Toyota Motor Sales, U.S.A., Inc.
Corporate Energy Management Program







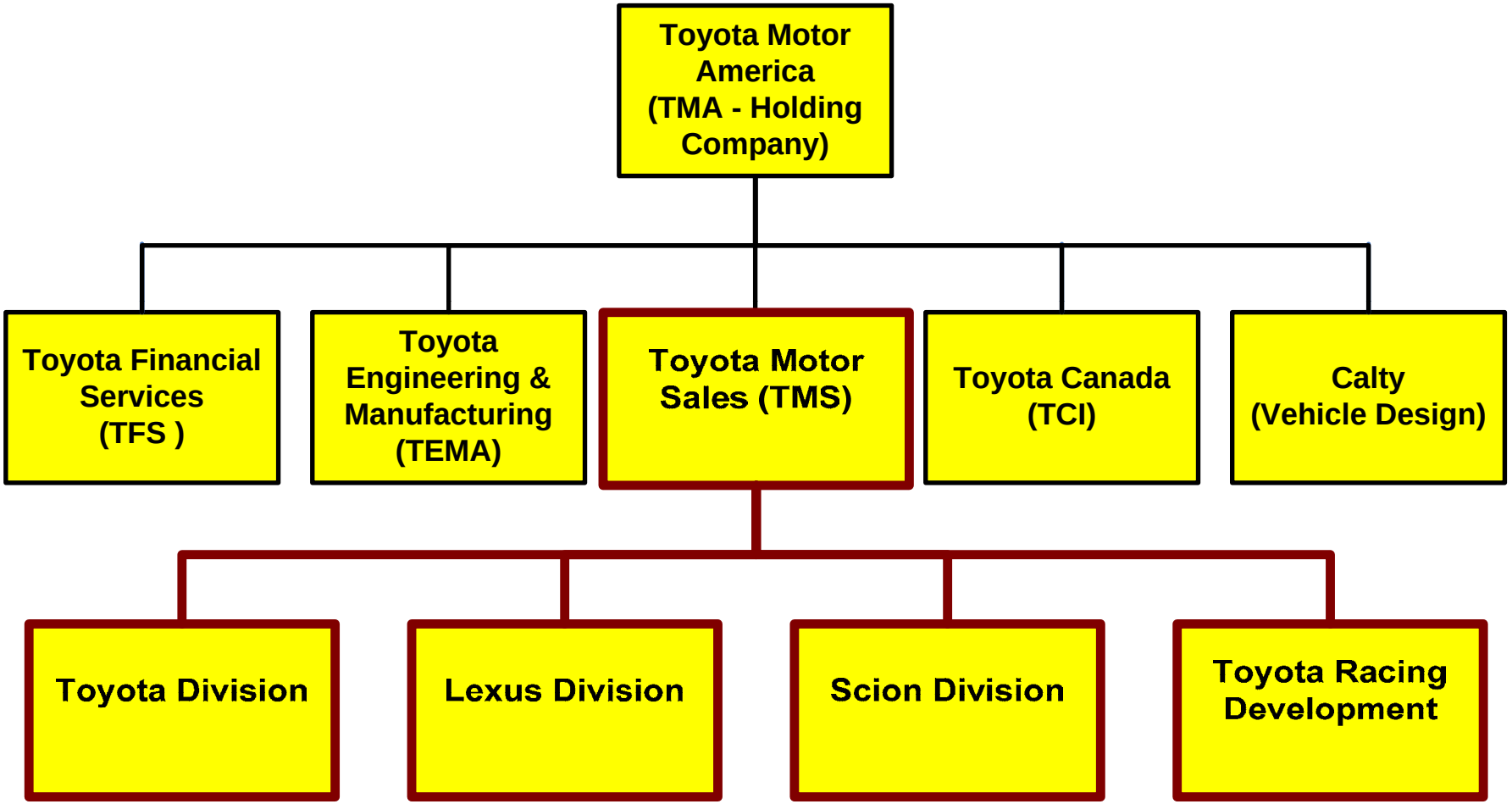

Tim Frank

Real Estate & Facilities

Association of Energy Engineers
Corporate Energy Management Award

The AEE 2008 International Corporate Energy Management Program of the Year Award was shared between Toyota Motor Engineering and Manufacturing North America (TEMA) and Toyota Motor Sales, USA (TMS).

TOYOTA Organization



TMS Corporate Energy Management Program Results:

FY01 Baseline Facilities Reductions *(Normalized)*

- *BTUs / Square Foot: 23.4%* ↓
- *kWh: 18.0%* ↓
- *Therms: 30.6%* ↓
- *CO2: 17.8%* ↓ *(not normalized)*

All Facilities Previous Year Comparison *(Normalized)*

- *BTUs / Square Foot: 6.3%* ↓
- *kWh: 8.0%* ↓
- *Therms: 3.5%* ↓
- *CO2: 6.3%* ↓ *(not normalized)*

Energy Star and LEED Accomplishments

Energy Star Buildings

- *TFS South Campus, CA*
- *TCS South Campus, CA*
- *Gramercy Plaza, CA*
- *Toyota Plaza, CA*
- *NAPCK Warehouse, KY*

LEED™ Certifications

- *South Campus – Gold NC*
- *Portland Vehicle Distribution Center – Gold NC*
- *Washington DC PR Office – Silver CI*
- *Lexus Florida Training Center – CI Silver, Gold?*
- *Toyota Phoenix Training Center – CI pending*
- *Toyota Inland Empire Training Center – CI pending*
- *TRD North Carolina – NC pending*

Toyota's Environmental Commitment Drives its Sustainability and Energy Management Programs.

Toyota Motor Corporation Earth Charter (1992)

- *Contribute towards a prosperous 21st century society*
- *Pursue environmental technologies*
- *Take action voluntarily*
- *Work in cooperation with society*

"It is more than just good business for Toyota; it is the key to the future of our industry and a necessity for a healthy future for people everywhere."

Fujio Cho, President of Toyota Motor Corporation

Toyota Motor Sales Facility Types

- ***Office Buildings***

  HQ Campus in California (2,000,000 Sq. Ft.)

  14 Toyota & Lexus Regional Offices (550,000 Sq. Ft.)

- ***Warehouse Facilities***

  2 Parts Centers (1,875,000 Sq. Ft.)

  9 Parts Distribution Centers (2,400,000 Sq. Ft.)

- ***Logistics Operations***

  Post Production Operations (675,000 Sq. Ft.)

  Site Lighting (800 acres)

Corporate Energy Program Overview

Comprehensive Program Developed With TMS Business Partner:

- ***Utility Invoice Tracking***
- ***Real Time Energy Monitoring***
- ***Treasure Hunts***
- ***Building Automation Systems***
- ***Energy Projects***

Corporate Energy Program Overview

- ***Utility Invoice Tracking***
- ***Real Time Energy Monitoring***
- ***Treasure Hunts***
- ***Building Automation Systems***
- ***Energy Projects***

Utility Invoice Tracking

Collecting Data

sitename	NAPCK Kentucky	SC EUI Baseline	EUI Baslline
siteType	(All)	32,904.61	49,091.02
sitestate	(All)		
mtrtype	(All)		

		monthyr						
pivotsite	Data	**Jan-00**	**Feb-00**	**Aug-08**	**Sep-08**	**Oct-08**	**Nov-08**	**Dec-08**
NAPCK Kentucky	Sum of kwhU	920,400	945,000	463,522	460,756	437,017	440,412	454,886
	Sum of kwhR	0	0	0	0	0	0	0
	Sum of kwhN	0	0	0	0	0	0	0
	Sum of BldgLoad	920,400	945,000	463,522	460,756	437,017	440,412	454,886
	Sum of therms	27,340	22,800	70	160	700	10,520	19,580
	Sum of wtrP	0	0	138,600	599,626	173,274	97,700	114,700
	Sum of wtrI							
	Sum of wtrR							
	Sum of galswater	0	0	138,600	599,626	173,274	97,700	114,700
	Sum of sqft	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984
	Sum of other sqft	0	0	0	0	0	0	0
	Sum of totalsqft	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984
	Sum of lacres	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Sum of eucost	$49,400	$51,100	$40,840	$38,411	$39,843	$43,334	$41,850
	Sum of ercost							
	Sum of encost							
	Sum of gcost	$29,700	$24,800	$144	$251	$899	$12,528	$20,113
	Sum of watercost	$0	$0	$564	$2,401	$702	$410	$468
	Sum of vehicles							
	Sum of parts							
	Sum of mmbtuElect	3,141	3,224	1,582	1,572	1,491	1,503	1,552
	Sum of mmbtuGas	2,733	2,279	7	16	70	1,052	1,958

Utility Invoice Tracking

Generating Reports

NAPCK Kentucky

Usage	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Electric Utility (kWh)	11,165,205	11,925,026	9,398,910	8,996,496	8,515,097	7,442,701	6,539,867	6,052,802
Electric Renewable (kWh)	-	-	-	-	-	-	-	-
Electric Net Metering (kWh)	-	-	-	-	-	-	-	-
Natural Gas (Therms)	145,310	25,370	47,202	46,248	62,200	48,915	79,193	77,377
Water Potable (gals)	3,303,006	2,293,824	2,034,770	2,015,900	3,202,300	2,584,000	3,334,900	4,148,600
Water Potable - Irrigation (gals)	-	-	-	-	-	-	-	-
Water Reclaimed (gals)	-	-	-	-	-	-	-	-

Costs	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Electric Costs	$ 559,455	$ 543,164	$ 458,431	$ 482,582	$ 510,675	$ 552,105	$ 494,262	$ 463,419
Electric Renewable Costs	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Electric Net Metering Credits	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Natural Gas Costs	$ 139,925	$ 23,768	$ 34,574	$ 45,769	$ 60,514	$ 66,407	$ 93,257	$ 103,327
Water Costs	$ 7,261	$ 728	$ 8,034	$ 10,627	$ 16,891	$ 13,411	$ 15,486	$ 16,645

Metrics	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Facility Square Feet	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984	1,071,984
Site Landscape Acres	-	-	-	-	-	-	-	-
Vehicles Processed	-	-	-	-	-	-	-	-
Parts Processed	-	-	9,387,461	40,382,514	45,043,416	47,732,598	51,686,474	31,295,762

Emissions	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
NOX (lbs)	36,908	37,472	29,942	28,676	27,418	23,884	21,530	19,987
SO2 (lbs)	52,681	56,189	44,302	42,406	40,148	35,088	30,854	28,558
CO2 (lbs)	14,539,491	13,813,125	11,246,604	10,779,178	10,445,917	9,058,306	8,438,063	7,863,580

Weather Covington/Cincinnati, OH	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Heating Degree Days (HDD)	5,444	4,399	5,471	4,328	4,710	4,697	4,735	4,896
Cooling Degree Days (CDD)	915	1,028	1,418	826	929	1,359	1,113	1,620
Precipitation (Inches of Water)	37	51	45	39	52	39	43	43

Utility Invoice Tracking

Generating Reports (cont.)

