CHARTING PATH TO PLATINUM

TWICE

A Consultant's Perspective

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Our Path
To Healthcare Sustainability

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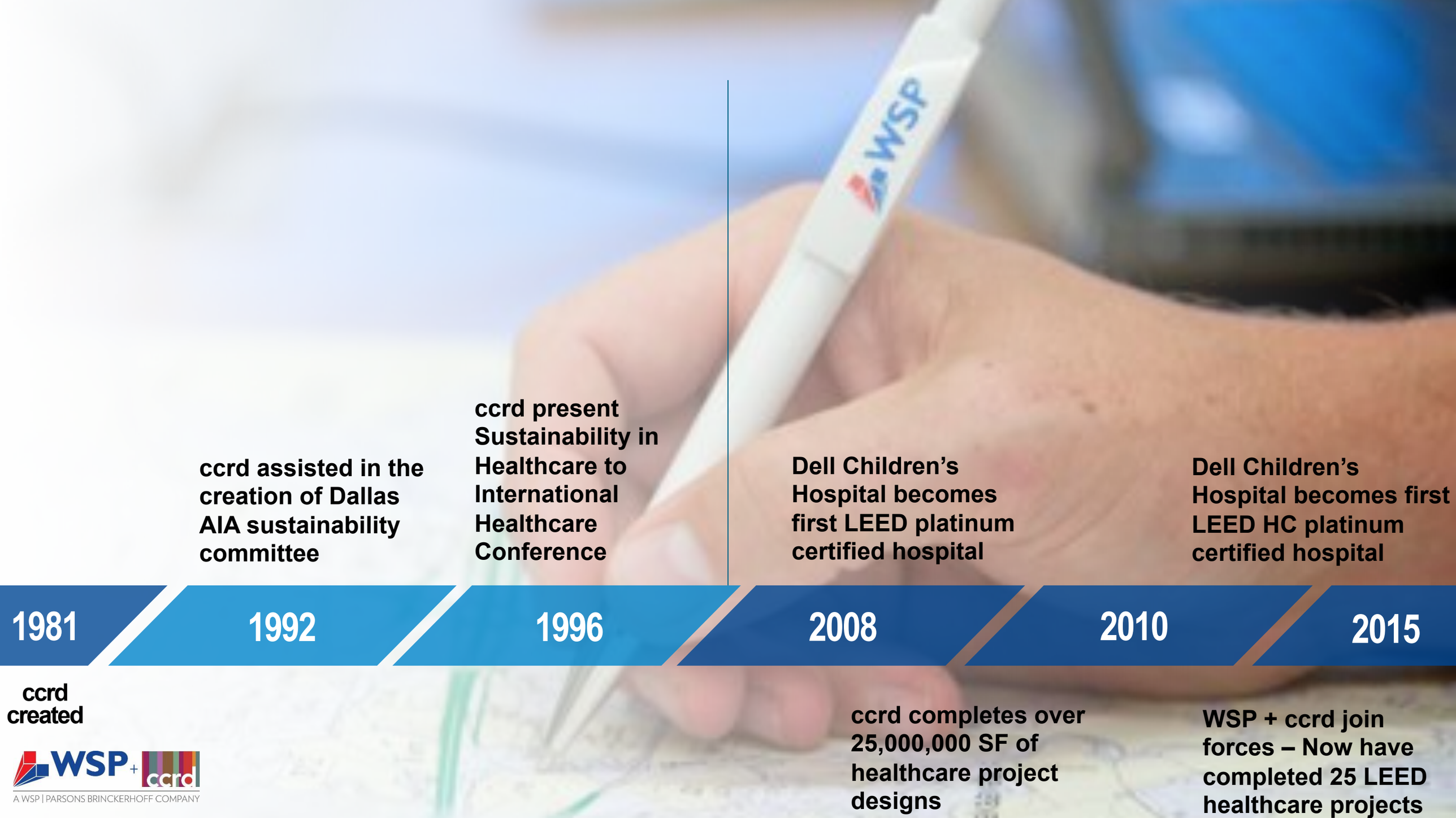
The Path for Today

- Why sustainability?
- Driver?
  - Statement for the Provider
  - Statement for the Community
  - Statement of Responsibility
- Dell Children's Hospital
- Dell Children's 3BT

Sustainability: Our Perspective

- Sustainable designs lead to a healthy building philosophy
- Our business is providing an environment for helping people get well
- It should start with a healthy building
- The healthy building concept is now:
  - The RIGHT thing to do
  - And it ‘sells’ in many ways



