



Sukanya Paciorek
Sustainability in Real Estate: Five key trends and what they mean for you
NESEA, Building Energy (BE) 2014

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Northeast Sustainable Energy Association | G338

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Session Description

As head of sustainability at one of the country's largest landlords, Sukanya Paciorek has her finger on the pulse of critical challenges facing large property owners. She will discuss five key industry trends: energy efficiency and the allocation of capital; onsite generation; tenant engagement; public disclosure; and the link between energy efficiency and investor value. She will also share lessons learned based on her experience retrofitting over twenty buildings including ten in Manhattan.

Learning Objectives

1. Sustainability is about people. We need to frame the sustainability discussion in broader terms than just energy: health, resilience
2. Data is important in being able to make informed decisions but we need to create systems that can make it meaningful without unnecessarily encroaching on privacy
3. Getting occupants engaged is critical to successful sustainability programs

Vornado Overview



Second largest U.S. Real Estate Investment Trust (REIT) in enterprise value and equity market capitalization

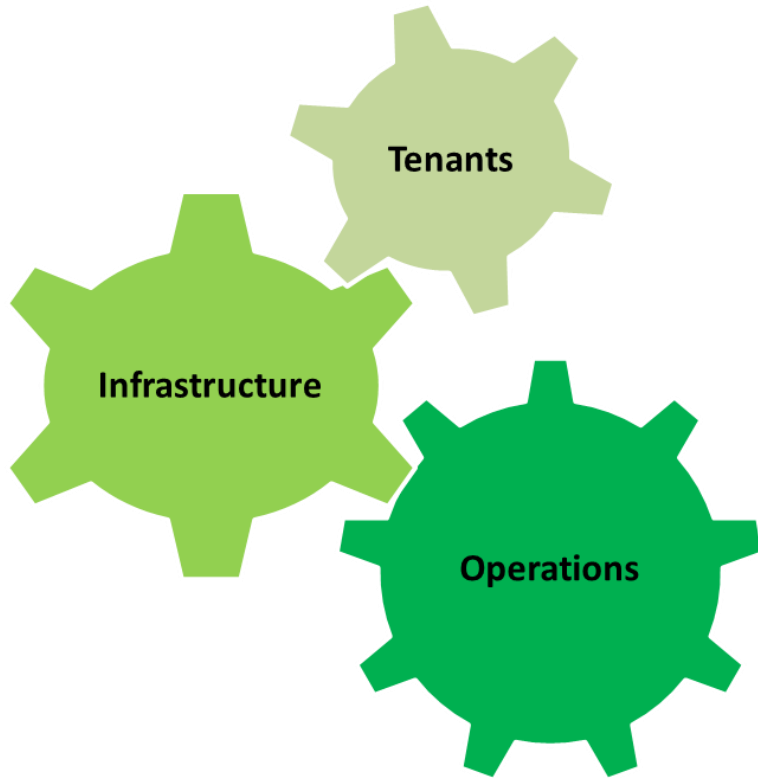
Portfolio of over 100 million sf in owned, controlled and managed assets throughout the U.S, around 28 million sf in New York City

NY Portfolio uses approx. 350 million kilowatt-hours each year making us one of the largest buyers of electricity in the NY ConEdison territory

Five Key Trends and what they mean for you

1. Infrastructure and Technology
2. Big Data
3. Resiliency
4. Health
5. Education & Outreach

Infrastructure/ Technology: Efficient deployment of capital



Big Data: where do you start?

- » Submetering
- » Sophisticated Metering Capacity
- » Interval Date
- » Web-based Tool

Energy Information Portal for Tenants

In 2009, Vornado rolled out its Energy Information Portal (EIP). The EIP is a web-based tool through which submetered tenants will have access to their electricity bill, and their energy usage profiles and data. We believe this tool can help tenants identify and change wasteful energy practices within tenant spaces, lower electricity costs and become more energy efficient.

Between 60-80% of the energy used in our office buildings is consumed by tenants within their spaces. In developing its energy and sustainability program, Vornado has recognized the opportunity to utilize its existing installed base of approximately 2,500 meters by modifying and upgrading the legacy systems to an "interval data" system and creating the EIP.

