

prescriptive data

10 Steps

Carbon Zero Real Estate Operations

Introduction

Increasingly over the last decade, there has been a magnified focus and call for leadership from the world's largest enterprises to bolster their role in slowing the velocity of climate change and mitigating its cascading effects at a planetary, fiduciary, commercial and individual scale.

The Market Need:

- Enterprise commitment to net-zero carbon emission goals has been pervasive across the corporate ecosystem.
- Calls from consumers and investors for transparency around climate impact and emissions have grown increasingly louder.
- Regulatory mandates governing emissions have already entered the largest commercial markets, including state and local laws in the US such as New York's Local Law 97 or California's Cap and Trade Act, and international legislation such as the Kyoto Protocol, European Climate Law, the European Green Deal and the European Union Emissions Trading System.

The Challenge:

Globally pervasive climate-friendly legislation has created an immediate need for corporate entities to decarbonize at scale and with haste, from both an operational and investment perspective. The demand for verifiable progress towards sustainability commitments requires visibility and granularity, which pose a larger challenge for enterprises: data.

NANTUM OS



Nantum OS Solution:

In response to this market challenge, we been working in close collaboration with KPMG and Microsoft to define a comprehensive decarbonization approach that harnesses innovative technology for the enablement of verifiable climate accounting, emissions management, and regulatory compliance.

Our approach is outlined below as a series of sequential and measurable steps, enabling easy visualization of progress.

10 Steps To Scalable Real Estate Decarbonization →

Step 1

Measure Energy Intensity Across Entire Real Estate Portfolio

Getting Started:

- Connect your electric, gas, and steam submeters to Nantum OS for real-time monitoring.
- Integrate your Energy Star Portfolio Manager account with Nantum OS.
- Integrate and visualize historical meter data into Nantum OS.

Taking Action:

- Set and track portfolio-wide energy reduction goals.
- Track and measure your sites' aggregated Monthly energy consumption against actual performance.
- Benchmark your portfolio's Annual performance against the previous year.

NANTUM
RUBIN

February 2, 2021
2:27 PM

PORTFOLIO COCKPIT

SITE LIST

AGGREGATES +

APPS +

MY ACCOUNT +

Portfolio Cockpit
RUBIN

Portfolio Highlights - Last 12 Months

Portfolio Dollar Savings
\$8,780

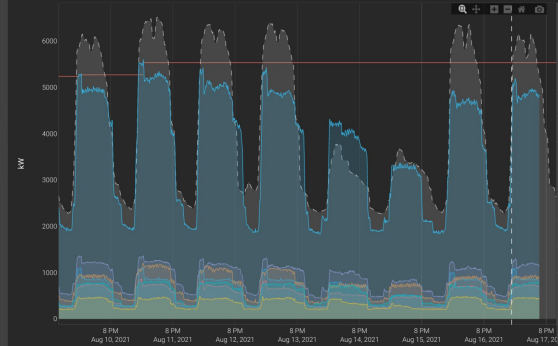
Portfolio Dollar Savings/Sqft
\$0.00

Total GHG Reduction
20
Mtons

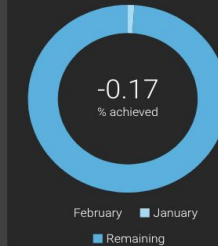
Total Energy Saved
236,004
MBTU

8/10/2021 - 8/17/2021

Today Yesterday Last 7 Days Custom < >

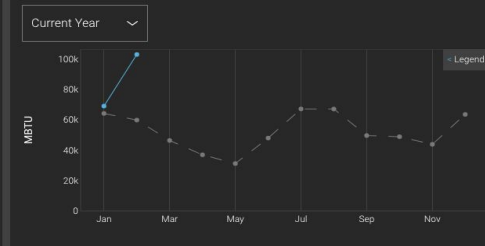


Goal Progress



Gas Consumption

Average Daily Energy Use Per Month



Steam Demand

Step 2

Measure Carbon Emissions Across Entire Real Estate Portfolio

Using your historical and real-time meter and submeter data, Nantum OS:

- Calculates and visualizes your carbon emissions in real-time.
- Visualizes your historical carbon emissions.
- Uses ML to predict your daily, monthly, and annual carbon emissions forecasts for sustainability and ESG planning.
- Understands which of your real estate locations have the highest carbon footprint.
- Compares against internal corporate mandates and carbon emission reduction goals.
- Provides real-time regulatory compliance and exposure analysis.