NAPCK Kentucky

Energy Calculations	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Electric (mmbtu)	38,097	40,690	32,070	30,697	29,055	25,396	22,315	20,653
Gas (mmbtu)	14,528	2,536	4,719	4,624	6,218	4,890	7,917	7,736
Energy Total (mmbtu)	52,625	43,226	36,789	35,321	35,273	30,286	30,232	28,389
BTU / SqFt (EUI)	49,091	40,324	34,319	32,949	32,905	28,252	28,202	26,483

Reductions	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
% Reduction from baseline (net)		17.9%	30.1%	32.9%	33.0%	42.4%	42.6%	46.1%
% Reduction from previous year (net)		17.9%	14.9%	4.0%	0.1%	14.1%	0.2%	6.1%

Savings (from baseline)	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Total mmbtu	52,625	43,226	36,789	35,321	35,273	30,286	30,232	28,389
Annual mmbtu Saved		9,399	15,835	17,304	17,352	22,339	22,392	24,236
Cummulative mmbtu Saved		9,399	25,234	42,538	59,889	82,228	104,621	128,856
Cummulative kWh Saved		(759,821)	1,006,474	3,175,183	5,825,291	9,547,795	14,173,133	19,285,536
Cummulative Therms Saved		119,940	218,048	317,110	400,220	496,616	562,733	630,666

Cost Avoided	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
btu/sqft	49,091	40,324	34,319	32,949	32,905	28,252	28,202	26,483
cost/btu/sqft	$ 14.25	$ 14.06	$ 14.37	$ 16.04	$ 17.36	$ 21.89	$ 20.83	$ 21.40
cost at baseline use	$ 699,380	$ 690,198	$ 705,209	$ 787,191	$ 852,169	$ 1,074,726	$ 1,022,682	$ 1,050,582
actual cost	$ 699,380	$ 566,932	$ 493,005	$ 528,351	$ 571,190	$ 618,511	$ 587,519	$ 566,746
savings	$ -	$ 123,266	$ 212,204	$ 258,840	$ 280,979	$ 456,215	$ 435,163	$ 483,837
cumulative savings		$ 123,266	$ 335,470	$ 594,310	$ 875,289	$ 1,331,504	$ 1,766,667	$ 2,250,504

Additional Calculations	FY01	FY02	FY03	FY04	FY05	FY06	FY07	FY08
Electric Cost per SF	$ 0.522	$ 0.507	$ 0.428	$ 0.450	$ 0.476	$ 0.515	$ 0.461	$ 0.432
Gas Cost per SF	$ 0.131	$ 0.022	$ 0.032	$ 0.043	$ 0.056	$ 0.062	$ 0.087	$ 0.096
Water Cost per SF	$ 0.007	$ 0.001	$ 0.007	$ 0.010	$ 0.016	$ 0.013	$ 0.014	$ 0.016
Total Cost per SF	$ 0.659	$ 0.530	$ 0.467	$ 0.503	$ 0.549	$ 0.589	$ 0.563	$ 0.544
Electric Cost per kWh	$ 0.05011	$ 0.04555	$ 0.04877	$ 0.05364	$ 0.05997	$ 0.07418	$ 0.07558	$ 0.07656
Gas Cost per Therm	$ 0.96294	$ 0.93684	$ 0.73247	$ 0.98964	$ 0.97290	$ 1.35759	$ 1.17760	$ 1.33537
Water Cost per Gallon	$ 0.00220	$ 0.00032	$ 0.00395	$ 0.00527	$ 0.00527	$ 0.00519	$ 0.00464	$ 0.00401

Utility Invoice Tracking

What have you done for me lately?

NAPCK Kentucky

For a period of 12 months.

	Previous Period	Selected Period	
Usage	Jan-07 thru Dec-07	Jan-08 thru Dec-08	
Electric Utility (kWh)	6,518,231	5,629,142	-13.6%
Electric Renewable (kWh)	-	-	
Electric Net Metering (kWh)	-	-	
Natural Gas (Therms)	85,772	86,391	0.7%
Water Potable (gals)	5,046,900	1,811,600	
Water Potable - Irrigation (gals)	-	-	
Water Reclaimed (gals)	-	-	
Costs	Jan-07 thru Dec-07	Jan-08 thru Dec-08	
Electric Costs	$ 478,657	$ 472,043	-1.4%
Electric Renewable Costs	$ -	$ -	
Electric Net Metering Credits			
Natural Gas Costs	$ 100,221	$ 111,295	11.0%
Water Costs	$ 19,843	$ 7,218	-63.6%
Metrics	Jan-07 thru Dec-07	Jan-08 thru Dec-08	
Facility Square Feet	1,071,984	1,071,984	
Site Landscape Acres	-	-	
Vehicles Processed	-	-	
Parts Processed	43,977,107	-	
Emissions	Jan-07 thru Dec-07	Jan-08 thru Dec-08	
NOX (lbs)	21,561	18,805	-12.8%
SO2 (lbs)	30,756	26,568	-13.6%
CO2 (lbs)	8,500,558	7,503,885	-11.7%

Utility Invoice Tracking

What have you done for me lately (cont.)?

NAPCK Kentucky

For a period of 12 months.	Previous Period	Selected Period	
Usage	**Jan-07 thru Dec-07**	**Jan-08 thru Dec-08**	
Weather Covington/Cincinnati, OH	**Jan-07 thru Dec-07**	**Jan-08 thru Dec-08**	
Heating Degree Days (HDD)	4,708	5,093	8.2%
Cooling Degree Days (CDD)	1,644	1,106	-32.7%
Precipitation (Inches of Water)	37	46	
Energy Calculations	**Jan-07 thru Dec-07**	**Jan-08 thru Dec-08**	
Electric (mmbtu)	22,241	19,207	-13.6%
Gas (mmbtu)	8,575	8,637	0.7%
Energy Total (mmbtu)	30,816	27,845	-9.6%
BTU / SqFt (per period)	28,747	25,975	-9.6%
Reductions	**Jan-07 thru Dec-07**	**Jan-08 thru Dec-08**	
% Reduction from baseline (net)	**41.4%**	**47.1%**	
% Reduction from previous year (net)		**9.6%**	
Additional Calculations	**Jan-07 thru Dec-07**	**Jan-08 thru Dec-08**	
Electric Cost per SF	$ 0.4465	$ 0.4403	-1.4%
Gas Cost per SF	$ 0.0935	$ 0.1038	11.0%
Water Cost per SF	$ 0.0185	$ 0.0067	-63.6%
Total Cost per SF	$ 0.5585	$ 0.5509	-1.4%
Electric Cost per kWh	$ 0.07343	$ 0.08386	14.2%
Gas Cost per Therm	$ 1.16846	$ 1.28826	10.3%
Water Cost per Gallon	$ 0.00393	$ 0.00398	1.3%

Utility Invoice Tracking

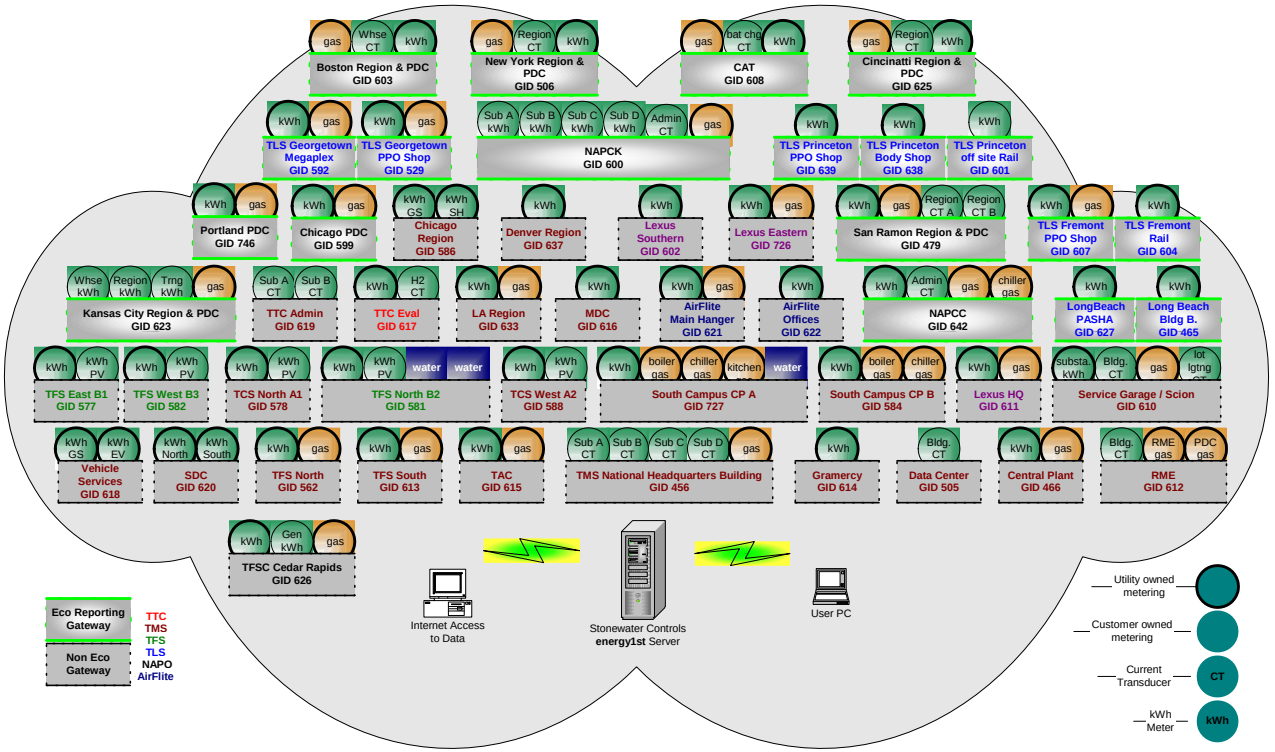
We have the data, now what do we do with it?

- ***Look for anomalies.***
- ***Benchmark with like facilities***
  - ***warehouses & offices.***
- ***Initially focus energy savings efforts in high cost or high use locations.***
- ***Look for changes in consumption based on occupancy schedule, overtime, temperature, etc.***
  - ***Ask the 5 whys to get to the root cause.***
- ***Supports measurement and verification process.***

Corporate Energy Program Overview

- ***Utility Invoice Tracking***
- ***Real Time Energy Monitoring***
- ***Treasure Hunts***
- ***Building Automation Systems***
- ***Energy Projects***