This upgraded system and the EIP are designed to help tenants, the users of energy, to better understand their energy usage profile and to hopefully induce a "Prius effect" among tenants to move toward energy efficiency and a decrease in energy usage. Additional benefits can result through increased participation in curtailment and demand side management programs and enhance job creation in the energy services industry. As the tenant consumption decreases it will produce cascading benefits by reducing the load on the main building chillers and HVAC systems by virtue of not having to remove the heat that is associated with the larger tenant energy use.

[Energy Information Portal \(EIP\) User Instructions](#) »



Energy Information Portal for Tenants

Vornado's Energy Information Portal is a web-based tool through which submetered tenants can access their energy usage profile and data, a first step toward helping them understand and reduce their energy usage. [LEARN MORE](#) »

Visibility assists with Building Diagnostics (Before)



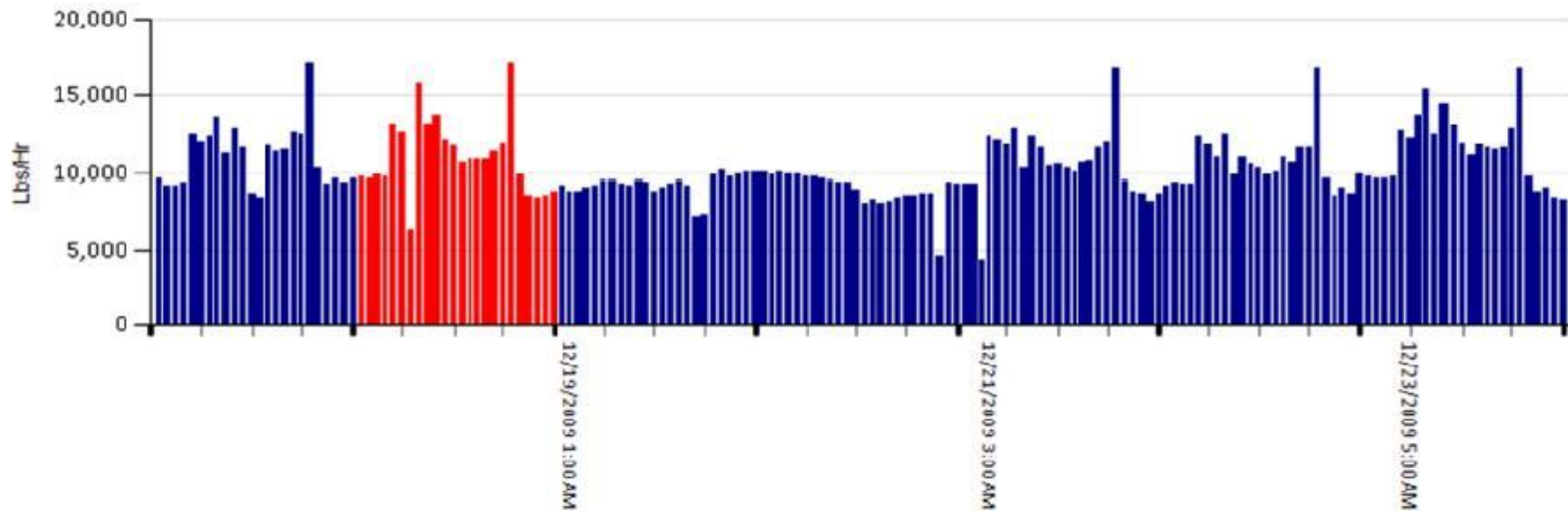
Interval Data Report



Powered By Syntoric Data Management



Hourly Interval Data Summary from : 12/17/2009 to : 12/23/2009 11:45:00 PM



880000.ST

Vornado Realty Trust - Steam

Number of Days	7	Load Factor	55.07 %
On Peak	791,640	Peak Demand	18920.00 Lbs/Hrs
Off Peak	958,820	Peak Date	Friday, December 18, 2009 6:30 PM
Total Lbs	1,750,460	CO2e	

Visibility assists with Building Diagnostics (After)

