



GSA Rocky Mountain Region



# Wayne N. Aspinall Federal Building & US Courthouse Partial Modernization

November 2013



## Sustainability Goals for the Wayne Aspinall Federal Building Modernization:

1. Net-Zero Energy Building
2. LEED Platinum
3. Improved Indoor Environmental Quality and Thermal Comfort
4. Water Use Reduction
5. Use of Sustainable Construction Practices
6. Effective Use of Technology for Sustainable Design and Historic Preservation





1.  
Optimize Building Envelope

2.  
Reduce Internal Loads

3.  
Design Highly Efficient Systems

4.  
Match Load with On-site Renewable Energy



Optimize  
Building  
Envelope

Reduce Internal  
Loads

Design High  
Efficiency  
System

Match Building  
Load with On-  
site Renewable  
Energy

## Optimize Building Envelope:

1. Spray Foam Insulation
2. Interior Storm Windows with High Performance Solar Film
3. Upgrade to R-30 Roof Insulation
4. White Membrane Roof



Spray Foam Insulation Installation

White Membrane Roof



Optimize Building Envelope

Reduce Internal Loads

Design High Efficiency System

Match Building Load with On-site Renewable Energy

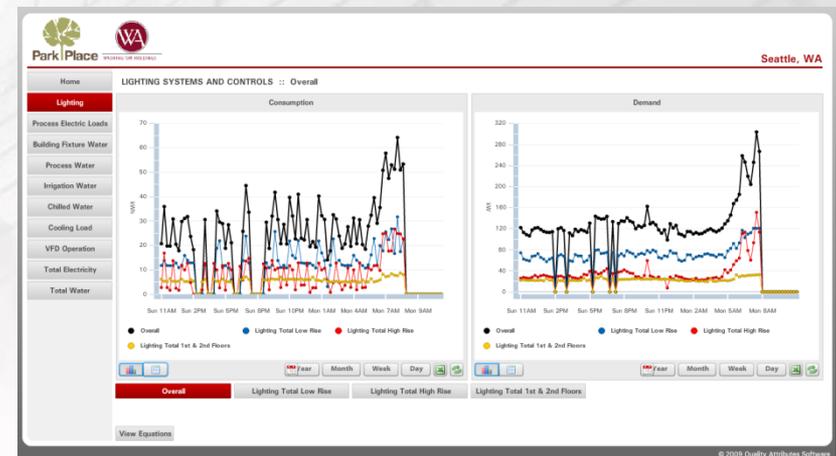
## Reduce Internal Loads:

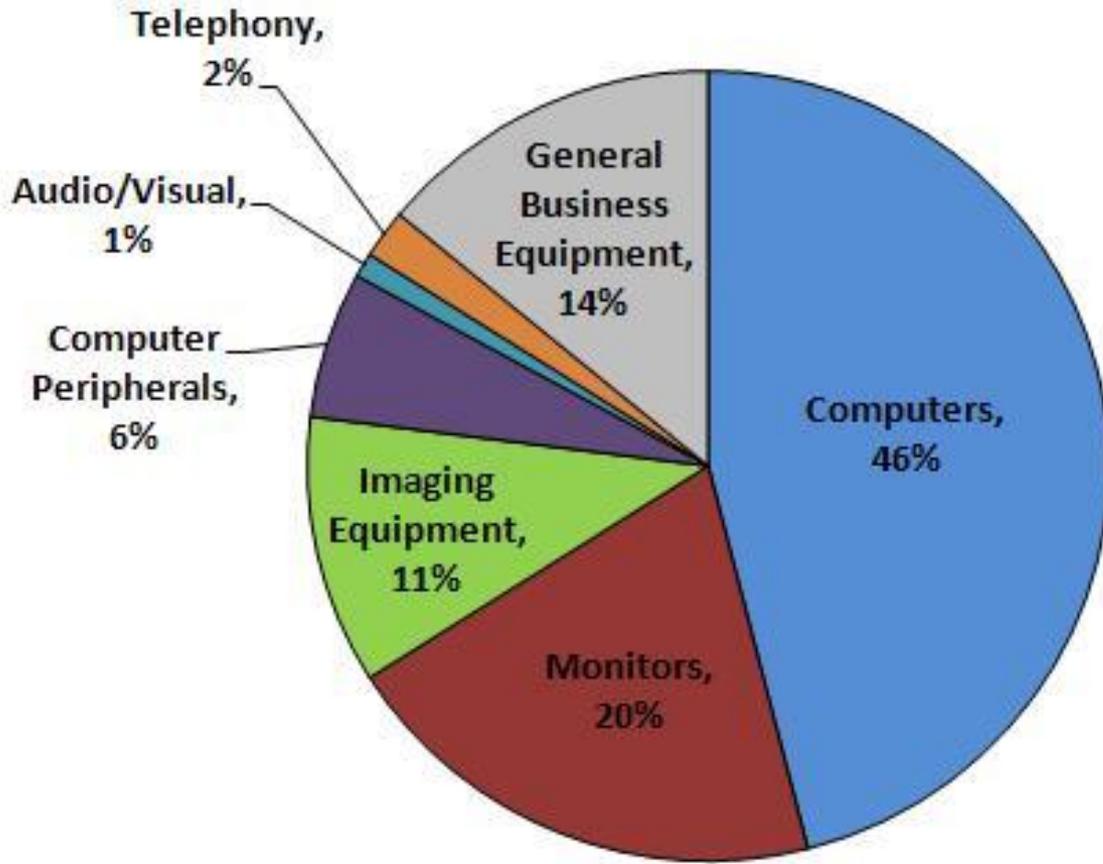
1. Energy Efficient Lighting
2. Wireless Lighting Controls
3. High Controllability of Lighting
4. Increased Daylighting
5. Graphical Display of Building Consumption
6. Plug Load Reduction