1981

ccrd created

1992

ccrd assisted in the creation of Dallas AIA sustainability committee

1996

ccrd present Sustainability in Healthcare to International Healthcare Conference

2008

Dell Children's Hospital becomes first LEED platinum certified hospital

ccrd completes over 25,000,000 SF of healthcare project designs

2010

Dell Children's Hospital becomes first LEED HC platinum certified hospital

2015

WSP + ccrd join forces – Now have completed 25 LEED healthcare projects

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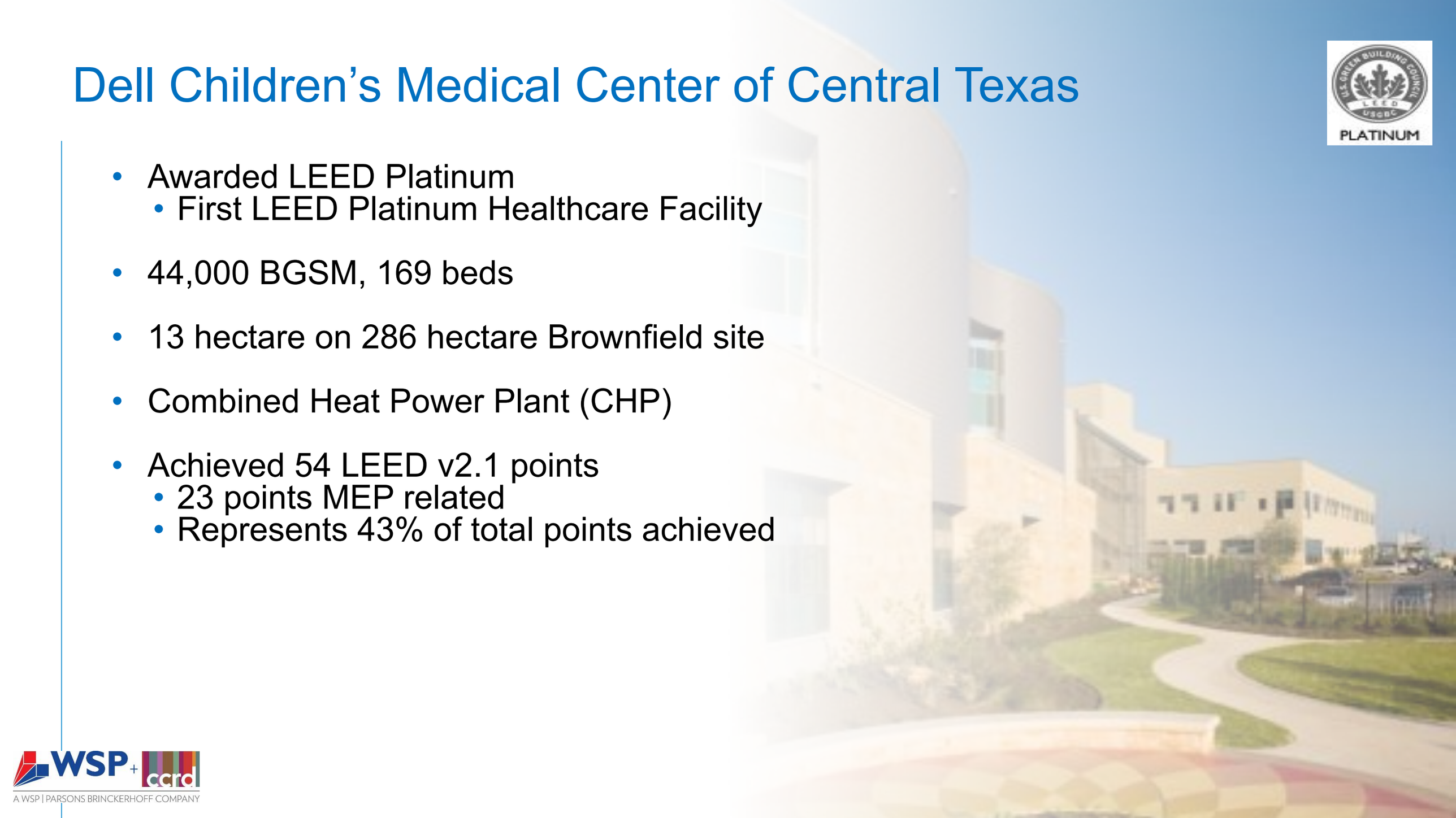
Dell Children's Medical Center of Central Texas

- Awarded LEED Platinum
  - First LEED Platinum Healthcare Facility
- 44,000 BGSM, 169 beds
- 13 hectare on 286 hectare Brownfield site
- Combined Heat Power Plant (CHP)
- Achieved 54 LEED v2.1 points
  - 23 points MEP related
  - Represents 43% of total points achieved




RONALD MCDONALD HOUSE
MEDICAL OFFICE BUILDING
COMBINED COOLING/HEATING/ POWER PLANT
EMERGENCY DEPARTMENT
MAIN ENTRANCE
SERVICE ENTRANCE
NURSING UNITS
HEALING GARDEN

Combined Cooling Heating and Power Plant

- 4.5MW natural gas-fired turbine supplies 100% of the hospital's electricity
- 75% more efficient than coal-fired power plants
- Lower emissions of nitrogen oxides and carbon dioxide as a result of efficient combustion chamber technology
- Steam, a by-product of the conversion process, is utilized by the hospital and is used in absorption chillers to produce all of the hospital's chilled water needs

Dell Children's Hospital Courtyards

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Dell Children’s Hospital Courtyards

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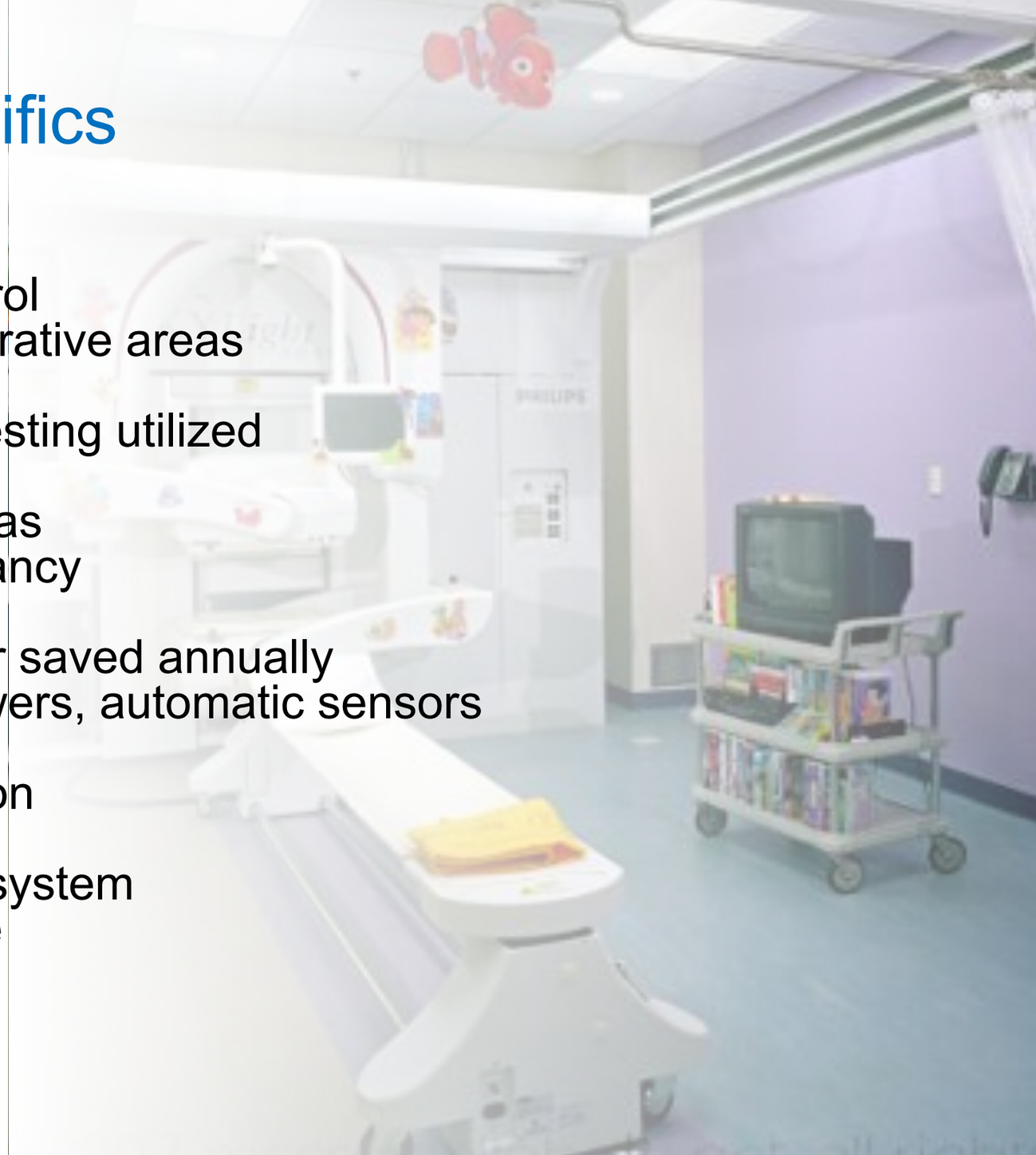
Dell Children's Hospital - Specifics