VORNADO
REALTY TRUST

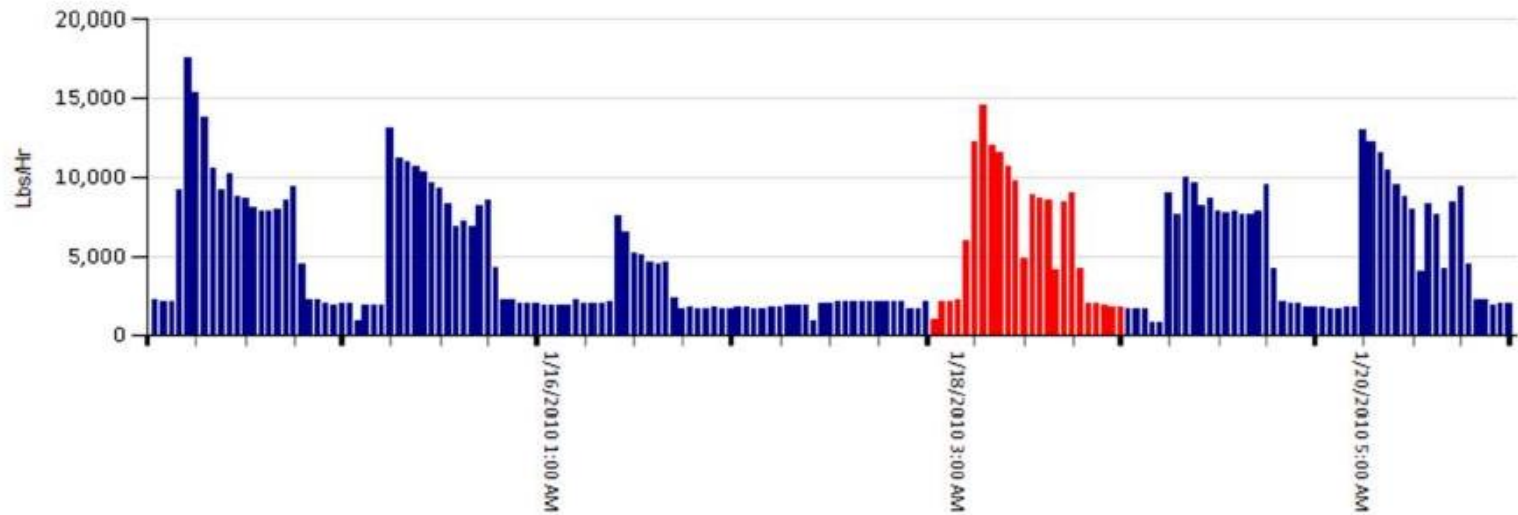
Interval Data Report

E.I.P.
ENERGY INFORMATION PORTAL

Powered By Syntonic Data Management



Hourly Interval Data Summary from : 1/14/2010 to : 1/20/2010 11:45:00 PM

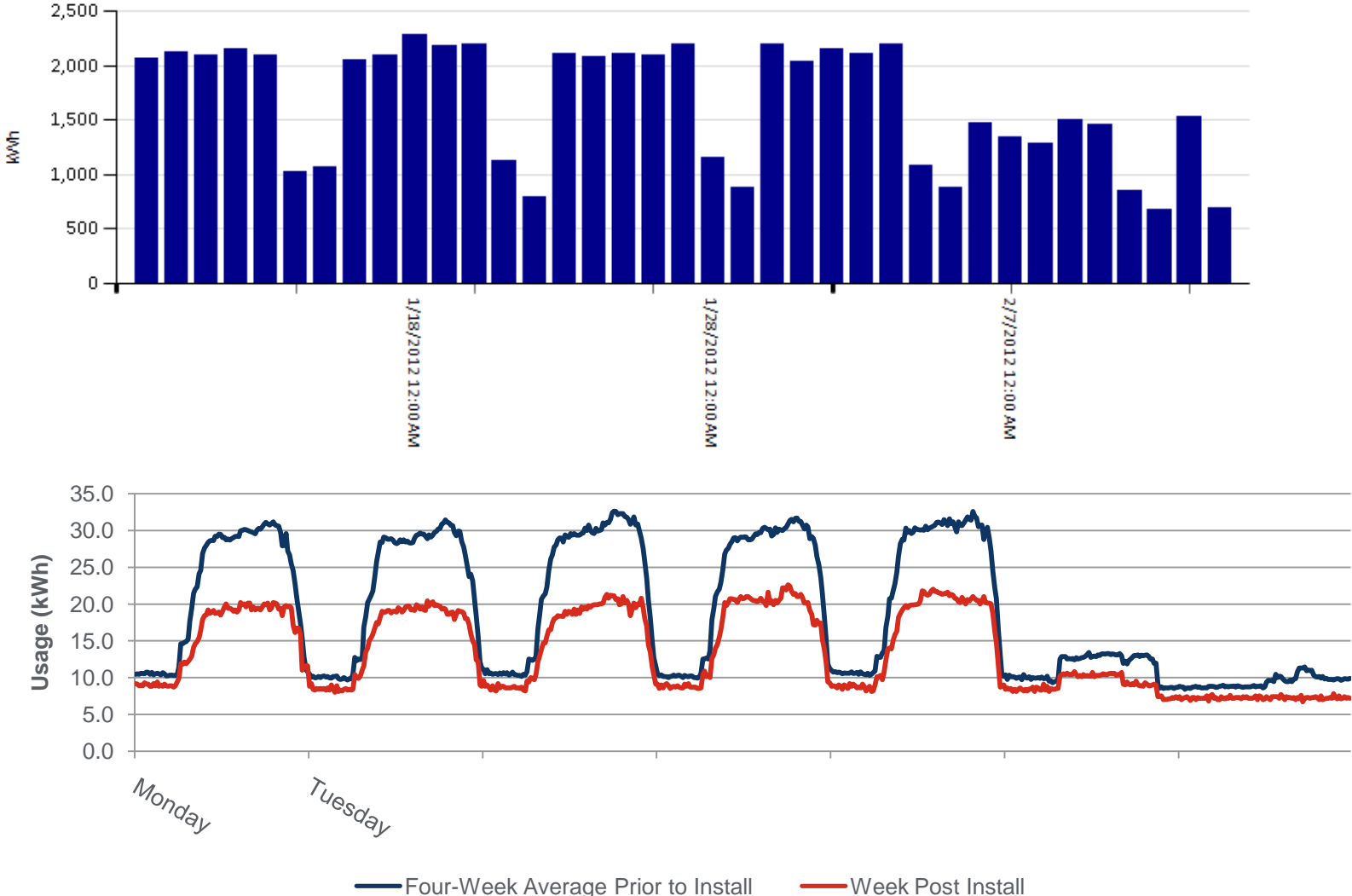


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Vornado Realty Trust - Steam

Number of Days	7	Load Factor	27.94 %
On Peak	471,760	Peak Demand	18140.00 Lbs/Hrs
Off Peak	379,820	Peak Date	Monday, January 18, 2010 5:00 AM
Total Lbs	851,580	CO2e	

Data allows us to M&V projects (LED example)



Big data from cities: Benchmarking



- About
- Cities
- FAQ
- Team
- Recognition
- Media
- Contact

A groundbreaking national initiative to improve the energy efficiency of buildings in 10 major American cities

THE CITY ENERGY PROJECT THEORY OF CHANGE



Engage America's leading cities



Focus on large existing buildings, the biggest energy users



Make it easier to invest in efficiency



Overcome barriers

BETTER BUILDINGS, BETTER CITIES

Resiliency is a key component of sustainability

- If “sustainability” is about long-term risk, resiliency is about mitigating immediate risk
- Shift from focus on long term efficiency solutions to short-term fixes
- Often makes projects with long ROI more feasible
- Integration is key



Onsite Generation and resiliency

- Provides backup power for building tenants
 - Supply security in the event of grid failure
 - Reduces demand for inefficient conventional on-peak generation
 - Generates economic value through superior efficiency & potential environmental/efficiency credits
 - Alleviates constraints in transmission and local distribution
 - Potential for CO2 mitigation
-

Cogeneration System Example



One Penn Plaza is a 2.5 million square foot Midtown Class A Office Tower

The Building has an electric peak demand of around 10 MW, with consumption of approximately 45-50 million kwh/year

Peak Power One 6.2 MW CHP produces 20-25 million kwh/year on-peak power

Project is expected to offset approximately 50% of the building's electric and 20-30% of its steam requirements