LED Fluorescent Tubes

Energy Monitoring Platform





Typical Office – Plug Load Breakdown

Desktop: 407 kwh/yr  
 Laptop: 96 kwh/yr  
 CRT monitor: 220 kwh/yr  
 LCD monitor: 132 kwh/yr  
 Laser printer: 280 kwh/yr



Electrical Strip with Motion Sensor

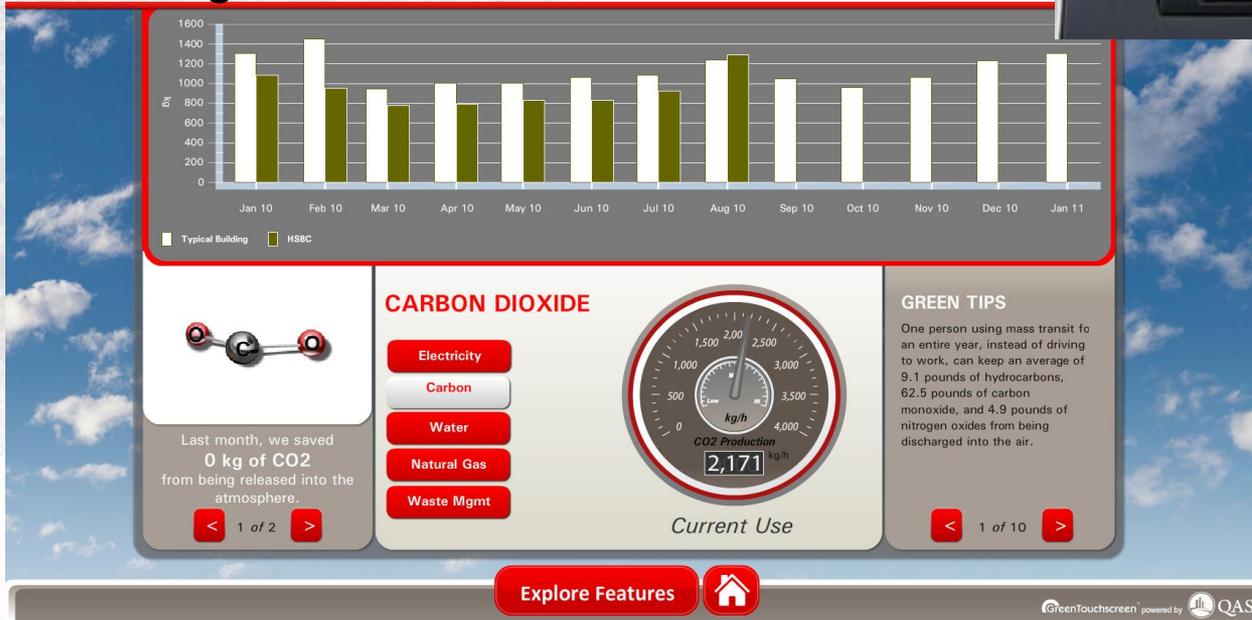
Total PV array production: 176,995 kwh

# Personal and Departmental Ownership of Energy Consumption

Much like the Toyota Prius, software packages allow tenants to view past and real time energy consumption of building.