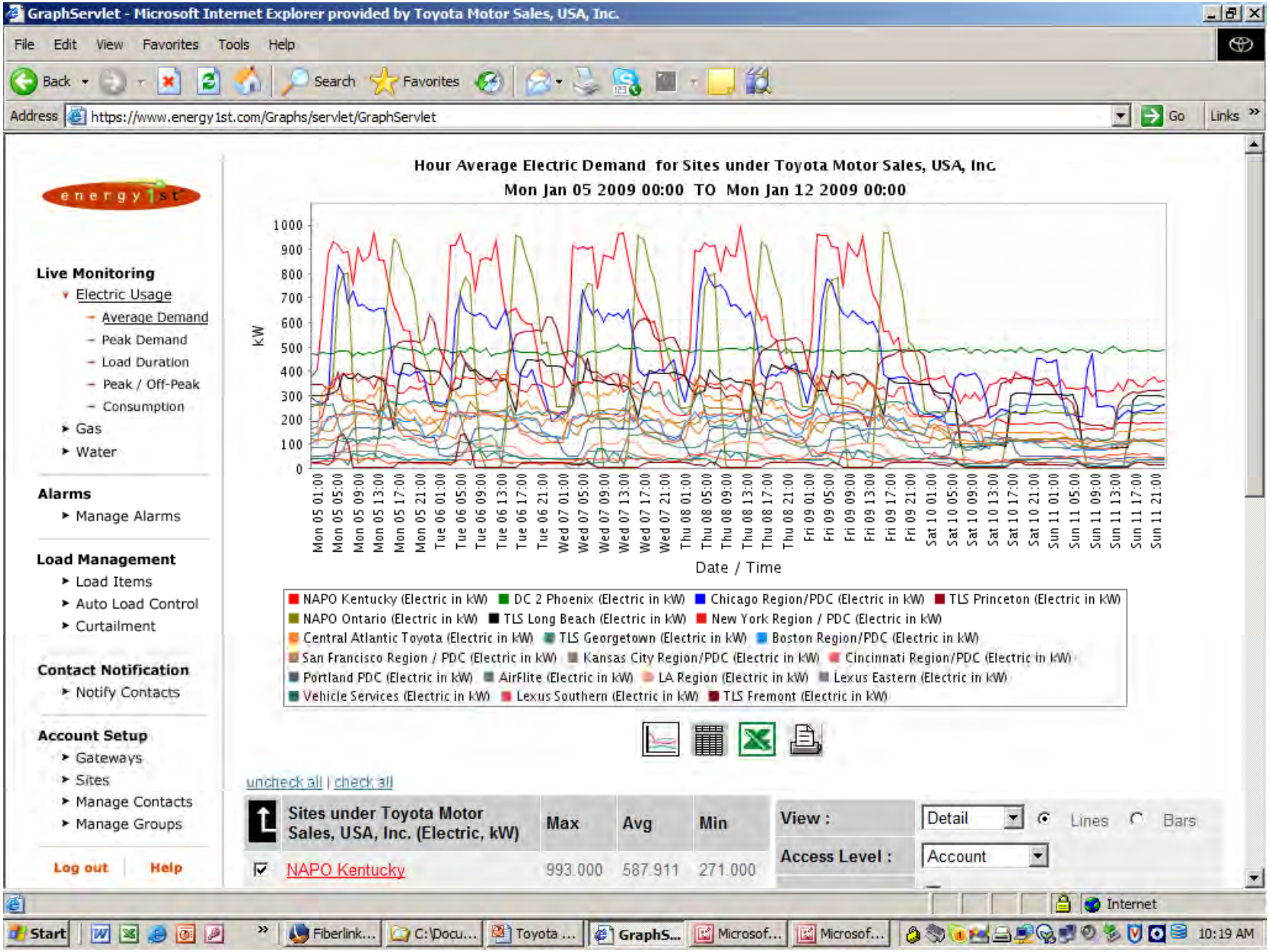
Real Time Energy Monitoring



Web Based System

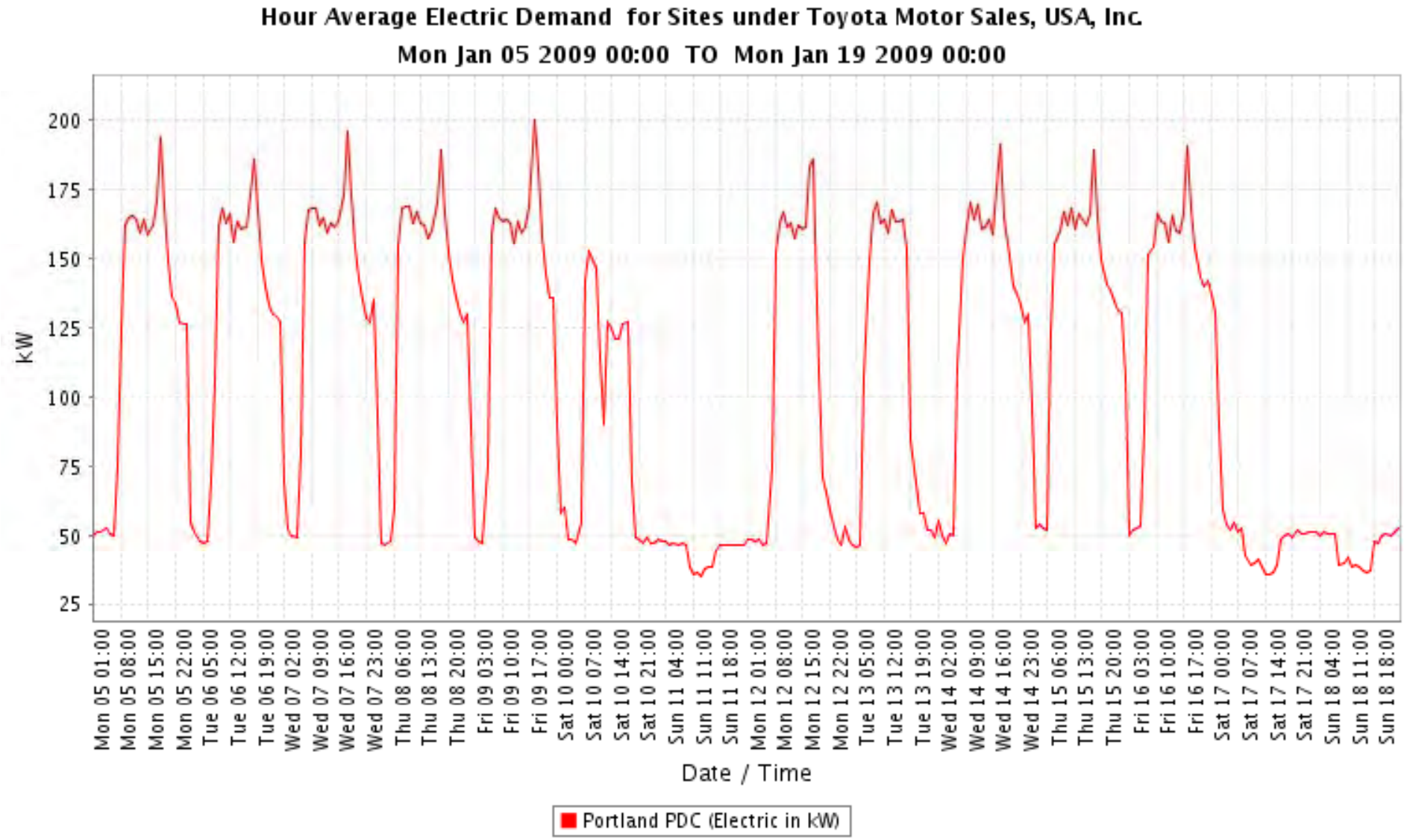
- 68 Sites / Buildings
- 132 Electric Meters
- 34 Natural Gas Meters
- 3 Water Meters

Real-Time Energy Monitoring



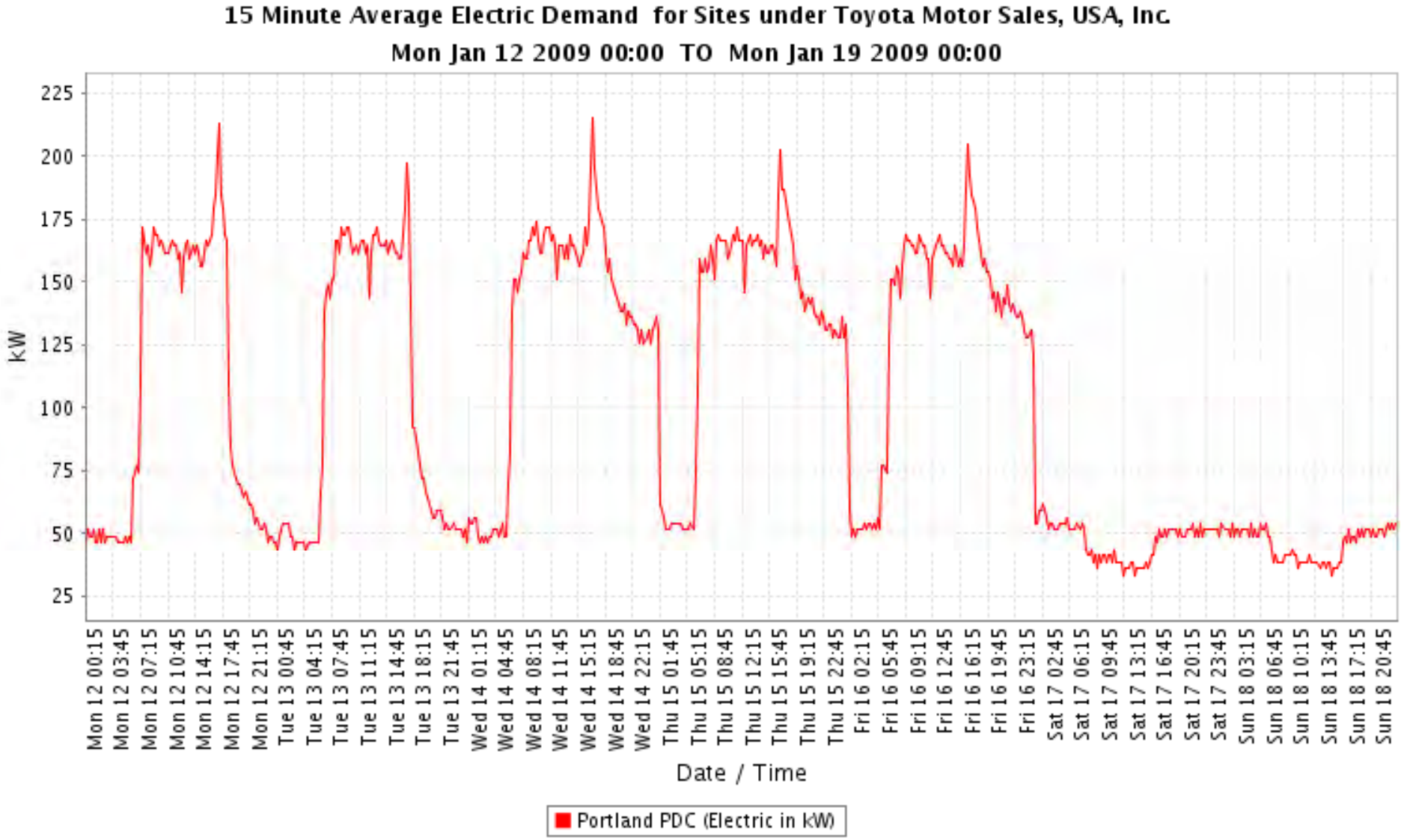
Real-Time Energy Monitoring

What do we look for?