Powerplant in a Box



Peak Power One Photos



Solar and fuel cell adaption growing in real estate



Resiliency through integration: Demand Response

Mozilla Firefox

File Edit View History Bookmarks Tools Help

Historical Price Chart - Outlook Web Acce... x <https://seis.sdmonline.com/mtrIntervalData02> x +

sdmonline.com <https://seis.sdmonline.com/SDMRReport.aspx?BuildingId=1&ReportId=2&ReportName=mtrIntervalData02> Google

Norton Safe Search Search Safe Web Identity Safe

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EIP
ENERGY INFORMATION PORTAL

My Account S Paciorek | Logout

Meter Point: 494102118500013 ConEdison View Report

To: 1/25/2012

Next

Summary from: 1/23/2012 12:15:00 AM to: 1/24/2012 11:45:00 PM

Building dropped its peak demand from 8,316 to 5,356 for one hour

Date/Time	Power Demand (Kw)
1/23/2012 9:00 AM	~2,500
1/23/2012 10:00 AM	~3,500
1/23/2012 11:00 AM	~3,500
1/23/2012 12:00 PM	~3,500
1/23/2012 1:00 PM	~4,000
1/23/2012 2:00 PM	~5,500
1/23/2012 3:00 PM	~6,500
1/23/2012 4:00 PM	~7,500
1/23/2012 5:00 PM	~7,500
1/23/2012 6:00 PM	~7,500
1/23/2012 7:00 PM	~7,500
1/23/2012 8:00 PM	~7,500
1/23/2012 9:00 PM	~7,500
1/23/2012 10:00 PM	~7,500
1/23/2012 11:00 PM	~5,500
1/24/2012 12:00 AM	~4,500
1/24/2012 1:00 AM	~4,000
1/24/2012 2:00 AM	~3,500
1/24/2012 3:00 AM	~3,500
1/24/2012 4:00 AM	~3,500
1/24/2012 5:00 AM	~3,500
1/24/2012 6:00 AM	~3,500
1/24/2012 7:00 AM	~3,500
1/24/2012 8:00 AM	~4,000
1/24/2012 9:00 AM	~6,000
1/24/2012 10:00 AM	~7,500
1/24/2012 11:00 AM	~7,500
1/24/2012 12:00 PM	~7,500
1/24/2012 1:00 PM	~7,500
1/24/2012 2:00 PM	~8,316
1/24/2012 2:30 PM	~5,356
1/24/2012 3:00 PM	~7,500
1/24/2012 4:00 PM	~6,000
1/24/2012 5:00 PM	~5,500
1/24/2012 6:00 PM	~4,500
1/24/2012 7:00 PM	~4,000
1/24/2012 8:00 PM	~4,000
1/24/2012 9:00 PM	~4,000
1/24/2012 10:00 PM	~4,000
1/24/2012 11:00 PM	~4,000

01.CONED Vornado Realty Trust / Electric 0.0 Cooling Deg. Days 41.4 Heating Deg. Days

Number of Days	2	Load Factor	65.69%
On Peak	188,580	Peak Demand	8372.00 KW
Off Peak	75,404	Peak Date	Tuesday, January 24, 2012 2:30 PM
Total kWh	263,984	CO2e	97.9 metric Ton

- 150 East 58th street
- 595 Madison Avenue
- 640 Fifth Avenue
- 866 UN Plaza
- Two Penn Plaza
- 770 Broadway
- 888 7th Avenue
- 689 Fifth Avenue
- 90 Park Avenue
- Eleven Penn Plaza
- 909 Third Avenue
- 4 Union Square
- 731 Lexington Avenue
- 350 Park Avenue
- 1540 Broadway
- 478-482 Broadway (C5)
- Vornado Realty Trust NY
- 40 Fulton Street
- 866 UN Reciprocal
- Peak Power One LLC
- Manhattan Mall
- 330 West 34th street

Healthy buildings is the next frontier

What Makes a Building “Sustainable?”



Green Cleaning Maintaining a clean building environment is critical to employee health and the environment. “Green” cleaning standards utilize cleaning best practices with low environmental-impact product lines to ensure a high degree of sustainability. Offices in some of our nation’s top cities have benefitted from the green cleaning services of [BMS Green Clean](#) please visit their web site to get more information about their integrated facility services.