- Individual control capabilities
  - 96% of occupants have lighting control
  - Underfloor air distribution in administrative areas
- Occupancy sensors and daylight harvesting utilized
- CO2 monitoring in high occupancy areas
  - Reduce outside air under low occupancy
- Approximately 1.3 million gallons water saved annually
  - Dual low flush fixtures, low flow showers, automatic sensors
- Energy savings estimated at $1.5 million
- Energy measurement and verification system
  - Maintain and optimize energy usage



Project Overview – 3BT Expansion

Heat Recovery

Lighting Controls

Solar PV & Heating Water

Dell Children's Medical Center – 3BT Expansion

- **FIRST** LEED Platinum under 2009 LEED for Healthcare
- 7,000 BGSM, 72 beds
- 57 LEED Design Phase Credits Awarded
- 86 LEED Credits Awarded Total

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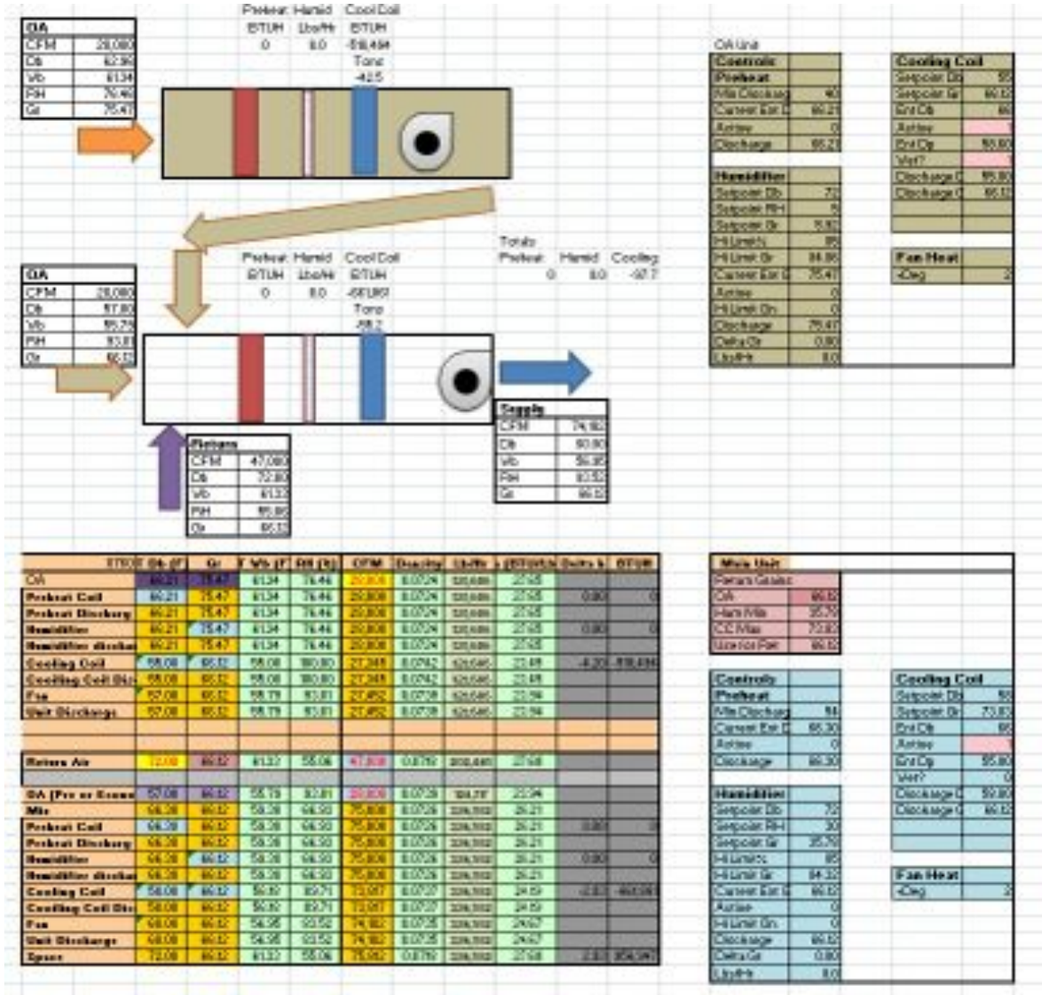
Dell – Outside Air Energy Recovery

Patient OA Energy Recovery Modeling



OA Method Comparison	$ 11.37	(1000 BTU/Lb)	$ 0.1932		
Unit is 75,000 CFM Supply with minimum OA of 28,000 CFM	Preheat	Humid	Cooling	Total Annual Costs	Savings from Standard Unit
	MBTU	Lbs	TonHrs		
AHU-Standard	418	257,678	1,219,371		
Standard air handling unit with minimum OA and no Economizer Cycle	$ 4.76	$ 2,929.79	$ 235,582.48	$ 238,517.03	
Standard with Econo	419	462,883	1,078,515		
Standard air handling unit with economizer cycle controlled by enthalpy with a 0.5 BTU/Lb offset	$ 4.76	$ 5,262.97	$ 208,369.13	$ 213,636.87	$ 24,880.16
Standard With Econo with Dew Point Lockout	418	257,678	1,129,008		
Standard air handling unit with economizer cycle controlled by enthalpy with a 0.5 BTU/Lb offset. Economizer is disabled whenever outside air humidity ratio is below indoor humidity ratio setpoint	$ 4.76	$ 2,929.79	$ 218,124.41	$ 221,058.96	$ 17,458.07
Pre-treat OA with Economizer	440	256,654	1,068,326		
Air handler has a separate OA unit that has a preheat and chilled water cooling coil. Preheat is set at 40 F for freeze protection of chilled water coil. OA chilled water coil is set at 55 F. Main unit chilled water coil is set at 58F.	$ 5.00	$ 2,918.16	$ 206,400.49	$ 209,323.65	$ 29,193.38
Standard with Econo and Energy Wheel	418	461,115	943,855		
Energy Wheel using 15,000 CFM of Return/Exhaust air is used to pre-treat minimum OA of 28,000 CFM. Energy whell is disabled when Economizer is active.	$ 4.75	$ 5,242.88	$ 182,352.79	$ 187,600.42	$ 50,916.61