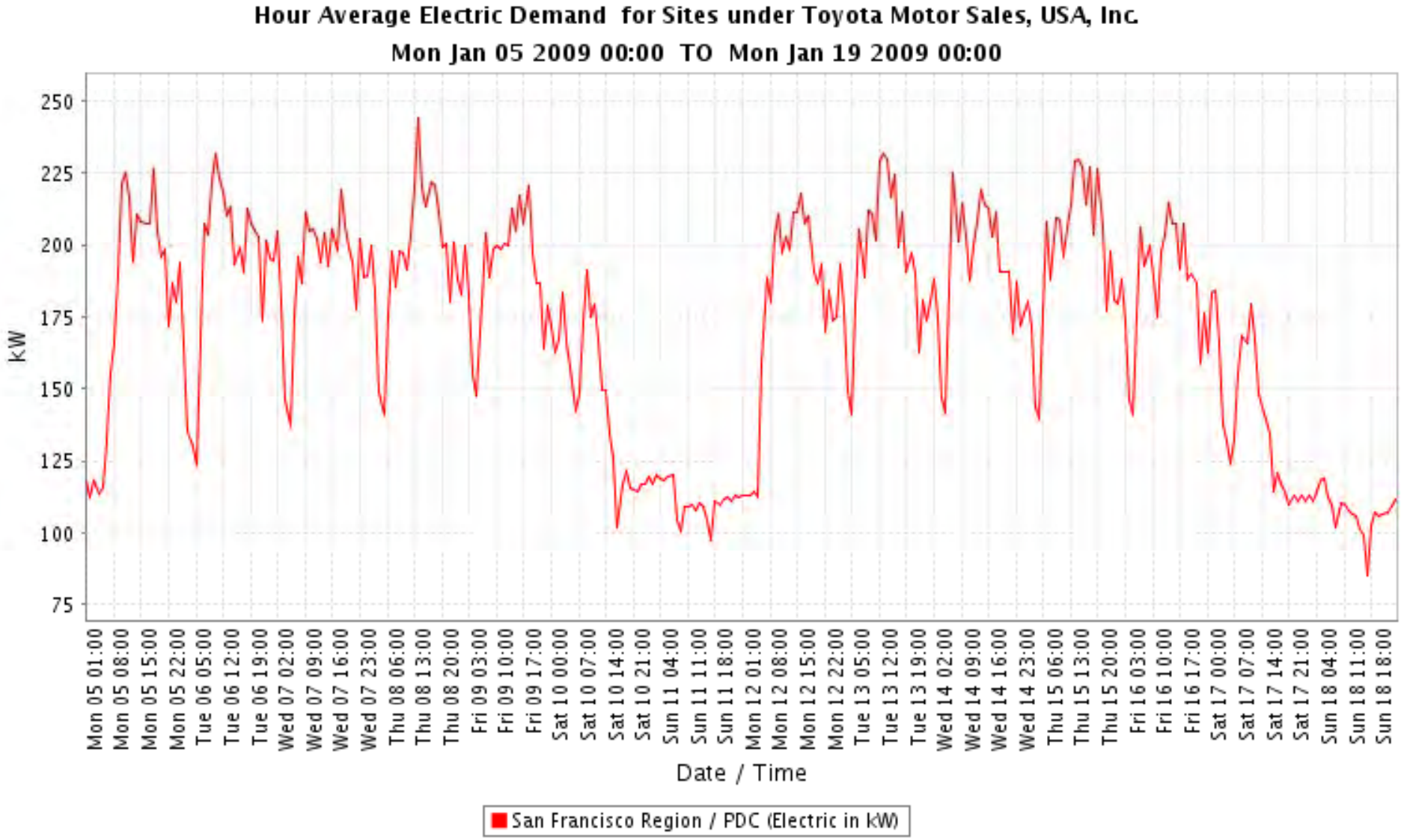
Real-Time Energy Monitoring

Taking a closer look…



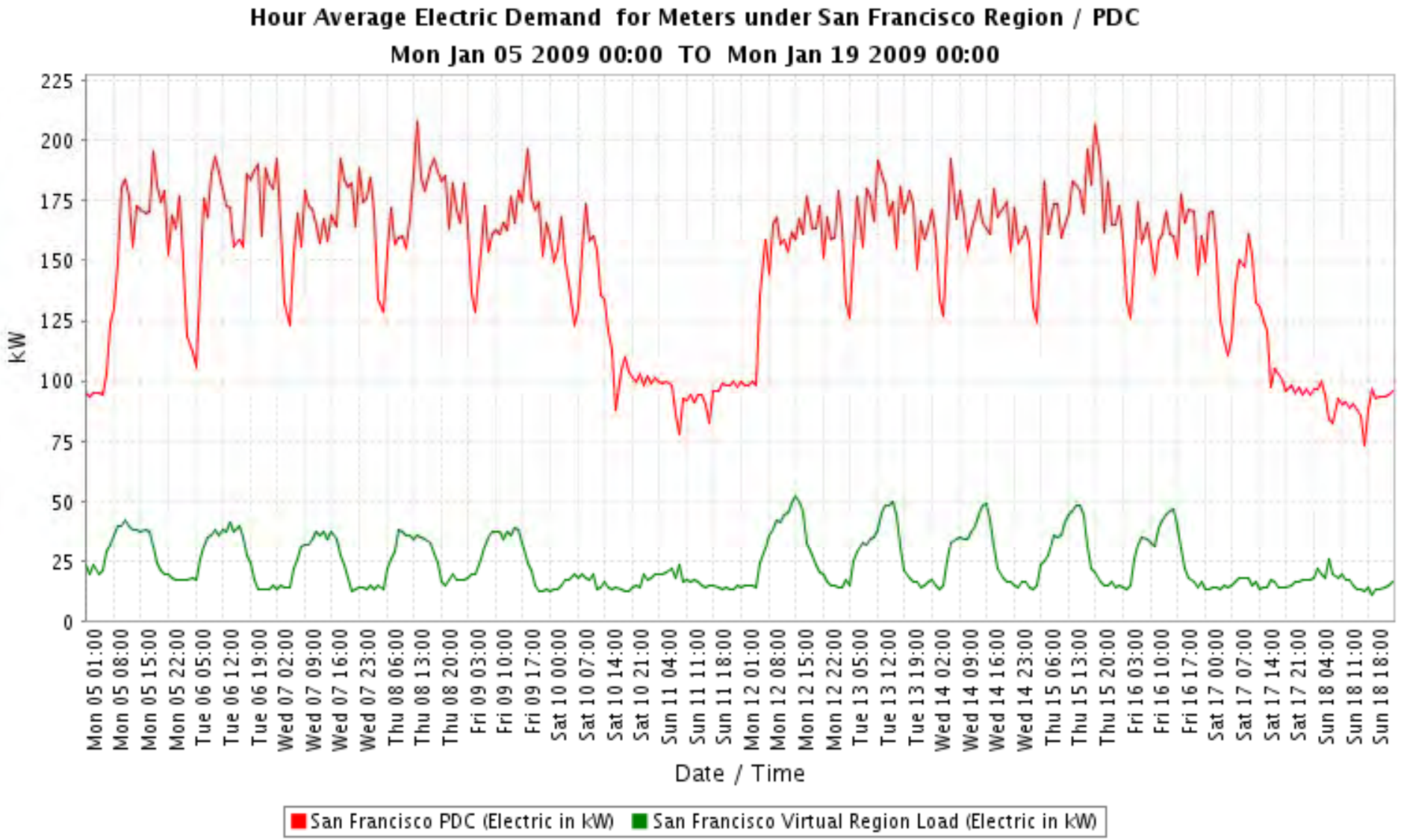
Real-Time Energy Monitoring

What do we look for?