- VORNADO'S SUSTAINABILITY PROGRAMS AND INITIATIVES
- SIGN UP FOR VORNADO GOES GREEN
- SOUND ON
- FULL SCREEN OFF

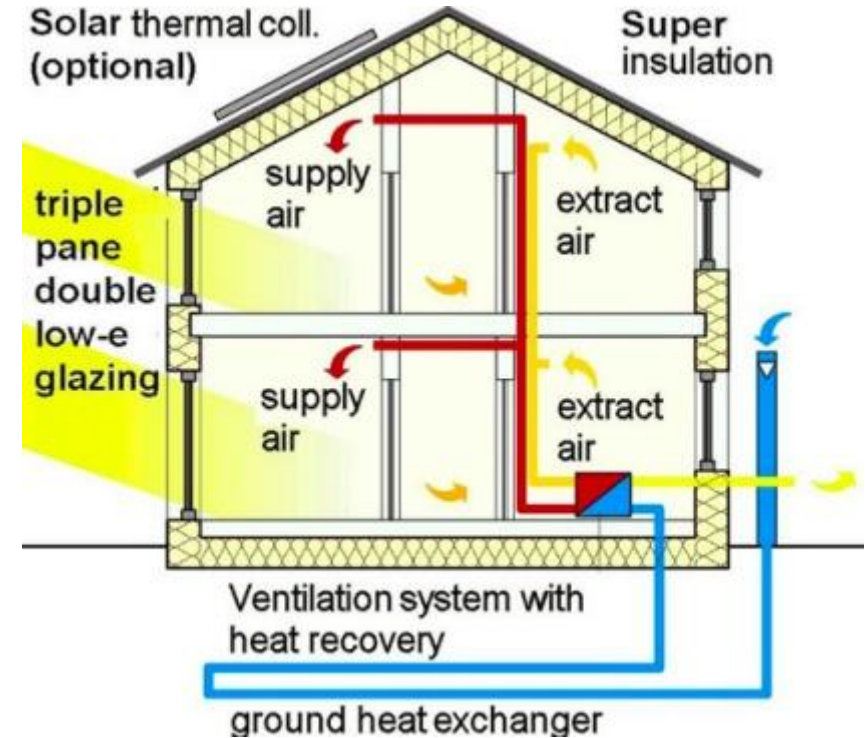
How Can I Help?



Passive house concepts can help change construction



Hudson Passive Project, Passive House NY



Education is critical to a successful sustainability program

- » Staff Training
- » Building Engineers Sustainability and Energy Efficiency Training
- » Quarterly Newsletters
- » Website
- » Tenant Education Seminars
- » Recycling Re-education Program

VORNADO'S ENVIRONMENTAL PUBLICATION

SEPTEMBER 2011

CONGRATULATIONS!

Vornado Realty Trust proudly announces the addition of 8 million square feet to its LEED Certified portfolio with over 6.5 million square feet of LEED Silver Certified properties! Below are the properties certified in 2011:



With over 18 million square feet of LEED Certified space nationwide, Vornado is a leader in sustainable building operations and maintenance. This could not be possible without the hard work and dedication of our building management teams, and the cooperation and encouragement from our world-class tenants.

2011 FIGHT FOR AIR CLIMB! AMERICAN LUNG ASSOCIATION ONE PENN PLAZA

Are you ready for the challenge? Brace yourself for the 57-story, 750-foot Fight for Air climb to the top of One Penn Plaza, in support of the American Lung Association. Individual and corporate participants are invited to join Vornado Realty Trust in January 2012 to help fight against the many hazards to lung health, including second hand smoke, asthma, emphysema and lung cancer. Break out the stairmasters and start training now – we look forward to seeing you in January!