Toyota Prius Energy Monitor



QAS Green Touchscreen

Optimize Building Envelope

Reduce Internal Loads

Design High Efficiency System

Match Building Load with On-site Renewable Energy

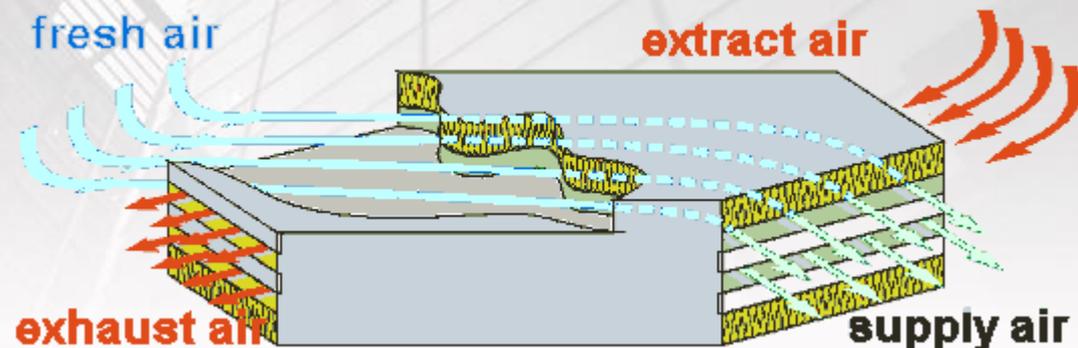
## Design High Efficiency System:

1. Water-Source Variable Refrigerant Flow (VRF) System
2. Air Quality Monitoring
3. Advanced Controls System
4. Evaporative Cooling
5. Airside Free Cooling
6. Passive Solar Gain

Water and Airside Heat Exchanger



CO Sensor



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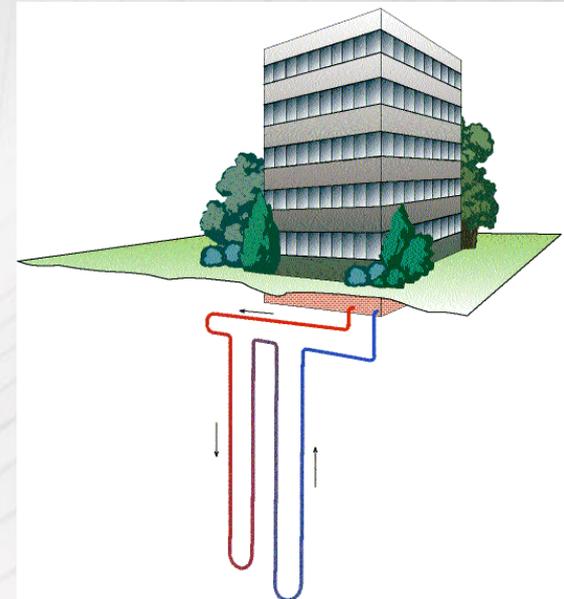
Match Building  
Load with On-  
Site Renewable  
Energy

## Geo-Exchange Concept:

Use the consistent temperature of the earth to provide heating, cooling and hot water.

## Current Design:

1. 32 vertical wells with well depth of 475 feet.
2. Water pumped between heat pumps, water-cooled condensing units and well