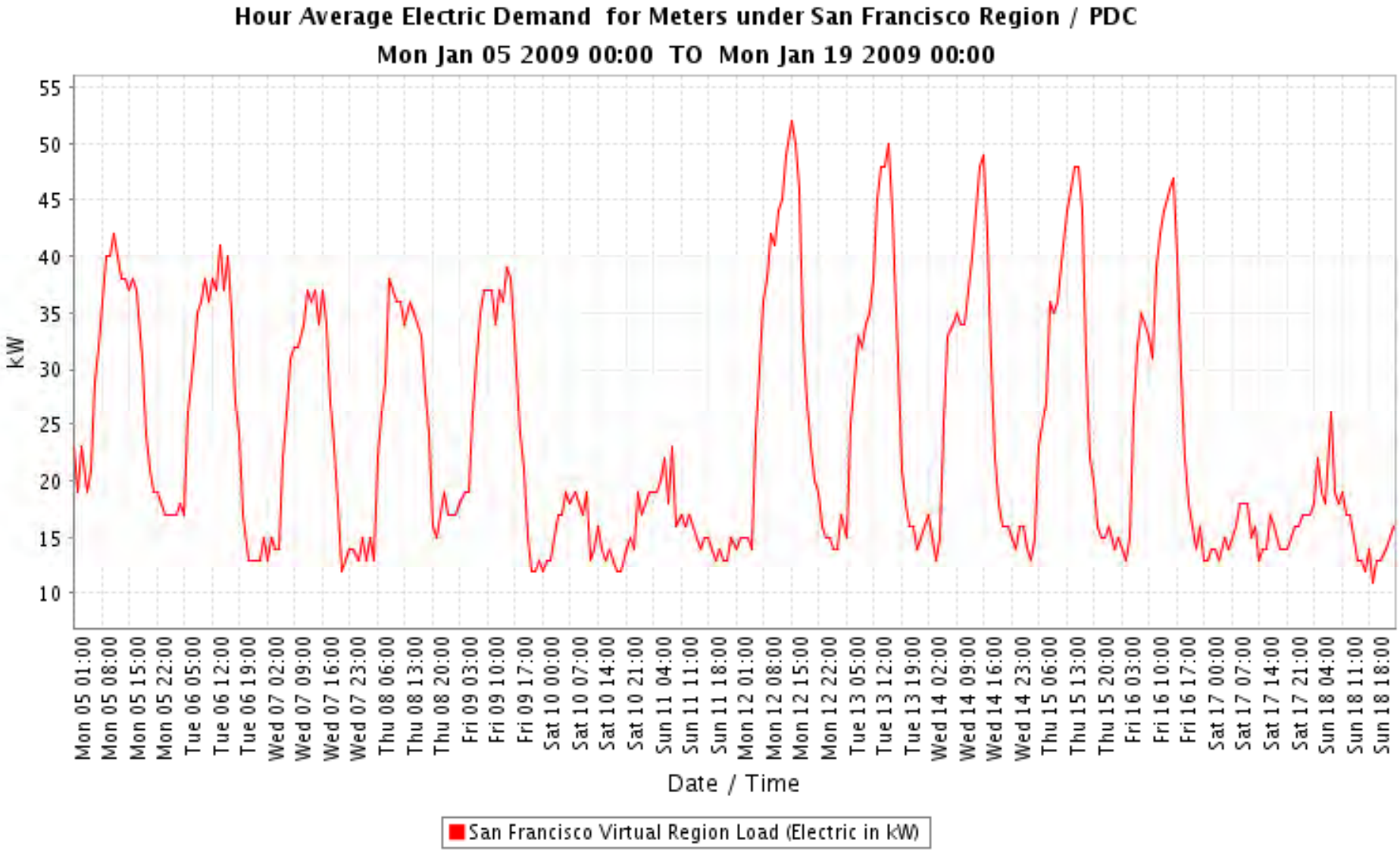
Real-Time Energy Monitoring

Isolating the data…



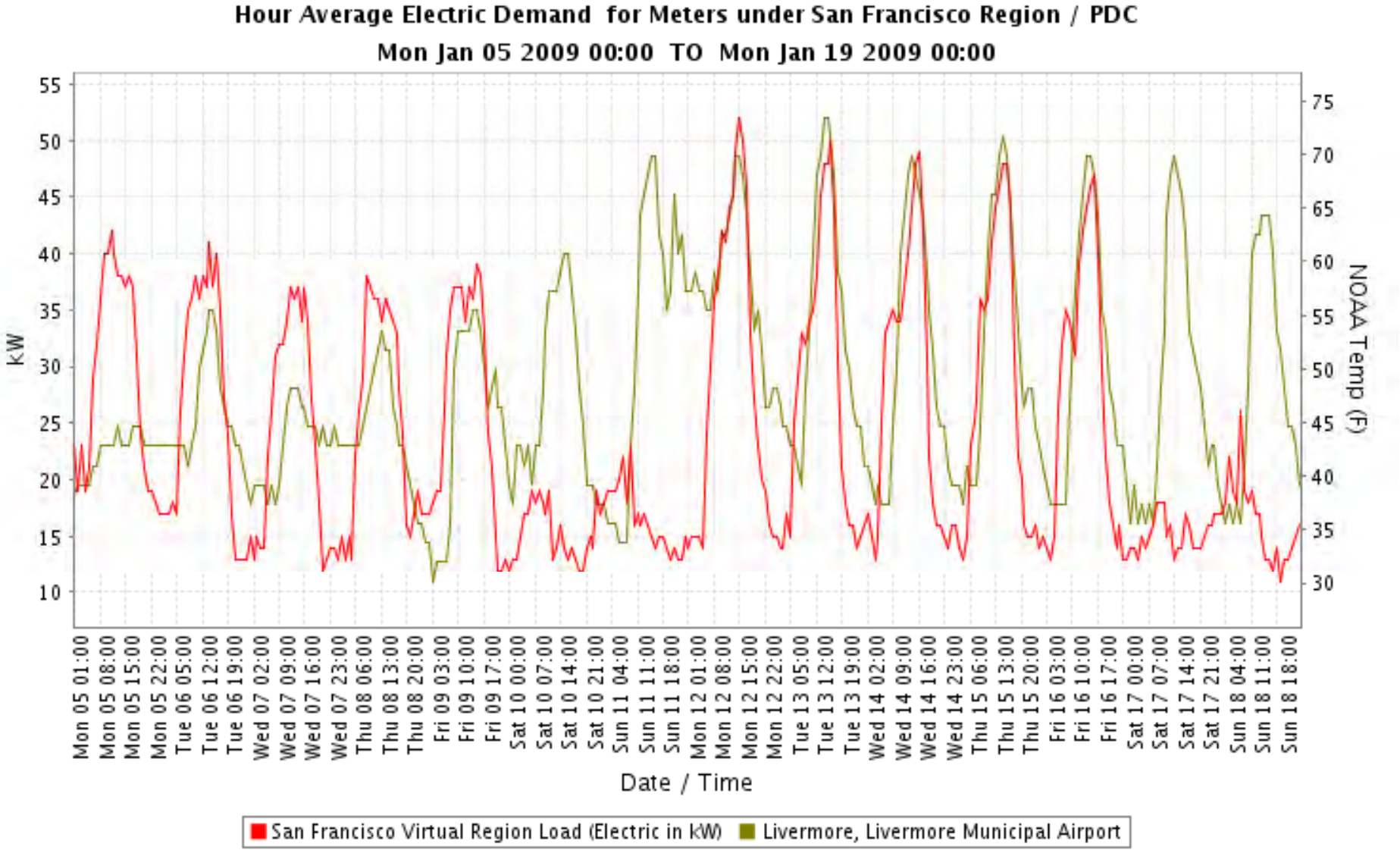
Real-Time Energy Monitoring

Taking a closer look…



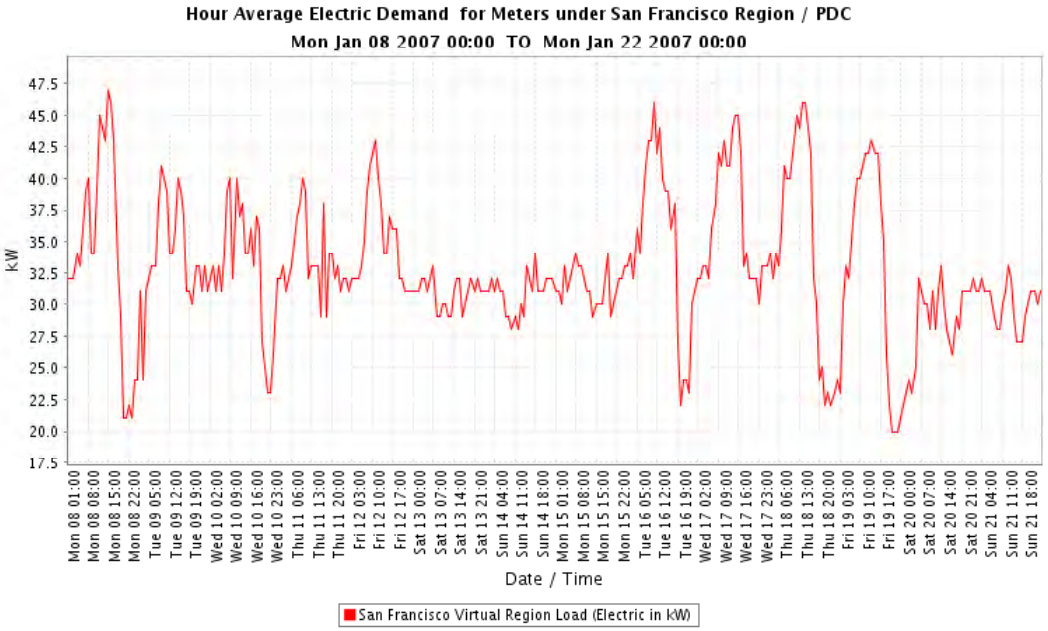
Real-Time Energy Monitoring

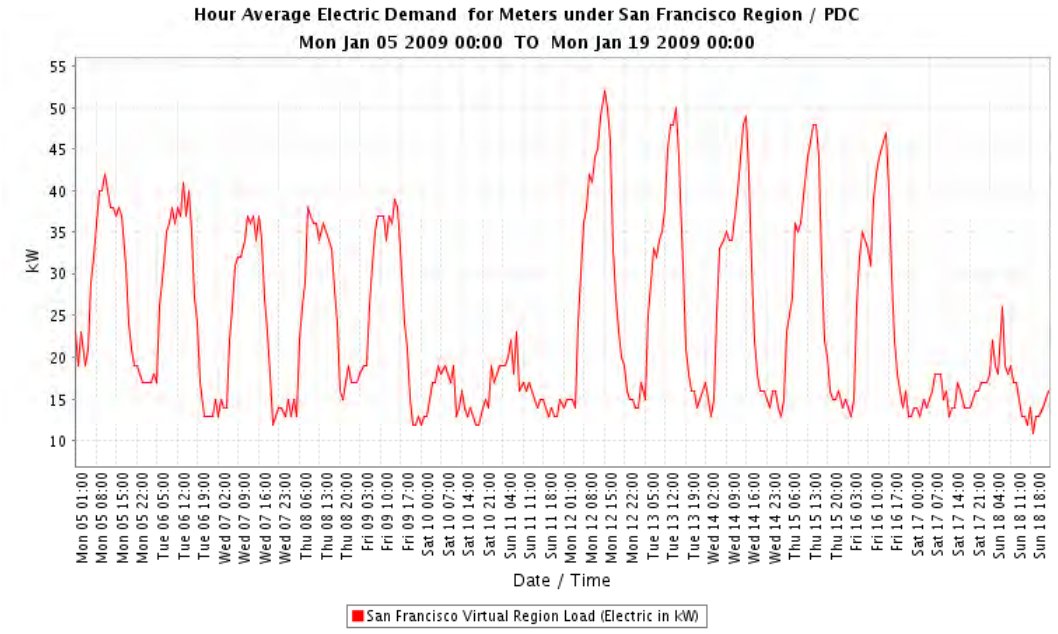
Impact of weather…



Real-Time Energy Monitoring

Does Re-commissioning Really Save Money?





Real-Time Energy Monitoring

Does Re-commissioning Really Save Money *(cont.)*?

Electric Energy Consumption , NOAA Temp (F) Report for Meters under San Francisco Region / PDC

Start:	Mon Jan 08 2007 00:00 PST	End:	Mon Jan 22 2007 00:00 PST
Interval size:	Hour	Units:	Electric Energy Consumption , NOAA Temp (F)

Summary Statistics		
Name	San Francisco Virtual Region Load	
Unit of Measure	degrees fahrenheit (Livermore, Livermore Municipal Airport)	kWh
Min	21.200	20.000
Avg	42.307	32.824
Max	75.200	47.000
Total	Not Applicable	11029.00

Electric Energy Consumption , NOAA Temp (F) Report for Meters under San Francisco Region / PDC

Start:	Mon Jan 05 2009 00:00 PST	End:	Mon Jan 19 2009 00:00 PST
Interval size:	Hour	Units:	Electric Energy Consumption , NOAA Temp (F)

Summary Statistics		
Name	San Francisco Virtual Region Load	
Unit of Measure	degrees fahrenheit (Livermore, Livermore Municipal Airport)	kWh
Min	30.200	11.000
Avg	48.529	23.887
Max	73.400	52.000
Total	Not Applicable	8026.00

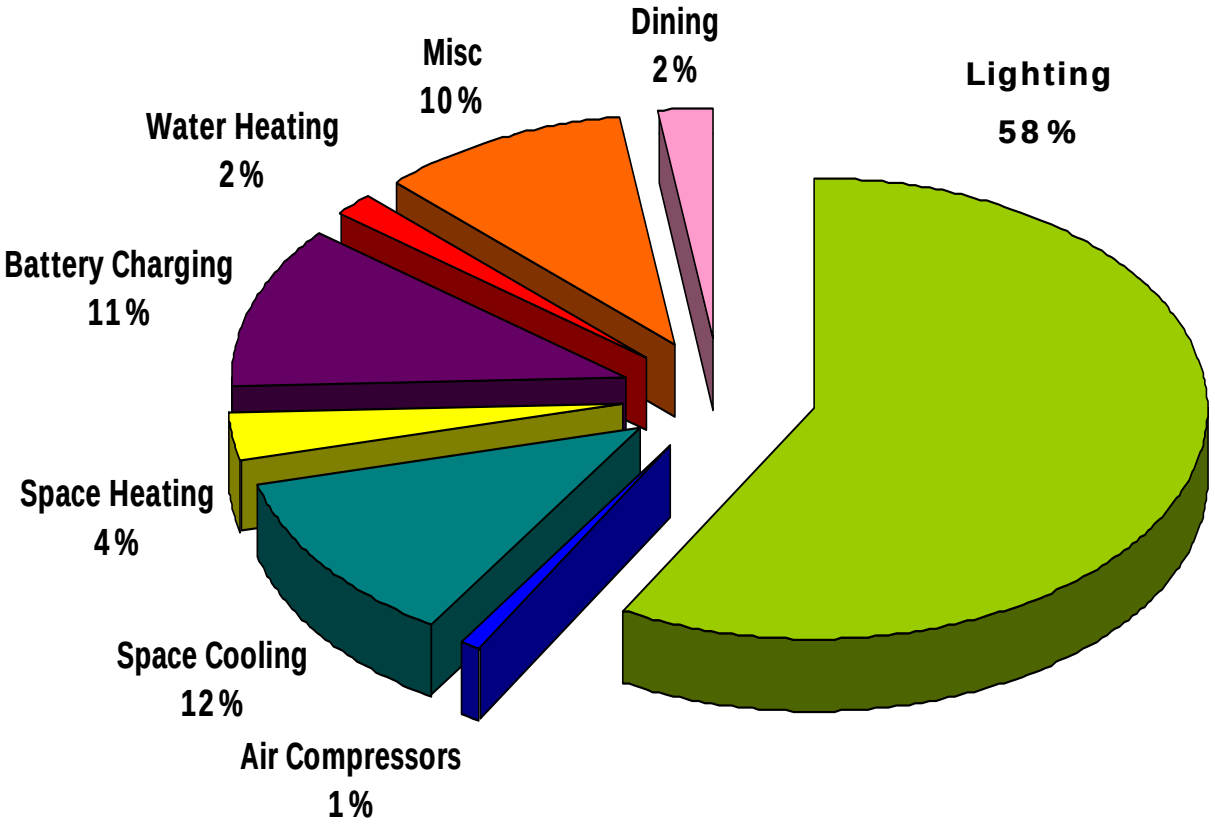
(11,029kWh – 8,026 kWh) * 26 * $0.125 / kWh = $9,750

Corporate Energy Program Overview

- *Utility Invoice Tracking*
- *Real Time Energy Monitoring*
- ***Treasure Hunts***
- *Building Automation Systems*
- *Energy Projects*

REF Treasure Hunts

Determine where and how energy is used.



