendant
- Perimeter
- Direct
- Indirect
- Bidirectional

Specification Outdoor
- Recessed
- Surface
- Pendant
- Direct
- Bidirectional
Fuel Cell Evaluation
Problem Statement

Legrand is going to spend millions on electricity over the next 20 years.

Electric grid prices are increasing annually while electric grid reliability continues to get worse

It is likely that the situation will get worse with time, not better

What are you going to do about it?

If we could “replace” your electric utility with one that is greener, in our control, less expensive, and more reliable.
Current

Conventional Model

Unreliable Grid

Inactive Equipment

Backup Generator

UPS

Batteries

Future

Fuel Cell Model

Always Online for You

Electric Grid as Backup

Independent from gas grid

Sunk Capital in equipment you hope to never use
Grid electricity cost assumptions

Sample Utility Bill

- Generation, 50%
- Transmission, 9%
- Distribution, 22%
- Taxes, Adders, 19%

Arbitrage cost avoidance opportunity in the Transmission & Distribution components of the electrical charge
Value proposition

+ Avoided Cost of grid electricity

- less Lease payments (for Equipment + installation)

- Less Extended Warranty (maintenance) cost

- less Cost of fuel

Savings (value)
Fuel Cell Provider Selection Criteria

- Company Risk
- Technology risk
- Generation of electricity versus electricity and heat
- Cost
- Availability
- System efficiency
- Quantity of fuel consumption based on efficiency
- Warranty cost
- Financing structure (buy vs lease)

Bloom Energy versus Doosan Fuel Cell America (formerly UTC Fuel Cell)
Bloom Energy Overview

Background:
- Company founded in 2001
- Privately held
- KR Sridhar; CEO & Co-founder
- Headquartered in Sunnyvale, CA; manufacturing in Newark, Delaware
- 1500 full-time employees
- Top 25 IPO candidate for 2015
- Total private funding to date $1.2B
- Investors include Kleiner Perkins and New Enterprise Associates
- Board members include Colin Powell and former AOL CEO Steve Case
- Product: Fuel cells that convert natural gas into electricity; 154 MW install base (4x UTC)
- Business Model: Sell and Lease Energy Servers to commercial customers through long-term contracts
- Profiled on “60 Minutes” in 2010 – “Bloom box in every home within 5 to 10 years”
Bloom Energy’s Attractive and Growing Customer Base

- Walmart
- eBay
- Intuit
- Macy’s Inc
- Intel
- IBM
- LinkedIn
- TaylorMade
- Kellogg’s
- Juniper Networks
- DreamWorks
- SoftBank
- Target
- Verizon
- Disney・PIXAR
- Honda
- Delmarva Power
- Urban Outfitters
- Kaiser Permanente
- JPMorgan Chase
- VersaCold
- Washington Gas
- Williams-Sonoma
- Lockheed Martin
- PG&E Corporation
- Adobe
- The Home Depot
- BD
- Xilinx
- Agilent Technologies
- Baker Hughes
- Fireman’s Fund Insurance Company
- The Batkovich Company
- Bank of America
- TransUnion
- Morgan Stanley
- FedEx
- Starbucks
- Intertel Communications
Site Selection Criteria

- Facilities with a significant 7x24 electricity demand (manufacturing facilities, distribution centers, datacenters, large retail stores, etc);
- Sufficient outdoor space for installation (ground, rooftop, setback);
- Appropriate natural gas feeds (pressure, volume) in the area (not necessarily already on site);
- Cost of electricity. Projects at facilities in the Northeast and West Coast typically provide the best returns (since those regions experience the highest electricity prices in the country); and
- Availability of state tax incentives.

Of 30 Legrand locations in North America, only 2 qualified
Why a Fuel Cell in West Hartford, Connecticut?

- The State of Connecticut has created a program that is designed to incentivize the deployment of low-emission/zero-emission sources of energy; fuel cells qualify for this program.
- System will generate an approximate 21% reduction in energy intensity for West Hartford BBBP Challenge site vs 2012 Baseline after Year 1, while supplying 88% of the electricity demand.
- At system capacity, the net savings is worth approximately $1.8M over the first ten years (impact to Operating Income).
Legrand is projected to spend $20M on electricity in West Hartford over the next 20 years

- Headquarters - ~200K square feet
- Wiremold Manufacturing – ~150K sq ft
- Fuel cell produces ~516 kwh per day
- Electric bill down $54K in June 2016 compared to June 2015 (at same rate)
- The fuel cell consumes $13K/month in gas (at current gas rates)
- Avoided $12K capacity charge from our electric supplier due to our onsite generation
- Demand charges from the utility will continue to decrease over time
- Our current peak demand charge is based on peaks that were reached in July 2015 (off peak hours) and Aug 2015 (on peak).
West Hartford actual results