2011 FIGHT
FOR AIR
CLIMB

SUSTAINABLE PROFILE: VARIABLE FREQUENCY DRIVES

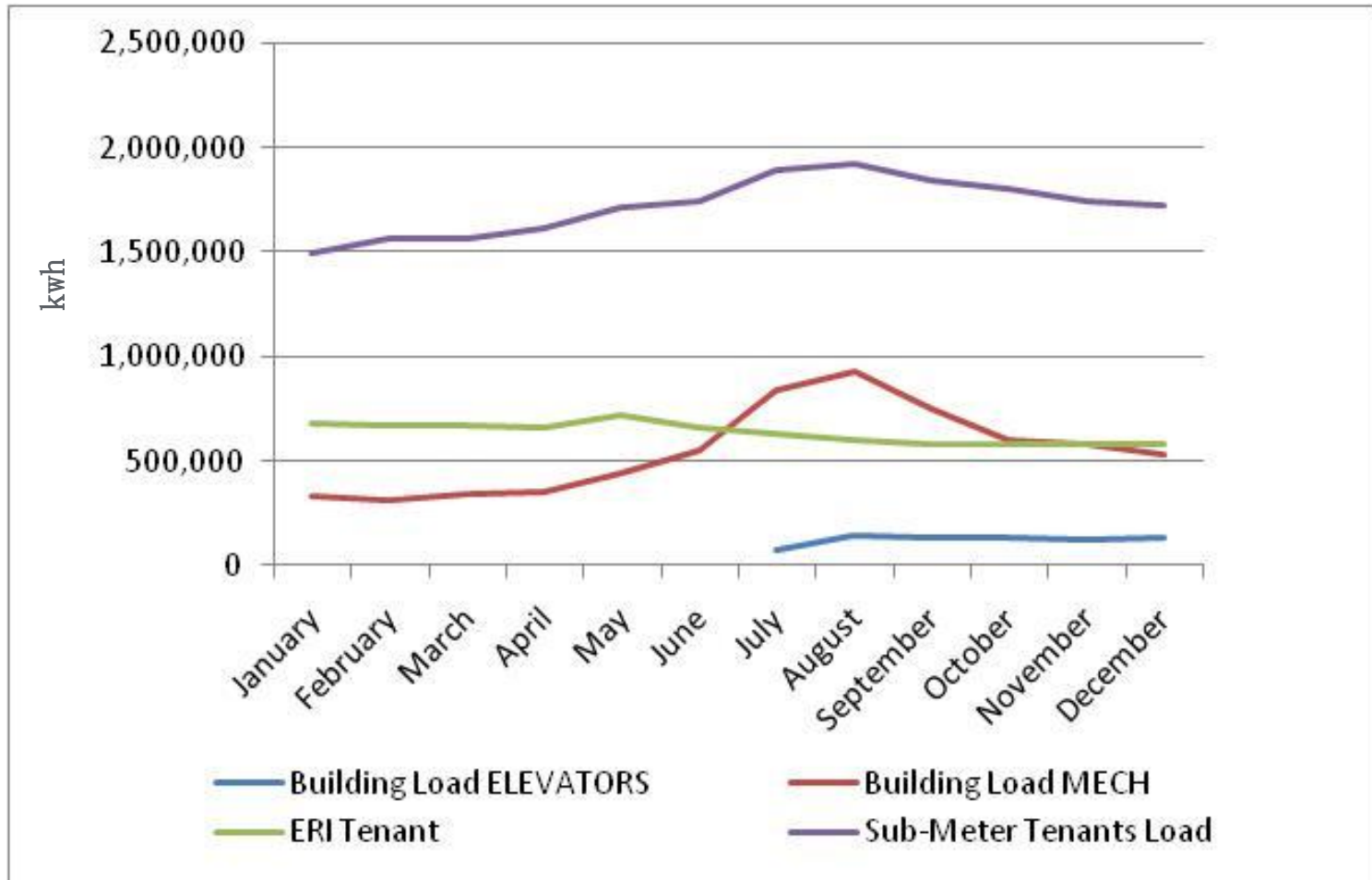
The typical building in New York City is over 50 years old, and was originally designed with a central mechanical plant. These outdated central plants often operate with an "all or nothing" sequence of operations, in that they operate at either very low or very high capacity to heat or cool the building. However, these buildings house a diverse assortment of tenants with varying demands for heat and air conditioning. Central plants are unable to vary the delivery of hot or cold air to the building, and often are over-performing to meet a relatively low demand for heating or cooling.