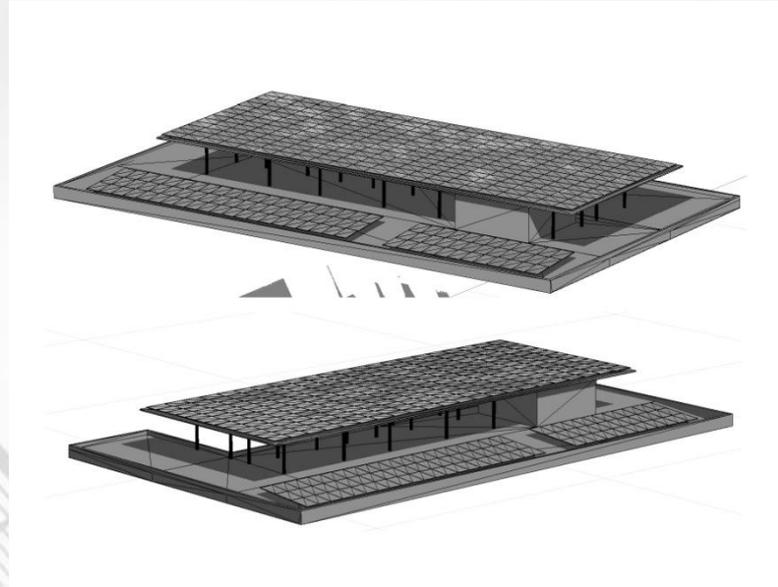
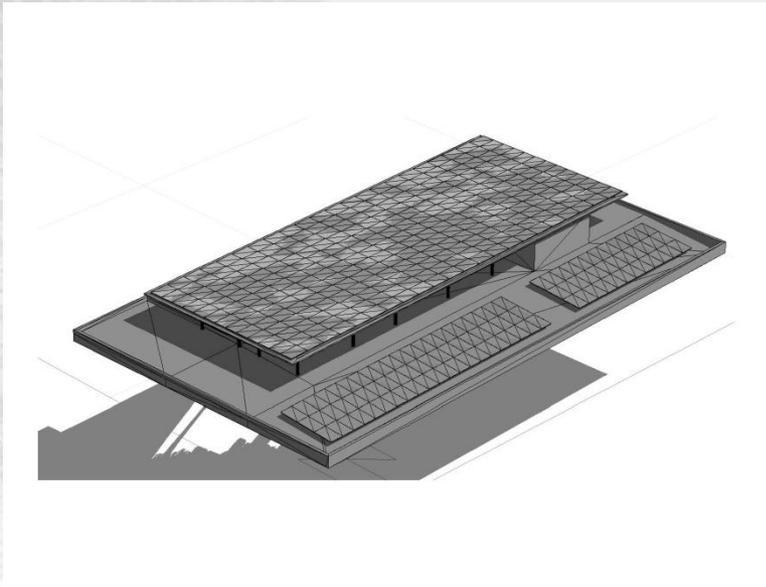
Geo-Exchange Diagram