Before:
• Electric Usage - Average kWh of 400k/mnth
• Natural Gas Usage – Average CCF of 25k/mnth
• Combined total usage – average MMBtu of 7k/mnth

After:
• Electric Usage - Average kWh of 50k/mnth (down 88%)
• Natural Gas Usage – Average CCF of 32k/mnth (up 28%)
• Combined total usage – average MMBtu of 4k/mnth (down 43%)

Actual gross savings of $40K/month; $15K net
500kW – Same footprint for WH

14 fuel cell units across; 2 deep
8 fuel cell units across; 2 deep
500kW Unit – actually producing 516kW
88% of electrical needs for site
Aerial View of Energy Server Location

Site Plan Notes:
1. Union labor is assumed.
2. Underground is free of obstructions and soil is not unsafe.
3. Underground of site is clear of obstructions – no relocation of utilities or structures required.
4. Generators and operation of generators are not included during interconnection.
5. There are no requirements for major utility modifications or runs.
6. AHU will accept position as shown without any significant screening or setback requirements.
7. Gas Main capacity and pressure would need to be verified.
8. Availability of gas and water in indicated location must be verified.
9. Nine (9) parking spots would be used at minimum.
Train Configuration – Conceptual Site Plan
“Flip the Switch” event on Earth Day 2016
Basic Cost Assumptions

**Financing payments (10 yrs)**
- Bank monetizes Federal tax incentives

**Warranty/Maintenance**
- Fixed cost for the entire project term

**Capital/Financing net of incentives, 1/3**

**Cost of fuel, 1/3**
- Can be hedged/fixed for long term

**Warranty/Maintenance, 1/3**
Bloom Energy installed a 500kW grid parallel system in West Hartford adjacent to the Wiremold facility.

Legrand entered into a 10 year Operating Lease along with an Equipment Financing Institution.

As a condition to the lease, Legrand entered into a maintenance agreement with Bloom Energy.

Financial Model assumes a $3.2M award through CT LREC Incentive Program. Award is a 15 year fixed contract which guarantees payment for production.

Bloom Energy provides a manufacturer’s warranty to Legrand inclusive of performance guarantees as part of ongoing maintenance agreement.

Connecticut Natural Gas (CNG) is the local utility but Legrand could secure a natural gas generation contract on the open market at potentially lower rates.

At the end of the 10 year term, Legrand has the option to walk away and have the fuel cells removed or exercise the option to purchase the fuel cells at the residual value and consider extending the maintenance agreement with Bloom.
Legrand Project Timeline

2015

- Meeting between Legrand and Bloom Energy to discuss proposal
- Meeting between Legrand and Bloom Energy
  - Deep Dive into Financial Model, Discussed Operating Lease Structure
  - Site Walk performed by Bloom Energy Field Applications Engineer
- Legrand Visit to Bloom Energy Installation at Macy’s in Cheshire, CT
- Legrand Visit to Bloom Energy Factory in Newark, DE
- Begin Legal Review of Bloom Energy and Financing Contract
- Legrand review of proposal and request approval to proceed
- CT LREC RFP released by CL&P
- Bloom Energy Contract Set Review Completed and Contingent Contracts Executed
- CT LREC Bids Due
- Submit executed LREC Contract and Performance Assurance

2016

- Bloom Energy Servers Installed and generating power.

2015

1/20
2/19
3/10
3/26
3/30
4/21
4/24
5/28
6/1
7/15
8/1

2016

4/2016
Carbon Footprint Impact

Annual Estimates:

The fuel cell will cause to reduce 1,500 metric tons of carbon.

This is equivalent of:
316 Passenger vehicles driven for 1 year, or
3,592,140 miles driven by a passenger vehicle, or
1,599,376 Pounds of coal burned, or
160 homes using energy for one year!
On Earth Day 2016, Legrand North America "Flipped the Switch" on a 500kW Bloom Energy Fuel Cell installed at their West Hartford, Connecticut headquarters location, a 200K square foot combined office and manufacturing facility. After its first month of operations, the fuel cell has enabled Legrand to offset 88% of their grid-purchased power, resulting in estimated annual energy savings of over 4 million kWh. Over the course of its 20 year life, the fuel cell is expected to save +$7 million for a 33% net cost reduction versus the electrical grid.