Kaizen the Process

- Assemble Team
- Analyze Energy Use and Cost
- Investigate Where and When Energy is Used
- Estimate Potential Savings
- Report on Findings
- Implement Measures

REF Treasure Hunts

The Energy Treasure Hunt Process – thank you TEMA:

1. *Developed by Toyota Engineering and Manufacturing North America (TEMA).*
2. *Assemble a team of 4-8. Included lighting business partner – General Electric.*
3. *Start on a Sunday. Visit facility when unoccupied. Note anomalies – lights on, equipment running, etc. Check exterior lighting.*
4. *Arrive Monday morning before operations start. Observe the facility as it wakes up.*
5. *Look for inefficient devices – motors, pumps, lights, vending machines.*
6. *Review BAS occupancy schedules, temperature setpoints, night time setbacks, morning warm-up, optimal start.*
7. *Document potential cost savings items. Estimate savings and project costs.*

REF Treasure Hunts

Energy Treasure Hunt Common Findings:

1. *Manual Lighting Systems – turn on lights just before operations start. Shut down as soon as shift ends. Coordinate janitorial staff with lighting.*
2. *Occupancy schedules – tighten them down.*
3. *Turn off exterior lighting after 10:00 or 11:00 pm.*
4. *De-lamp office lighting by removing 1 lamp in a 3 lamp fixture or 2 lamps in a 4 lamp fixture. Saves 25%.*
5. *Vending machine – remove advertising lights.*
6. *Motion sensors in closets, conference rooms, break-rooms.*
7. *Air and water line leaks.*
8. *Inefficient lighting.*
9. *Inefficient motors.*
10. *Inefficient heating and cooling systems.*

Corporate Energy Program Overview

- ***Utility Invoice Tracking***
- ***Real Time Energy Monitoring***
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- ***Energy Projects***

Building Automation Systems

TMS utilizes Building Automation Systems (BAS) to implement energy savings initiatives.

- *If you don't have BAS or Lighting Control Systems, you are limited on opportunities to reduce energy consumption.*

- *If you have facilities that are located in several geographical areas and you have minimal expertise available: standardize, standardize, standardize.*

Building Automation Systems

What did we do at TMS?

Standardized on BACnet Protocol.

- *Allowed TMS to connect BAS systems together at multiple sites.*
- *Provided an opportunity to competitively bid to multiple providers:*
  - *Alerton, Delta, Automated Logic.*

Trained our stronger HVAC technicians on the BAS systems.

- *Learned operating system and programming.*
- *Technicians programmed modifications at minimal costs.*
- *Fewer service calls. Less cost.*

Networked BAS through TMS network.

- *Trained technicians could remotely access, monitor, and modify systems.*
- *Fewer trained technicians.*
- *More consistent implementation.*
- *Limited access.*

Building Automation Systems

Optimizing BAS reduces energy consumption.

1. *Re-commissioning HQ Building – partnered with utility provider, Southern California Edison, took advantage of rebates and incentives.*
2. *Fine tuned occupancy schedules.*
3. *Increased summer cooling temperature setpoints.*
4. *Reduced temperature setpoint range variations.*
5. *Decreased winter heating temperature setpoints.*
6. *Focused on minimizing energy use during holidays.*
7. *Implemented HVAC control strategies to reduce energy use.*

Building Automation Systems

Occupancy Schedules: If your operation changes, change your schedules. Utilize Optimum Start/Stop.

Facility	Original Occupancy Schedule 4/2/08	Revised/Current Occupancy Schedule 5/30/08
Boston Region & PDC	Monday - Friday 6am - 6pm	Monday - Friday 6am - 6pm
CAT Region	Monday 4am - 6pm, Tuesday - Friday 5:30am - 6pm Saturday 6am - 2:15pm	Monday 4am - 6pm, Tuesday - Friday 5:30am - 6pm
CAT PDC	Monday 5:15am - 12am, Tuesday - Friday 12am - 2:15am & 5:15am - 12am, Saturday 5:15am - 2pm	Monday 5:15am - 12am, Tuesday - Friday 12am - 2:15am & 5:15am - 12am
Chicago Region	Monday - Friday 6am - 6pm	Monday - Friday 6am - 6pm
Chicago PDC	Monday - Friday 6am - 12am	Monday - Friday 6am - 12am
Cincinnati Region & PDC	Monday - Friday 5am - 6pm	Monday - Friday 5am - 6pm
Dallas Lexus	Monday - Friday 7am - 8pm, Saturday 7am - 2pm	Monday - Friday 7am - 8pm
Denver	Monday - Friday 5:30am - 6:30pm	Monday - Friday 5:30am - 6:30pm
Kansas City Region & PDC	Monday - Friday 6am - 6pm	Monday - Friday 6am - 6pm
LA Region	Monday - Friday 5:30am - 5:30pm	Monday - Friday 5:30am - 5:30pm
Lexus Eastern	Monday - Friday 5:30am - 6:00pm	Monday - Friday 5:30am - 6:00pm
NAPCK	Monday - Friday 4am - 6pm, Saturday 5am - 5pm	Monday - Friday 6am - 3:45pm
New York Region	Monday 5:30am - 6pm, Tuesday - Friday 7am - 6pm	Monday 5:30am - 6pm, Tuesday - Friday 7am - 6pm
New York PDC	Monday - Friday 5:30am - 11:30pm	Monday - Friday 5:30am - 11:30pm
New York Tech Training	Monday - Friday 6:30am - 7pm	Monday - Friday 6:30am - 7pm
Phoenix DC2	Saturday - Sunday 24hr	Saturday - Sunday 24hr
Portland PDC	Monday - Friday 5:30am - 6pm	Monday - Friday 5:30am - 6pm
Georgetown TLS	Sunday 24hr, Monday 24hr, Tuesday - Friday 12am - 4am & 6:15am - 12am, Saturday 12am - 6:15am	Monday 3am - 12am, Tuesday - Friday 12am - 4:30am & 6:30am - 12am, Saturday 12am - 4:30am
Portland TLS	Monday - Friday 12am - 1am & 5am - 11pm	Monday - Friday 12am - 1am & 5am - 11pm
San Antonio TLS	Monday 5:30am - 12am, Tuesday - Friday 24hr Saturday 12am - 4am	Monday 5:45am - 6pm, Tuesday - Friday 6:15am - 6pm
Airflite	Monday - Friday 5am - 9pm, Saturday 5am - 11pm Sunday 8am - 12pm	Monday - Friday 5am - 9pm, Saturday 5am - 11pm Sunday 8am - 12pm

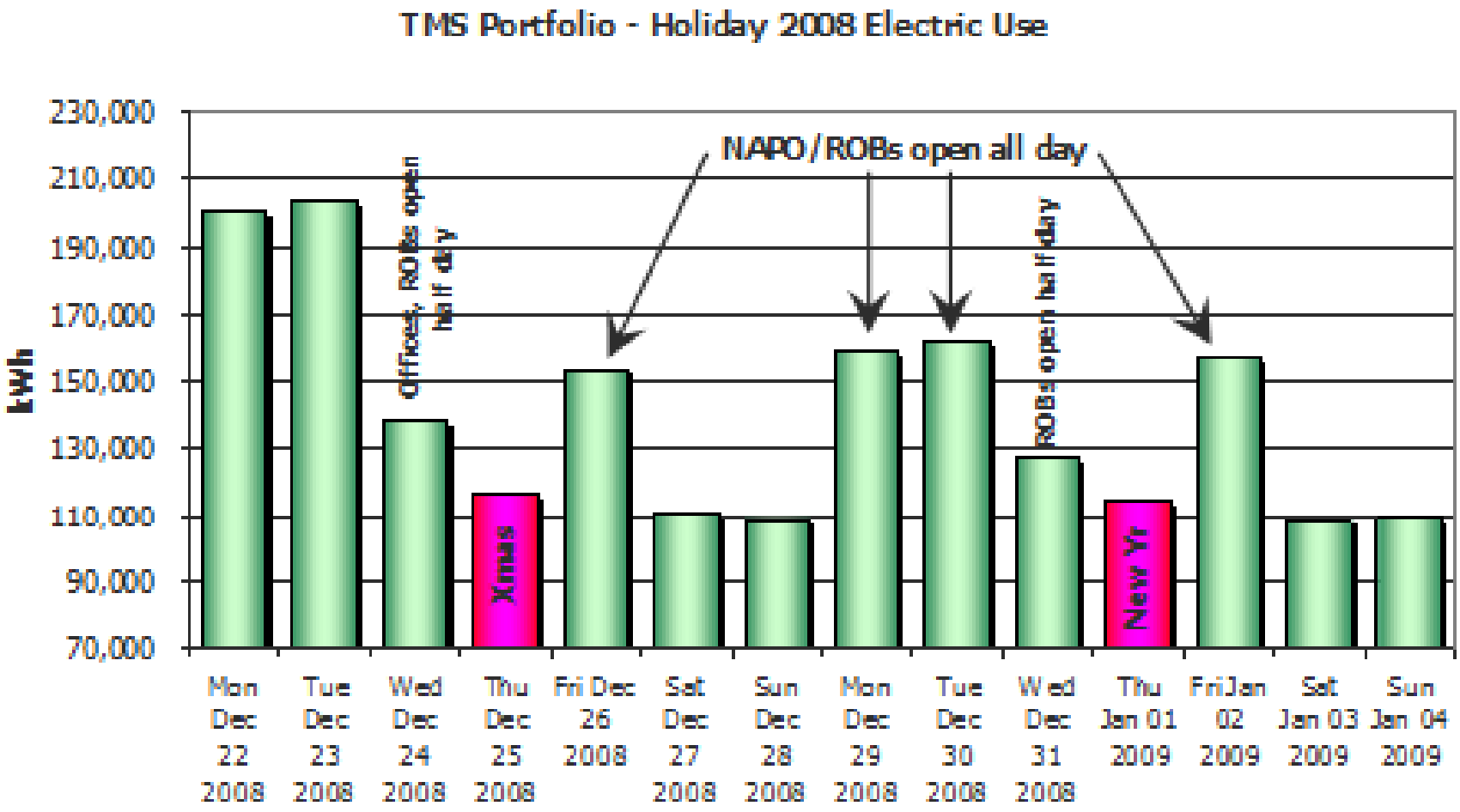
Building Automation Systems

Temperature and Range Adjustments: Tighten the range, re-program HVAC systems, optimize supply air temps - reduce energy consumption.

Facility	Original Set Point Range 4/2/08	Revised Set Point Range 4/23/08	Revised/Final Summer Set Point Range 5/30/08	Status
Boston Region & PDC	65 - 80	69 - 73	70 - 73	Complete
CAT Region	61 - 80	69 - 73	70 - 73	Complete
CAT PDC	61 - 80	69 - 73	70 - 73	Complete
Chicago Region	65 - 80	69 - 73	70 - 73	Complete
Chicago PDC	65 - 80	69 - 73	70 - 73	Complete
Cincinnati Region & PDC	60 - 80	69 - 73	70 - 73	Complete
Dallas Lexus	65 - 75	69 - 73	70 - 73	Complete
Denver	65 - 85	69 - 73	70 - 73	Complete
Kansas City Region & PDC	65 - 78		70 - 73	Complete
LA Region	68.5 - 74.5	69 - 73	70 -73	Complete
Lexus Eastern	65 - 81	69 - 73	70 - 73	Complete
NAPCK	65 - 80	69 - 73	70 - 73	Complete
New York Region	65 - 80	69 - 73	70 - 73	Complete
New York PDC	65 - 80	69 - 73	70 - 73	Complete
New York Tech Training	65 - 80	69 - 73	70 - 73	Complete
Phoenix DC2	65 - 76	69 - 73	70 - 73	Complete
Portland PDC	63 - 80	69 - 73	70 - 73	Complete
Georgetown TLS	70 -75	69 - 73	70 - 73	Complete
Portland TLS	66 -74			Unable to implement
San Antonio TLS	68 - 75	69 - 73	70 -73	Complete
Airflite	60 - 80	69 - 73	70 - 73	Complete

Holiday Energy Use Performance

Focusing on holiday schedules reduced electric use by 10% when compared to 2007.



Building Automation Systems

HVAC Control Strategies

Supply Air Temperature Reset.