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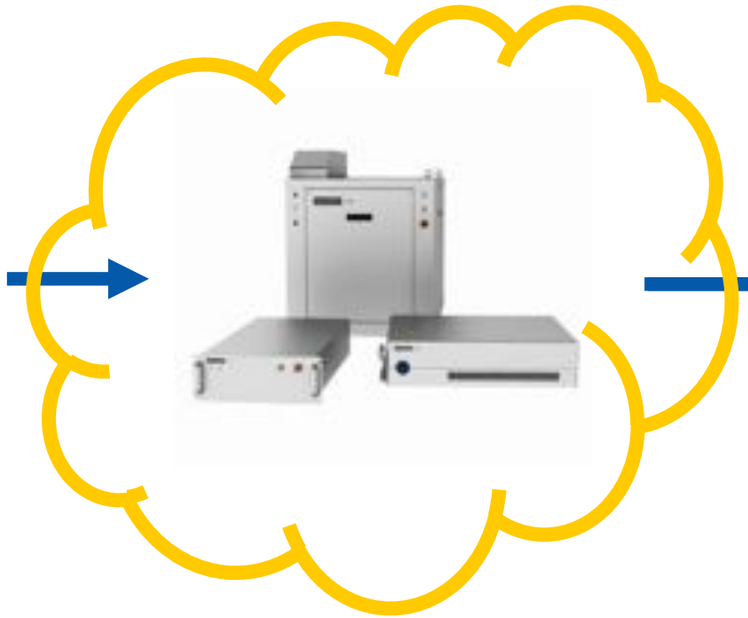
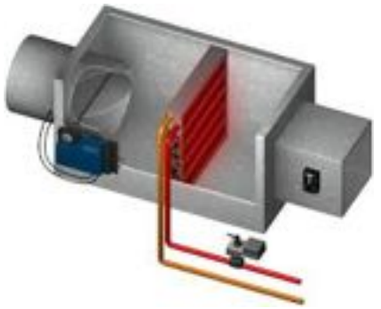
Dell – Lighting Controls Integration

Patient Tracking & BMS

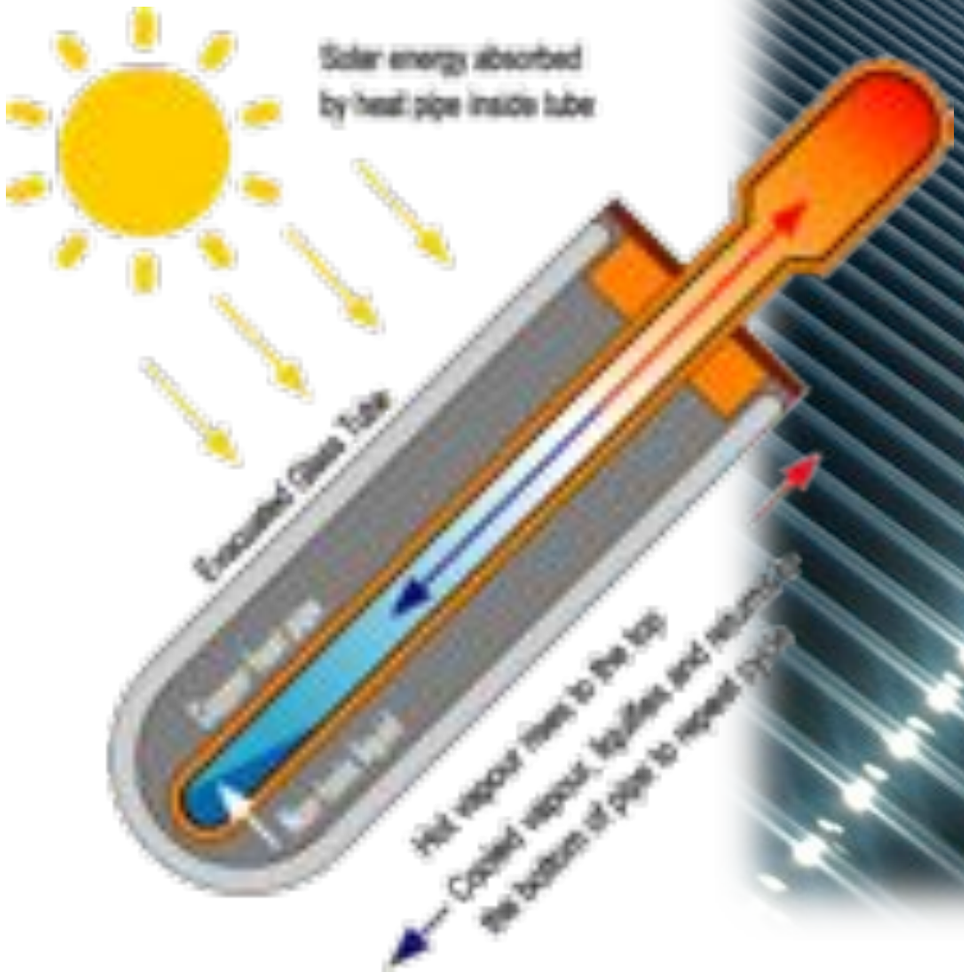
In-patient Registered – Billing Tracking





- Owner Desire for Setbacks Based on Bed Tracking
- Patient Information Protection Concerns/ Constraints
- Collaboration with BMS/Lighting Controls/Finance Software