Optimize  
Building  
Envelope

Reduce Internal  
Loads

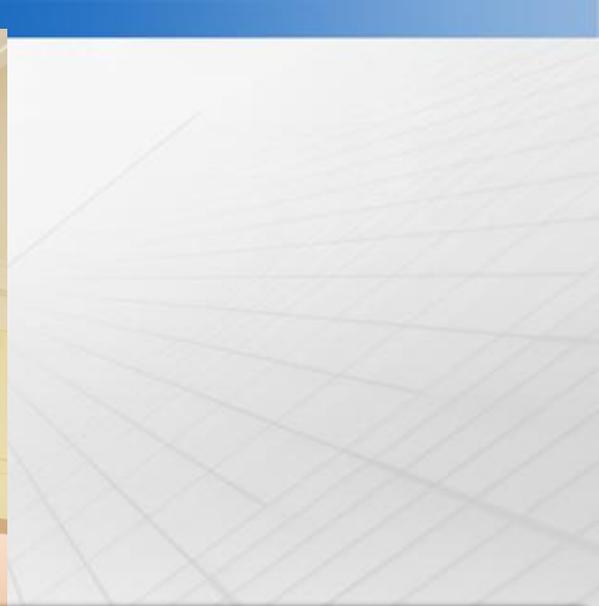
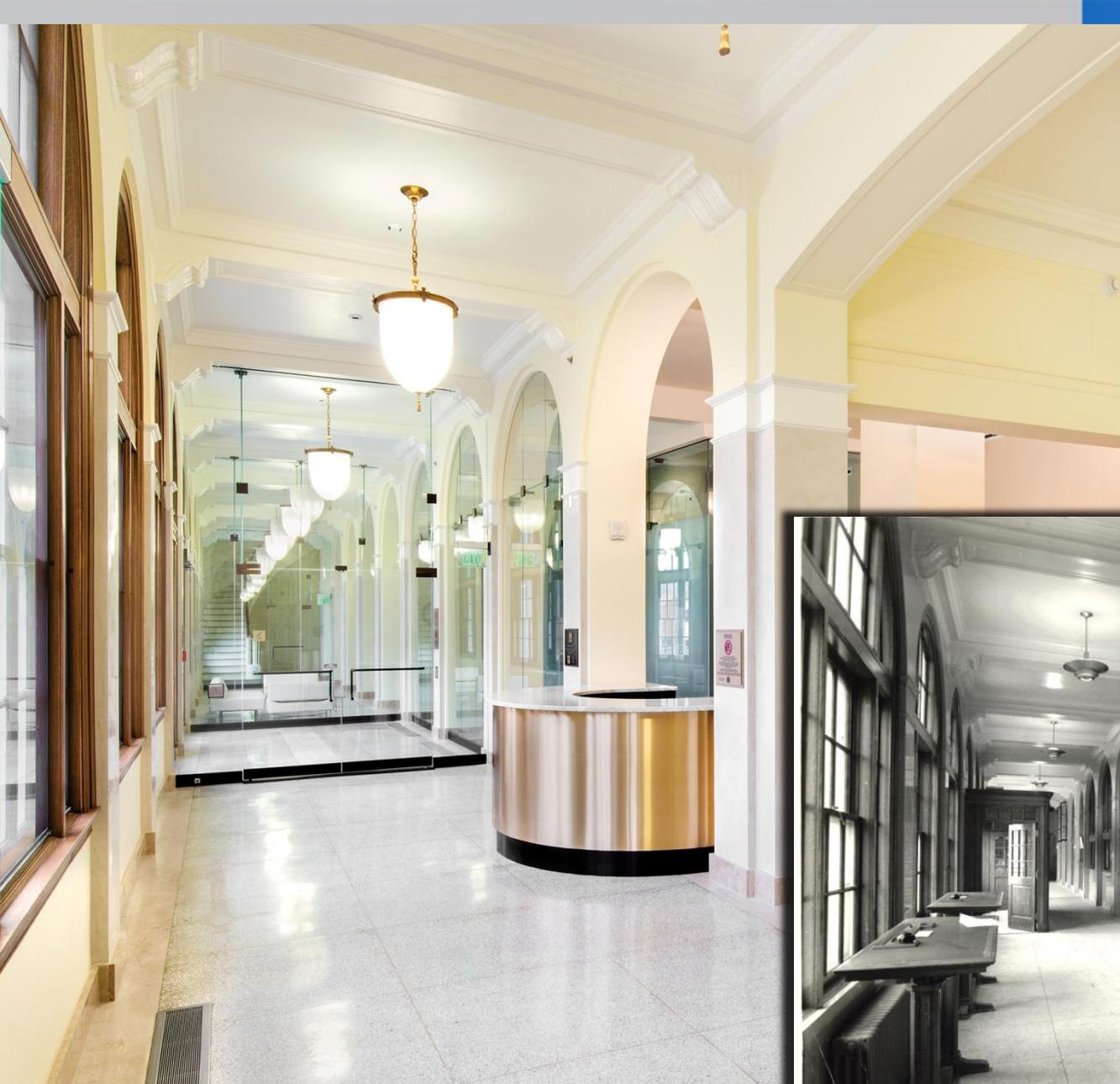
Design High  
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## Sustainability Goals for the Wayne Aspinall Federal Building Modernization:

1. **Net-Zero Energy Building**
2. LEED Platinum  
Awarded LEED Platinum  
certification in September 2013
3. Improved Indoor Environmental  
Quality and Thermal Comfort –  
Increased Zone Control & Air  
Exchange
4. Water Use Reduction – 30%  
Reduction
5. Use of Sustainable Construction  
Practices – 56.4% of Waste  
Recycled
6. Effective Use of Technology for  
Sustainable Design and Historic  
Preservation – Yes.



## Path to Net Zero:

Team to begin tracking net zero in 2014

Since the project reached substantial completion in April 2013, the project team has been analyzing data from the building to fine tune systems to meet or exceed estimated energy performance.

Engineer will assist GSA's property management team in reviewing energy data for the building for 1<sup>st</sup> year post construction.

Tenant education and engagement will play a large role in realizing net zero.