1. *Poll VAV boxes.*
2. *Look at top 30% VAV boxes requesting cooling.*
3. *Adjust supply air temperature between 55 to 68 degrees.*

Caution: Monitor humidity – lower supply to 55° if humidity exceeds 60%.

Boiler Water Supply Temperature Reset.

1. *Similar to above utilizing top 30% heating signals and adjusting supply water temperature.*

Next Steps

Incorporate CO2 sensors to lower minimum air cfm standards.

Corporate Energy Program Overview

- ***Utility Invoice Tracking***
- ***Real Time Energy Monitoring***
- ***Treasure Hunts***
- ***Building Automation Systems***
- ***Energy Projects***

REF Energy Projects

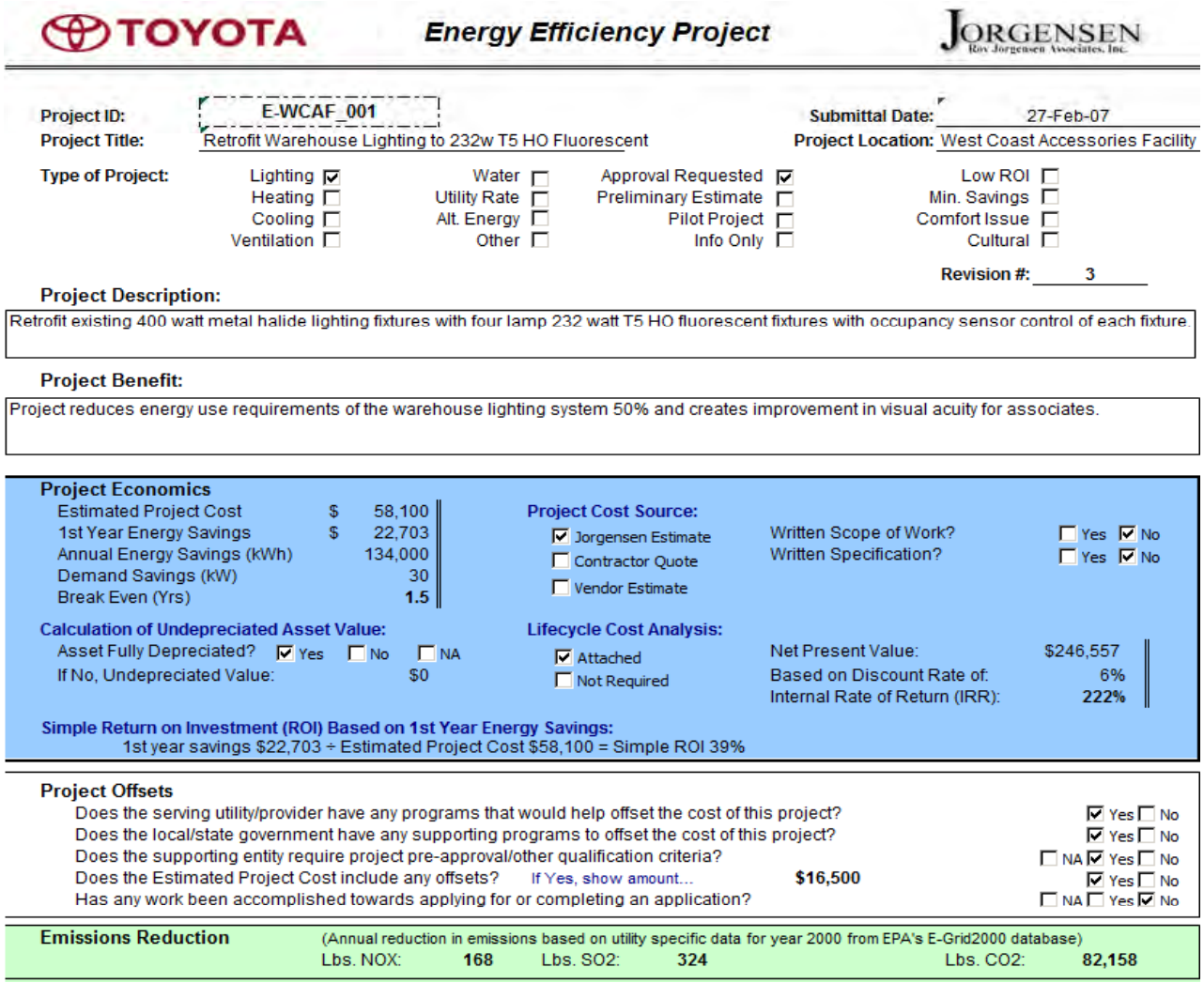
How do you sell energy projects?

1. *What are the rules? Meet with your Finance Department. Find out their expectations for an acceptable return: IRR, NPV, ROI, Payback?*
2. *Use their forms if available.*
3. *Demonstrate a systematic approach to estimating energy savings and dollars.*
4. *Let them know that you will validate performance and return - International Performance Measurement & Verification Protocol (IPMVP).*

Project Justification

Selling the Value

- *Developed a Systematic Approach to Define all Efficiency Projects.*
- *Holistic Look at all Aspects of a Project.*
- *Each Project Stands on Its Own.*
- *Comparative Decisions on Competing Projects.*



TOYOTA — Energy Efficiency Project — JORGENSEN (Roy Jorgensen Associates, Inc.)

Project ID: E-WCAF_001 **Submittal Date:** 27-Feb-07

Project Title: Retrofit Warehouse Lighting to 232w T5 HO Fluorescent **Project Location:** West Coast Accessories Facility

Type of Project:

Lighting ☑	Water ☐	Approval Requested ☑	Low ROI ☐
Heating ☐	Utility Rate ☐	Preliminary Estimate ☐	Min. Savings ☐
Cooling ☐	Alt. Energy ☐	Pilot Project ☐	Comfort Issue ☐
Ventilation ☐	Other ☐	Info Only ☐	Cultural ☐

Revision #: 3

Project Description:

Retrofit existing 400 watt metal halide lighting fixtures with four lamp 232 watt T5 HO fluorescent fixtures with occupancy sensor control of each fixture.

Project Benefit:

Project reduces energy use requirements of the warehouse lighting system 50% and creates improvement in visual acuity for associates.

Project Economics

Estimated Project Cost	$	58,100
1st Year Energy Savings	$	22,703
Annual Energy Savings (kWh)		134,000
Demand Savings (kW)		30
Break Even (Yrs)		**1.5**

Project Cost Source:
☑ Jorgensen Estimate
☐ Contractor Quote
☐ Vendor Estimate

Written Scope of Work? ☐ Yes ☑ No
Written Specification? ☐ Yes ☑ No

Calculation of Undepreciated Asset Value:
Asset Fully Depreciated? ☑ Yes ☐ No ☐ NA
If No, Undepreciated Value: $0

Lifecycle Cost Analysis:
☑ Attached
☐ Not Required

Net Present Value: $246,557
Based on Discount Rate of: 6%
Internal Rate of Return (IRR): **222%**

Simple Return on Investment (ROI) Based on 1st Year Energy Savings:
1st year savings $22,703 ÷ Estimated Project Cost $58,100 = Simple ROI 39%

Project Offsets

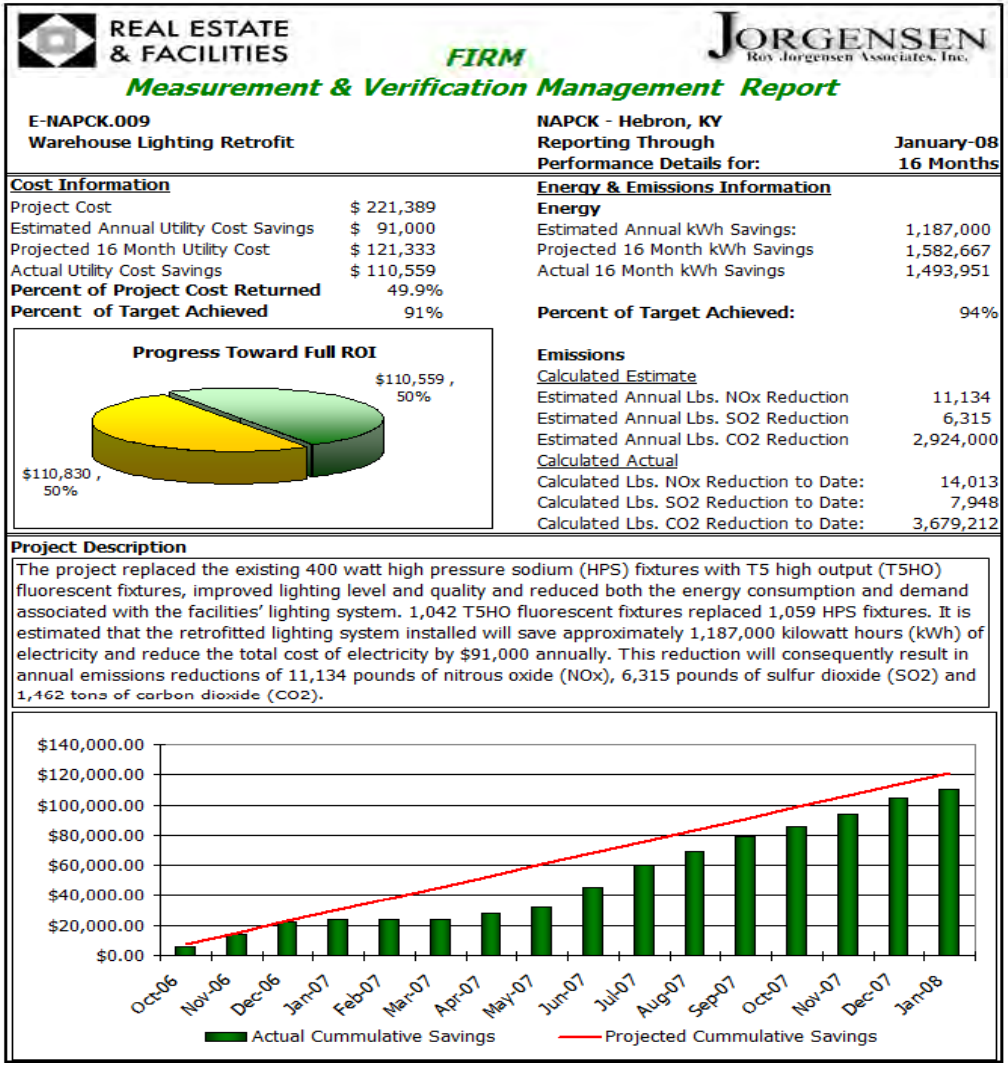
Does the serving utility/provider have any programs that would help offset the cost of this project?		☑ Yes ☐ No
Does the local/state government have any supporting programs to offset the cost of this project?		☑ Yes ☐ No
Does the supporting entity require project pre-approval/other qualification criteria?		☐ NA ☑ Yes ☐ No
Does the Estimated Project Cost include any offsets?	If Yes, show amount... **$16,500**	☑ Yes ☐ No
Has any work been accomplished towards applying for or completing an application?		☐ NA ☐ Yes ☑ No

Emissions Reduction (Annual reduction in emissions based on utility specific data for year 2000 from EPA's E-Grid2000 database)
Lbs. NOX: **168** Lbs. SO2: **324** Lbs. CO2: **82,158**

Measurement & Verification

How Does TMS Validate Performance?

- *Developed M&V Plan Approach.*
- *Adopted IPMVP Standard.*
- *Created Formal Reporting Format.*
- *Piloted M&V Protocol.*
- *Implemented M&V for All Capital Projects.*



REAL ESTATE & FACILITIES

FIRM

JORGENSEN
Roy Jorgensen Associates, Inc.