On Site Renewable



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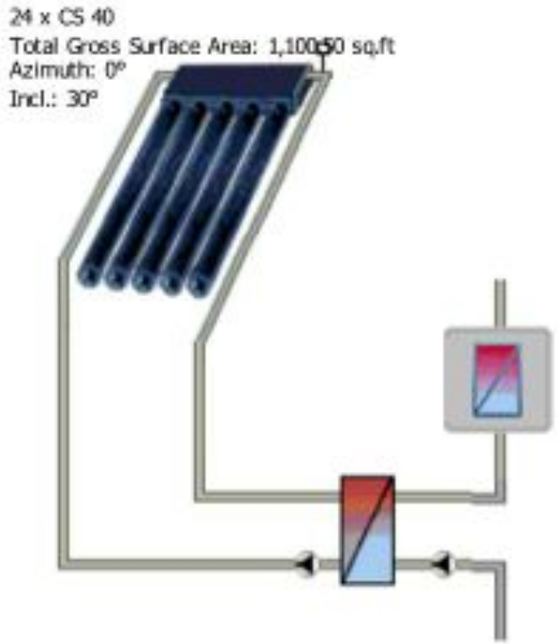
Dell – On Site Renewable Energy

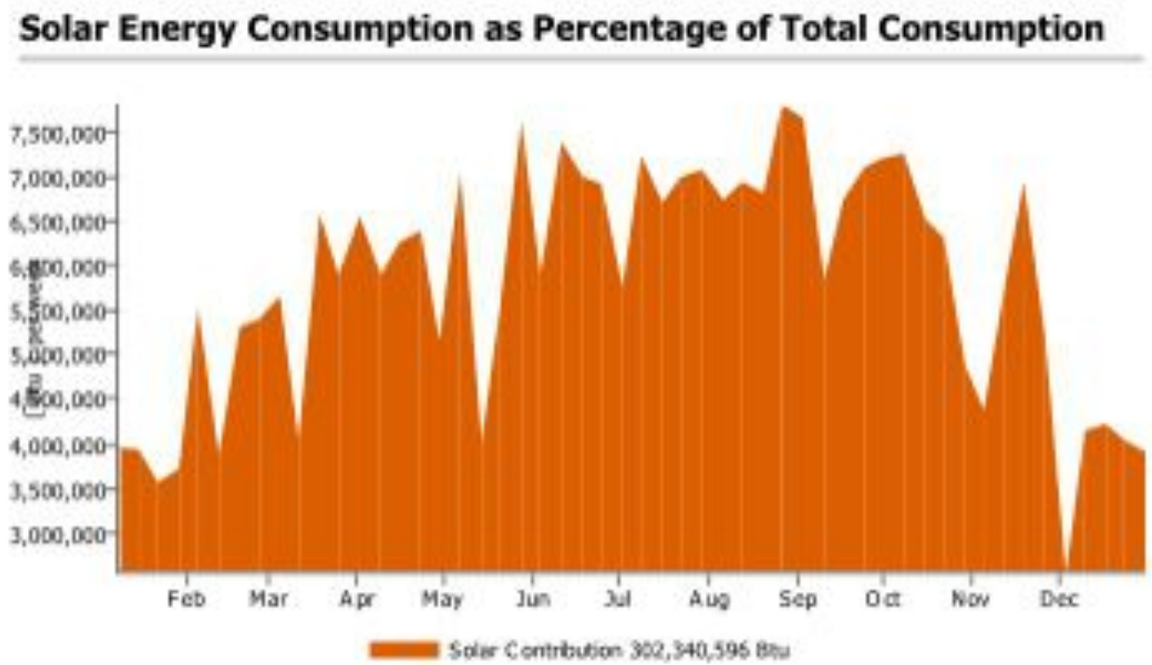
Solar Heating Water System



Results of Annual Simulation

Installed Collector Power:	244.19 kBtu/hr	
Installed Gross Solar Surface Area:	1100.496 sq.ft	
Collector Surface Area Irradiation (Active Surface):	500.32 MBtu	601.49 kBtu/sq.ft
Energy Produced by Collectors:	315.84 MBtu	379.70 kBtu/sq.ft
Energy Produced by Collector Loop:	301.22 MBtu	362.13 kBtu/sq.ft
Process Heating Energy Supply:	301.22 MBtu	

- 88,654,000 w-Hr collected annually
- 1.3% of On-Site Renewable



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Computational Modeling Results

Energy Cost and Consumption by Energy Type - Performance Rating Method Compliance

	Proposed Design		Baseline Design	
Energy Type	**Energy Use**	**Cost ($)**	**Energy Use**	**Cost ($)**
Electric	915,050 kWh	91,505	2,639,855 kWh	263,986
Natural Gas	0 Therm	0	80,542 Therm	78,125
Remote HW	34,300 Therm	33,271	0 Therm	0
Remote STM	5,190 THERMS	5,901	8,034 THERMS	9,134
Remote CW	731,163 Ton-Hrs	141,261	0 Ton-Hrs	0
Subtotal (Model Outputs)	**15,845,130 kBTU**	**271,938**	**17,864,698 kBTU**	**351,245**
	Energy Generated	**Renewable Energy Cost Savings ($)**		
Total On Site Renewable Energy				
	Energy Savings	**Cost Savings ($)**		
Exceptional Calculation Totals				
	Energy Use	**Cost ($)**		
Net Proposed Design Total	**15,845,130 kBTU**	**271,938**		
	Percent Savings		**Energy Use Intensity**	
	Energy	**Cost**	**Proposed Design (kBTU/ft²)**	**Baseline Design (kBTU/ft²)**
Summary Data	**11.3 %**	**22.6 %**	**190.47**	**214.75**

- 22% better than ASHRAE 90.1 Baseline by COST
- 75 W-hr/m2 more efficient than Baseline by USE
- ONLY energy numbers used in the combined heat & power calculation

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District Thermal Performance Calculations

For Projects Served by District Thermal Energy and CHP USGBC has Supplemental Guide.