One solution to this problem is installing variable frequency drives (VFDs) on the supply fans that deliver air from the mechanical plant. VFDs permit the system to control the amount of air being delivered to tenant spaces, thus controlling the amount of energy consumed by the mechanical plant to meet tenant demand.



1740 Broadway recently completed a VFD installation that yielded immediate energy savings. In the winter months following the installation, the building saw a 41% reduction in steam consumption. This reduction also improved the Energy Star score of the building by two points.

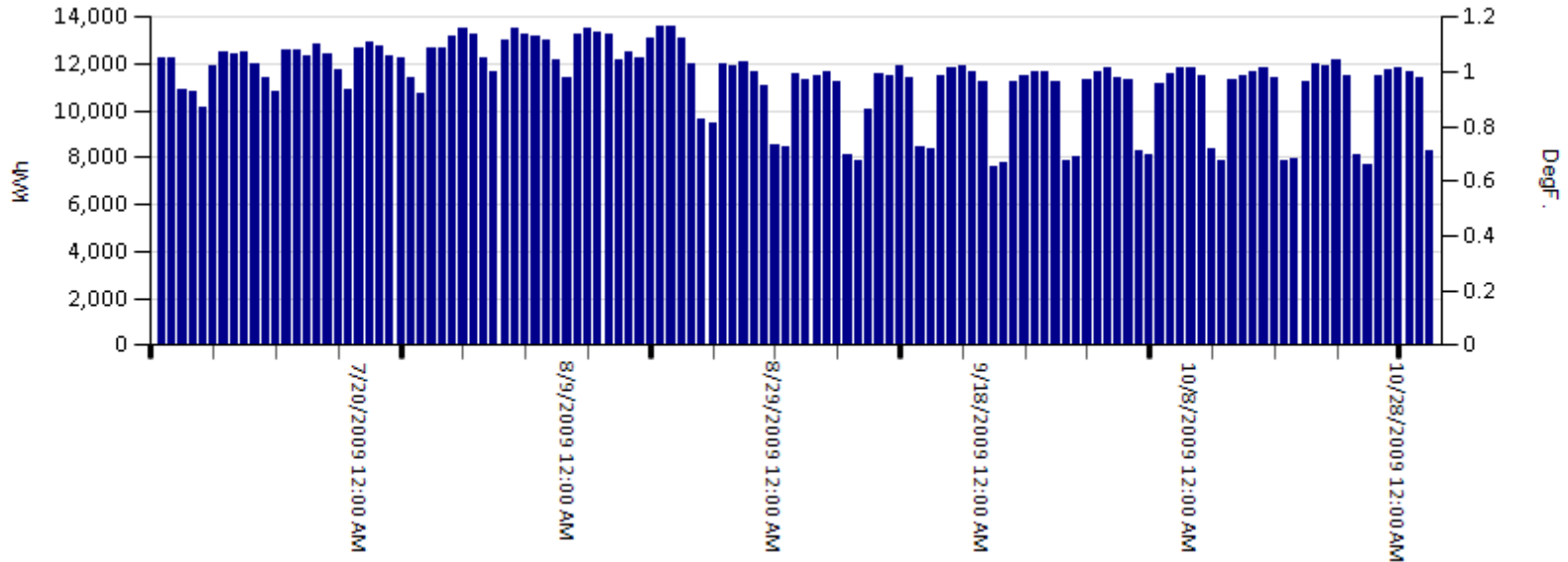
Partnering with occupants is critical



Development of EIP: Tenant Diagnostics

Interval Data Report

Daily Interval Data Summary from : 7/1/2009 12:15:00 AM to : 10/31/2009 11:45:00 PM



Number of Days	123	Load Factor	67.46 %
On Peak	704,930	Peak Demand	701.00 kW
Off Peak	691,125	Peak Date	Thursday, July 30, 2009 3:00 PM
Total kWh	1,396,055	CO2e	517.9 metric Ton

Takeaways

1. Sustainability is about people. We need to frame the sustainability discussion in broader terms than just energy: health, resilience
2. Data is important in being able to make informed decisions but we need to create systems that can make it meaningful without unnecessarily encroaching on privacy
3. Getting occupants engaged is critical to successful sustainability programs

Questions?

This concludes the American
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