Measurement & Verification Management Report

E-NAPCK.009
Warehouse Lighting Retrofit

NAPCK - Hebron, KY
Reporting Through **January-08**
Performance Details for: **16 Months**

Cost Information

Project Cost	$ 221,389
Estimated Annual Utility Cost Savings	$ 91,000
Projected 16 Month Utility Cost	$ 121,333
Actual Utility Cost Savings	$ 110,559
Percent of Project Cost Returned	49.9%
Percent of Target Achieved	91%

Progress Toward Full ROI

Energy & Emissions Information

Energy

Estimated Annual kWh Savings:	1,187,000
Projected 16 Month kWh Savings	1,582,667
Actual 16 Month kWh Savings	1,493,951
Percent of Target Achieved:	94%

Emissions

Calculated Estimate

Estimated Annual Lbs. NOx Reduction	11,134
Estimated Annual Lbs. SO2 Reduction	6,315
Estimated Annual Lbs. CO2 Reduction	2,924,000

Calculated Actual

Calculated Lbs. NOx Reduction to Date:	14,013
Calculated Lbs. SO2 Reduction to Date:	7,948
Calculated Lbs. CO2 Reduction to Date:	3,679,212

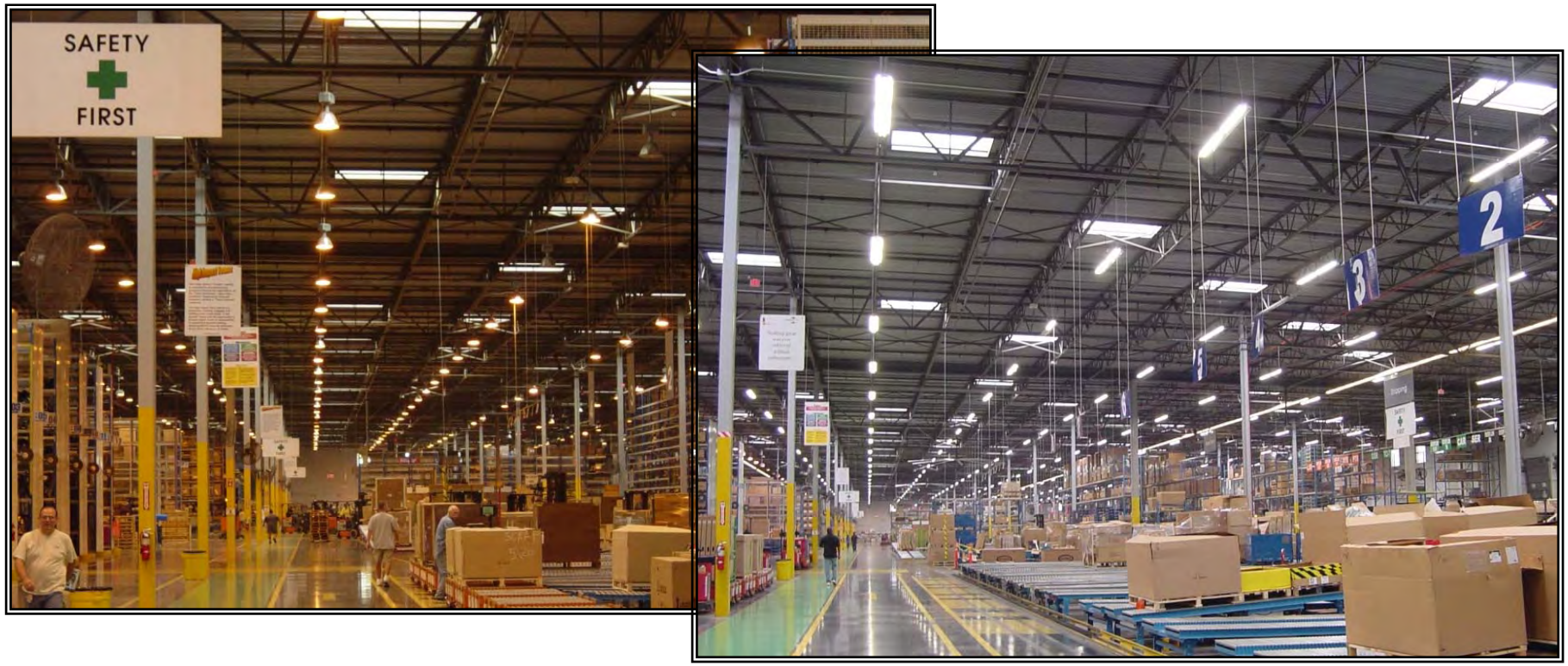
Project Description

The project replaced the existing 400 watt high pressure sodium (HPS) fixtures with T5 high output (T5HO) fluorescent fixtures, improved lighting level and quality and reduced both the energy consumption and demand associated with the facilities' lighting system. 1,042 T5HO fluorescent fixtures replaced 1,059 HPS fixtures. It is estimated that the retrofitted lighting system installed will save approximately 1,187,000 kilowatt hours (kWh) of electricity and reduce the total cost of electricity by $91,000 annually. This reduction will consequently result in annual emissions reductions of 11,134 pounds of nitrous oxide (NOx), 6,315 pounds of sulfur dioxide (SO2) and 1,462 tons of carbon dioxide (CO2).

Warehouse Lighting Retrofit Projects

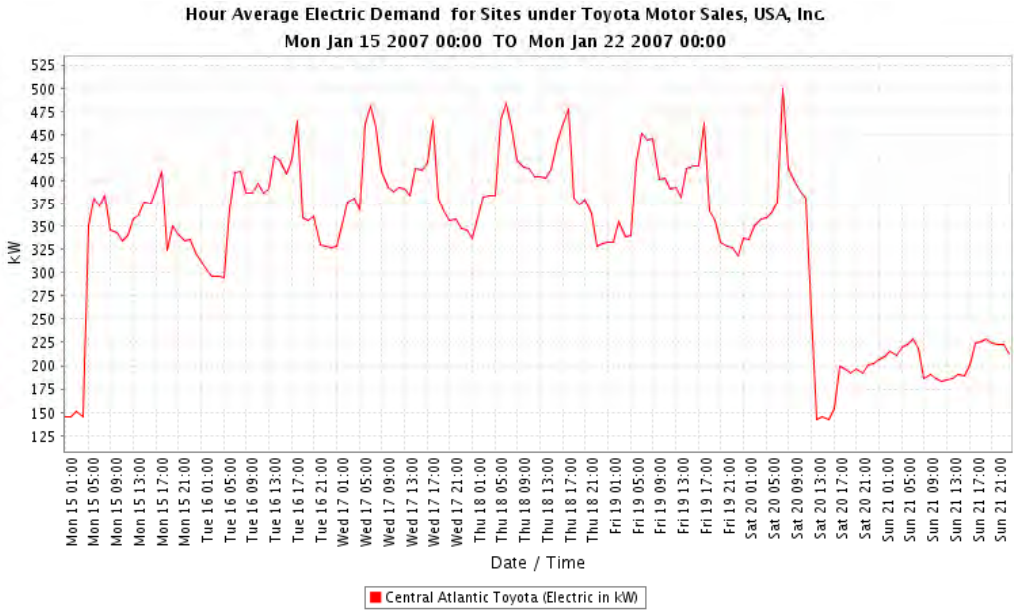
HPS vs. T5 HO:

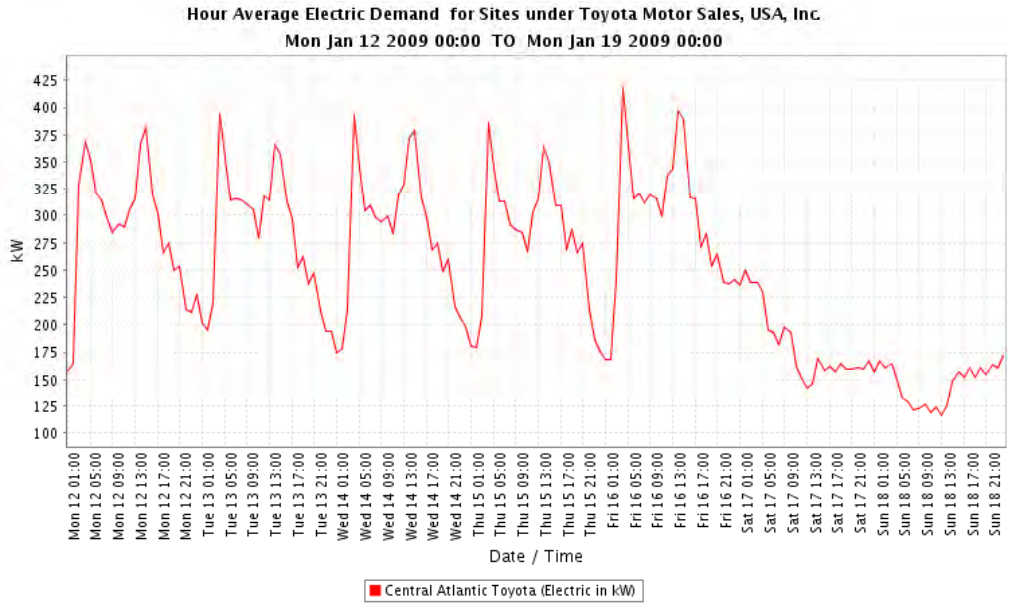
- *Requires 50% Less Energy.*
- *Better Color Contrast.*
- *Longer Lamp Life, Less Lumen Depreciation.*



Lighting Retrofit Projects Verification

Do Lighting Retrofits Save Money?





Lighting Retrofit Projects Verification

Do Lighting Retrofits Save Money *(cont.)* ?

Electric Energy Consumption , NOAA Temp (F) Report for Sites under Toyota Motor Sales, USA, Inc.

Start:	Mon Jan 15 2007 00:00 EST	End:	Mon Jan 22 2007 00:00 EST
Interval size:	Hour	Units:	Electric Energy Consumption , NOAA Temp (F)

Summary Statistics		
Name	Central Atlantic Toyota	
Unit of Measure	degrees fahrenheit (Baltimore, Baltimore-Washington International Airport)	kWh
Min	19.400	142.920
Avg	36.211	336.711
Max	66.200	499.680
Total	Not Applicable	56567.52

Electric Energy Consumption , NOAA Temp (F) Report for Sites under Toyota Motor Sales, USA, Inc.

Start:	Mon Jan 12 2009 00:00 EST	End:	Mon Jan 19 2009 00:00 EST
Interval size:	Hour	Units:	Electric Energy Consumption , NOAA Temp (F)

Summary Statistics		
Name	Central Atlantic Toyota	
Unit of Measure	degrees fahrenheit (Baltimore, Baltimore-Washington International Airport)	kWh
Min	1.400	117.000
Avg	23.450	250.419
Max	39.200	418.140
Total	Not Applicable	42070.32

(56,567 – 42,027 kWh) * 52 * $0.158 / kWh = $119,000

Railcar Lighting

HPS vs. T5HO:

- *> 60% Energy Reduction.*
- *Decreased Shadowing.*
- *Better Color Contrast .*
- *Longer Lamp Life.*
- *Less Lumen Depreciation.*
- *Lower Maintenance Cost.*
- *Improved Controllability.*

Solar Photovoltaic System

NAPCC Power Purchase Agreement (PPA)

- *Provides a competitive rate for electricity.*
- *Mitigates the future risk of inevitable electrical price increases.*
- *Provides 58% of NAPCC's electricity requirements during the term of this agreement.*
- *The remaining electricity will continue to be provided by Southern California Edison.*

Moving Forward

Options for Securing Green Energy Supply

Fuel Cells

Power Purchase Agreements

Toyota Motor Sales, U.S.A., Inc.
Energy Management Program

Questions/Contact Information

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