Treatment of District or Campus Thermal Energy in LEED V2 and LEED 2009 – Design & Construction

Pertains to all Building Design & Construction and Interior Design & Construction LEED v2.0 through v2009 Rating Systems

(i.e., New Construction, Schools, Core & Shell, Commercial Interiors, Retail for New Construction, Retail for Commercial Interiors, and Healthcare)

(August 13, 2010)

Austin Energy provides chilled water, steam and power

4 Years of Energy Numbers Provided

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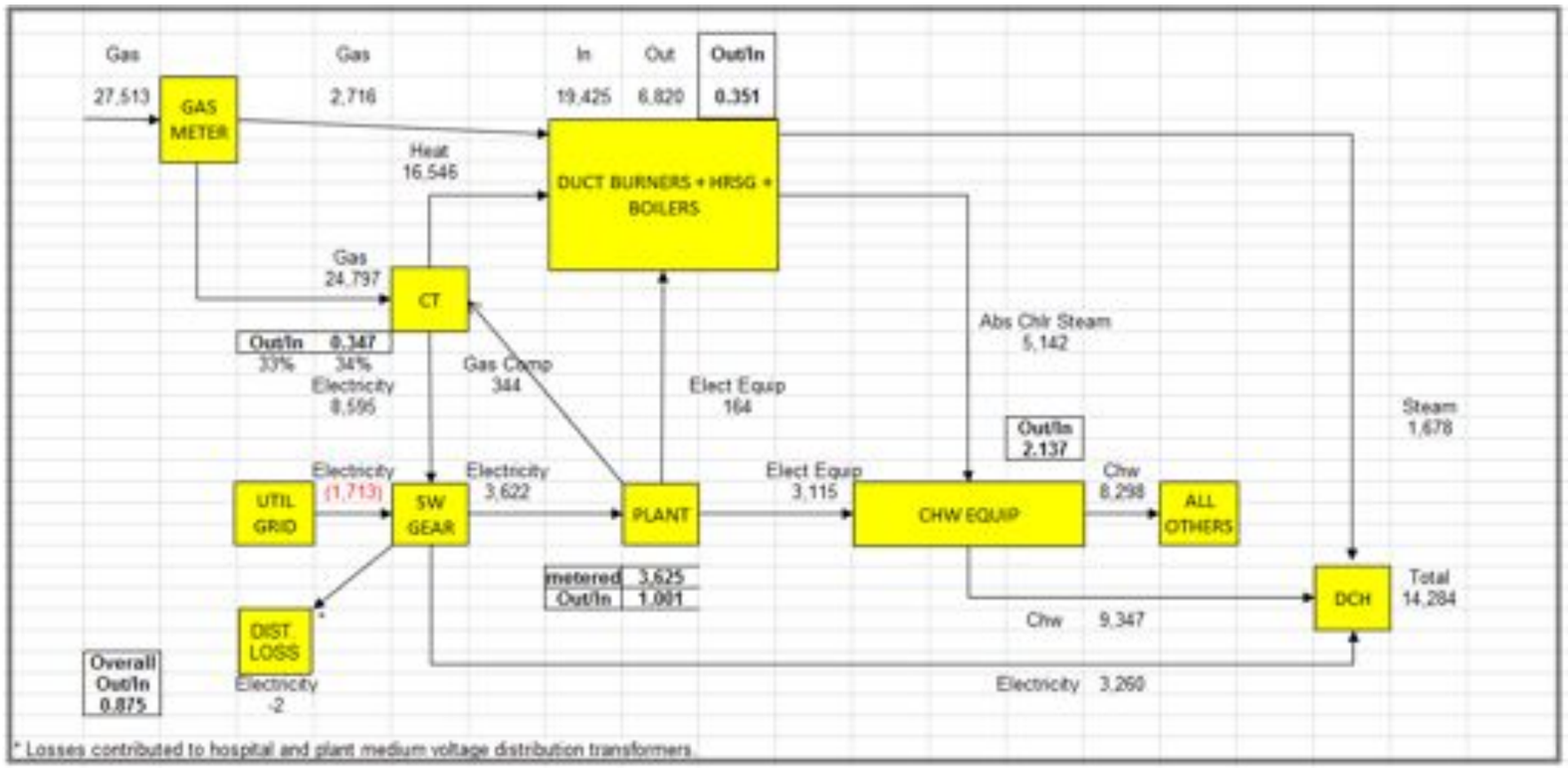
CHP Metered Data



- Monitored Data Was Used to Determine:
  - Average Annual Net Electricity Produced
  - Average Annual Natural Gas Fuel Input to Plant
  - Average Annual Waste Heat Recovered From Turbine Exhaust
  - Average Annual Steam and Chilled Water Produced

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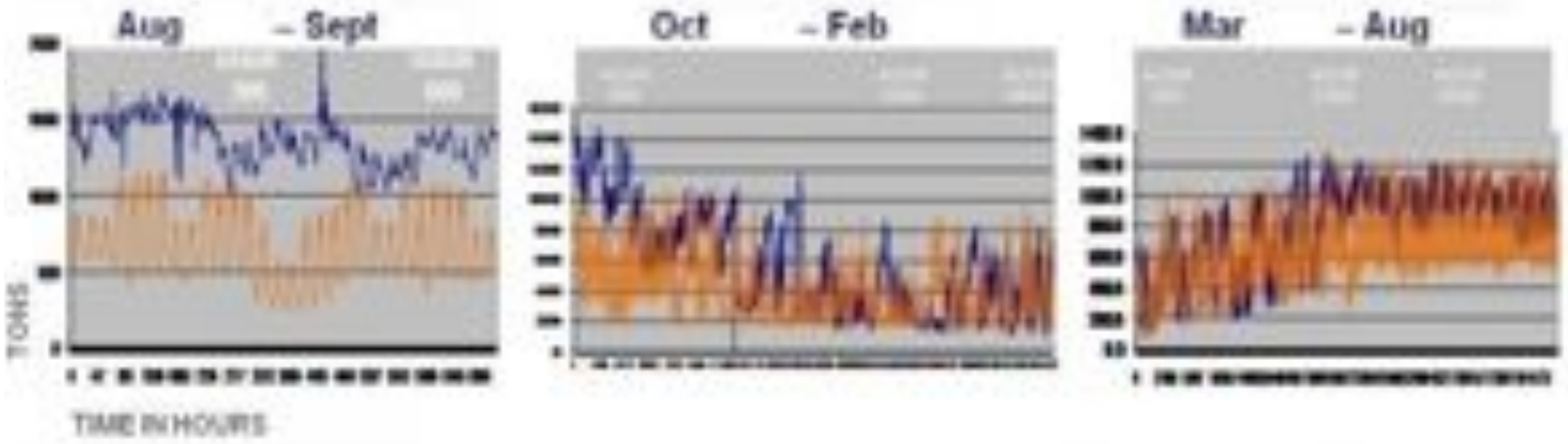
Results of Computational Model & CHP Calculations

- The energy cost savings for the Proposed case was determined to be 46% over the Baseline case, which would qualify the project for <u>23 Points</u> under the requirements of EA Credit 1.

$$Energy\ Cost\ Savings = \left[1 - \left(\frac{Energy\ Cost_{Proposed}}{Energy\ Cost_{Baseline}}\right)\right] \times 100$$

$$Energy\ Cost\ Savings = \left[1 - \left(\frac{\$255{,}854}{\$473{,}190}\right)\right] \times 100 = 46\%$$

Actual Loads vs. Design Projections



ACTUAL LOAD
PROJECTED LOAD

Projections based on January and February data indicated that chilled water peak tonnage would be in the 1400 – 1500 ton range – close to original "budget" projection vs over 1800 peak tons seen at opening. Actual Peak Summer Tonnage was in the 1230 to 1240 ton design range as a result of optimization.