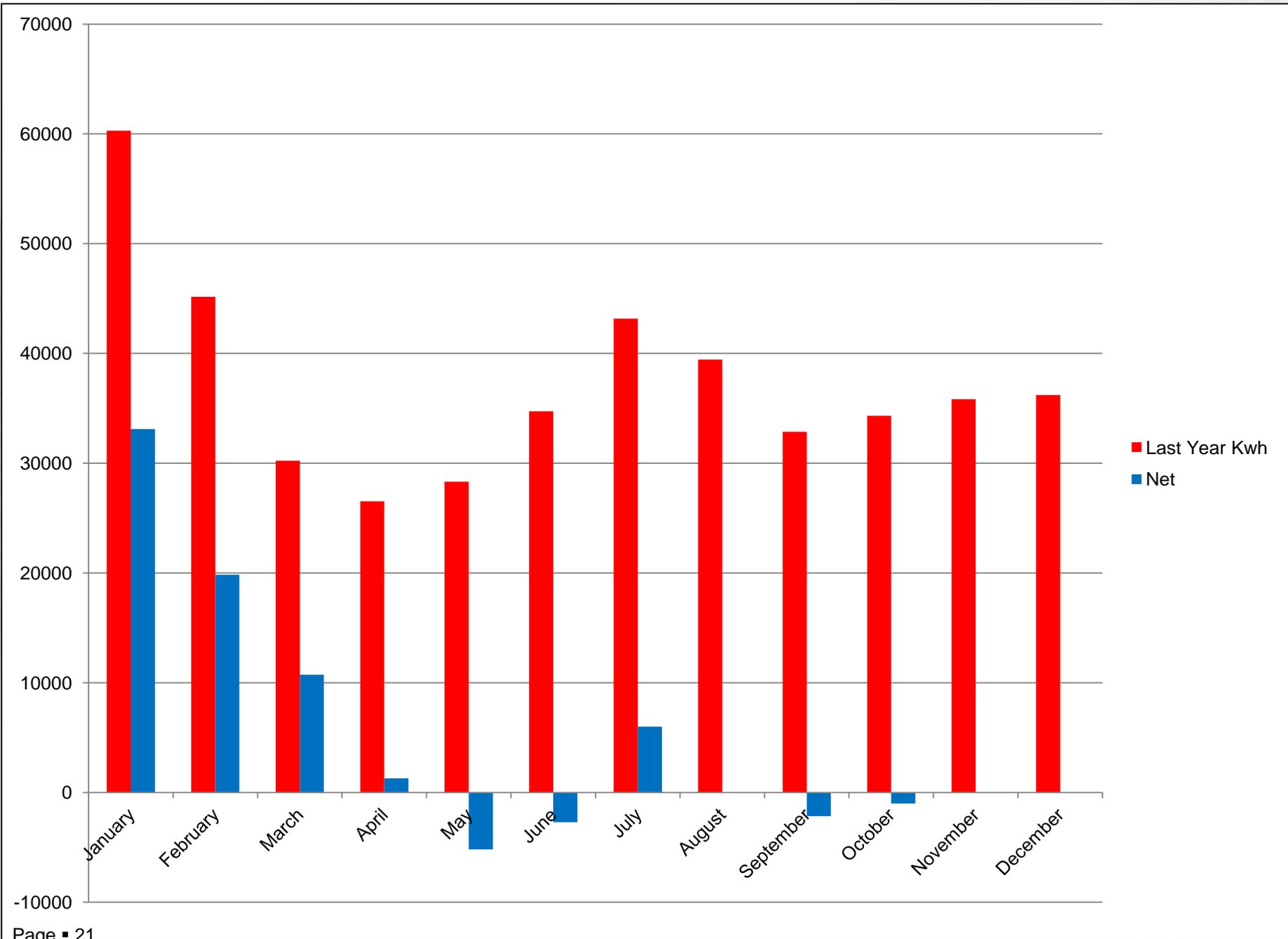
Initiated a "Green Team" made up of tenant representatives to implement building energy conservation measures within their agency.

Developed a guide for the agencies describing how systems within the building work and what they can do to reduce their energy footprint in the building

Built two pricing scenarios to offer financial incentives through modest rent reimbursements taken from the flat utility charge for agencies who meet their annual energy use targets.

Currently the plug load energy demand for the agencies during the daytime is less than predicted in the energy model. Team will focus effort on reducing agency plug loads during nights and weekends to meet energy targets.

As of May 2013, the building is 96% more efficient than the pre-construction building in May 2008. Target is 100% more efficient. The kWh charge from the utility was \$6.10 for the month of May 2013.



Wayne N. Aspinall Federal Building & US Courthouse Modernization

# DISCUSSION

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