Chilled Water and Electrical design projections during the summer months were not achieved, partly due to above average temperatures and partly due to optimistic off-peak hour modeling assumptions.
Steam peak demand and consumption was significantly better than modeled projections as a result of post occupancy optimization efforts.

Additional night setback and discharge air temperature optimization in July resulted in noticeable reductions in August.
Future ECMs (to be funded by Austin Energy Rebates):
Additional lighting occupancy sensors to reduce electrical consumption.
Isolate small 24/7 areas off large air handling systems to improve off-hour performance.
Future Goal: Achieve Energy Star Rating.

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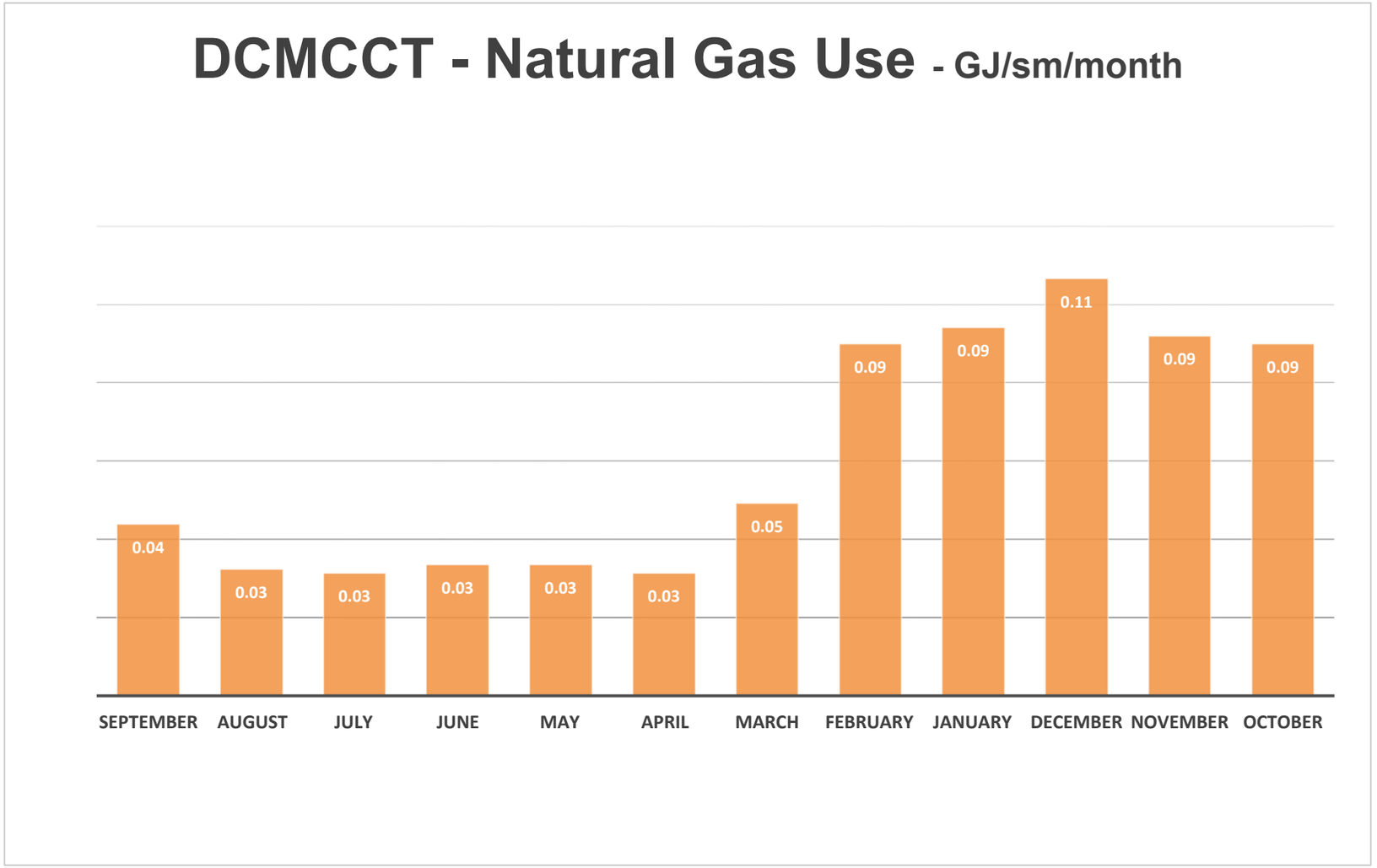
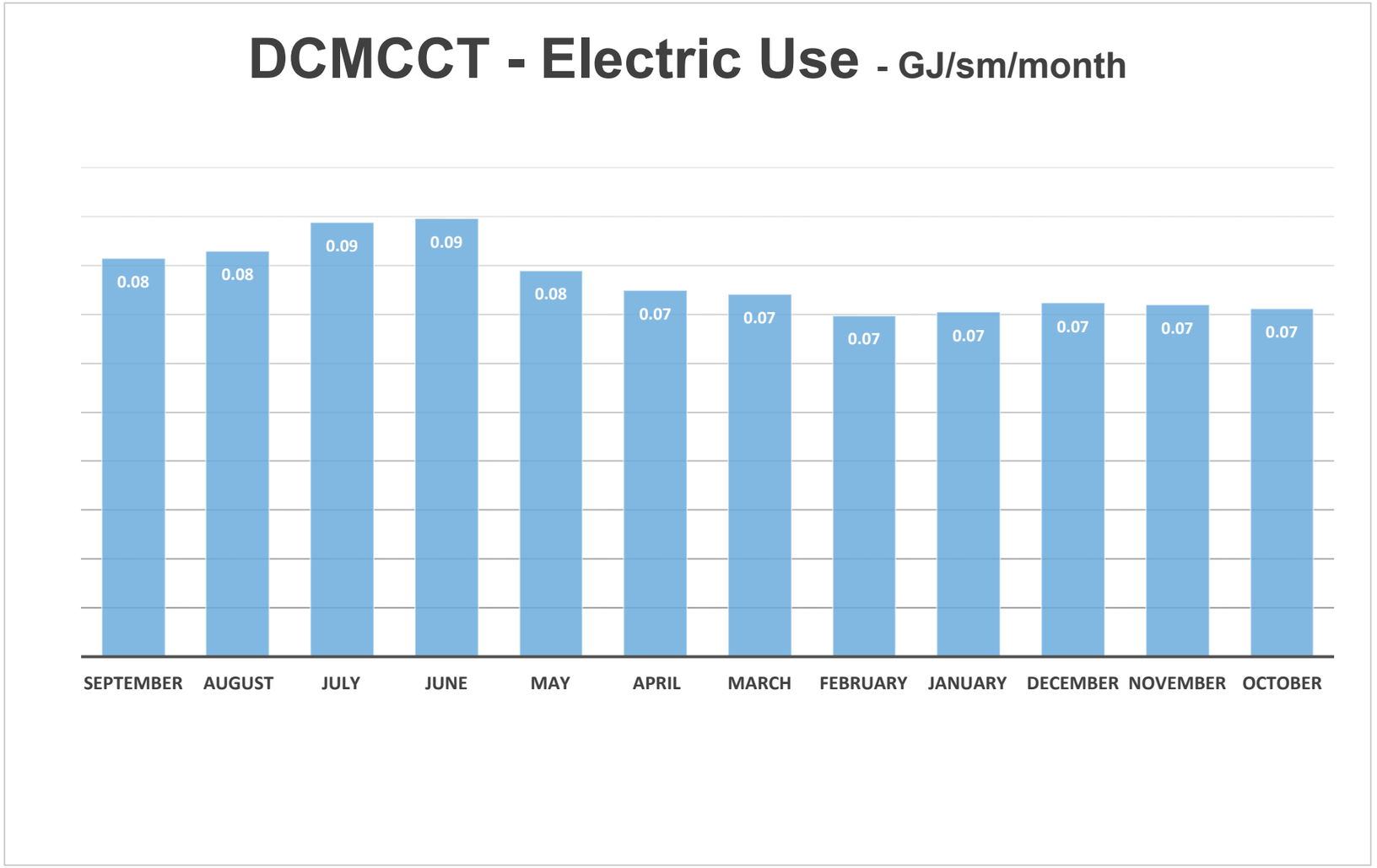
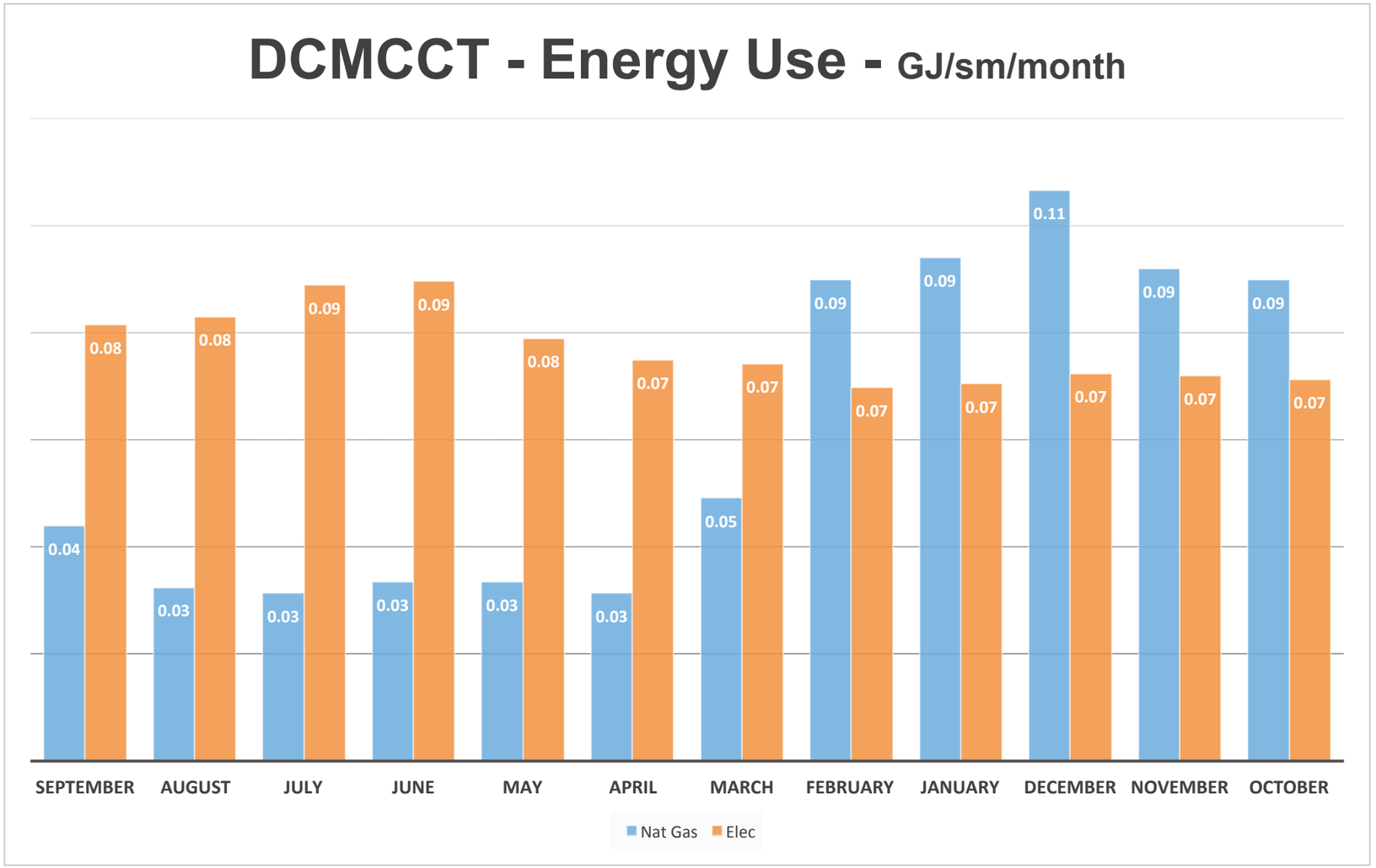
Dell Natural Gas Usage



Dell Electric Usage



Dell Total Energy Usage



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Dell Children's Medical Center of Central Texas

DRIVER: Community & Wellness

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Question & Answer

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