NANTUM

GHG Emissions ⓘ
345 PARK AVENUE > GHG EMISSIONS

February 2, 2021
2:28 PM EST

33° *

relative humidity: 87%
wet-bulb: 31.3°
wind: 10.19 mph n

*powered by Dark Sky

345 PARK AVENUE [Change](#)

PORTFOLIO COCKPIT

SITE LIST

COCKPIT

ACTIVITY +

DATA TYPE +

SENSORS +

APPS -

Billing

Covid Re-Occupancy

Custom KPIs

Data Export

Dynamic Graphs

GHG Emissions

Measurement & Verification

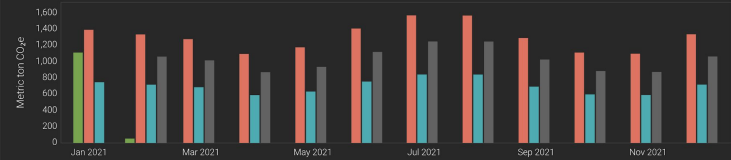
Report Center

Savings Calculator

MY ACCOUNT +

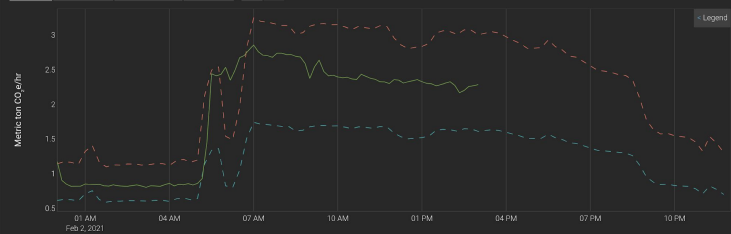
Monthly View

Current Year



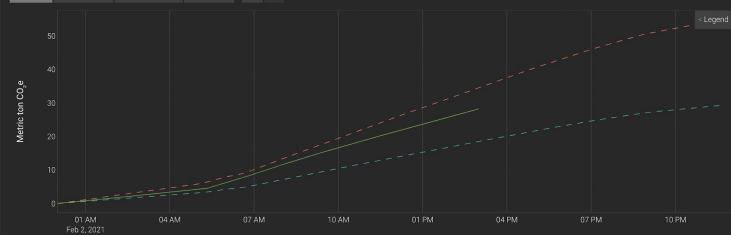
Daily Metric Ton/Hr

Today Yesterday Last 7 Days Custom < >



Daily Metric Ton

Today Yesterday Last 7 Days Custom < >



Step 3

Track All Your Energy Reduction Project ROI In Real-Time

Nantum's Measurement and Verification App allows energy managers, operations teams, and sustainability managers to track and evaluate energy savings projects within your building in real-time.

View project KPIs around energy and dollars savings, GHG reductions, and ROI.

Measure accuracy and efficacy of, and adherence to, energy conservation measures (ECM).

Measure success of energy efficiency projects using IPMVP and ASHRAE Guideline 14 standards incorporating asset grade data (AGD).

NANTUM

Measurement & Verification

345 PARK AVENUE • BUILDING LEVEL • PROJECT DETAILS

June 21, 2017
2:05 PM EDT

84°
relative humidity: 39%
wet-bulb: 66.2"
wind: 10.9 mph w

345 PARK AVENUE Change

PORTFOLIO

COCKPIT

ACTIVITY +

DATA TYPE +

SENSORS +

APPS -

Billing

Custom KPIs

Dynamic Graphs

Report Center

Savings Calculator

Measurement & Verification

MY ACCOUNT +

Project Overview

New Electric Chiller Drives and Waterside Economizer

Nantum OS is the world's most advanced and secure building and portfolio Operating System for commercial and residential real estate. Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud exercitation ullamco laboris nisi ut aliquip ex ea commodo consequat. Duis aute irure dolor in reprehenderit in voluptate velit esse cillum dolore eu fugiat nulla pariatur. Excepteur sint occaecat cupidatat non proident, sunt in culpa qui officia deserunt mollit anim id est laborum.

Project Details

Property	Value
Project Status	Completed
Baseline Start	01/01/2017
Baseline End	12/31/2017
Baseline Method	Weather Normalized
Reporting Period Start	12/11/2017
Reporting Period End	No Data
Project Length (Years)	5

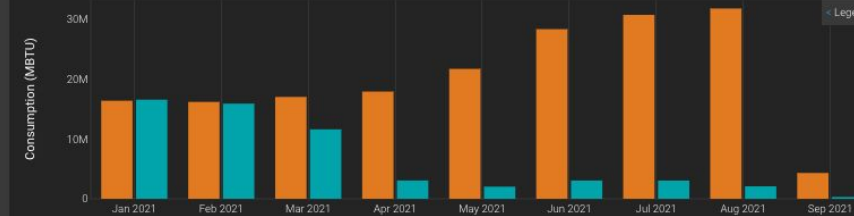
Project Performance

Performance Period: Year To Date

Performance Highlights

Dollar Savings	Dollar Savings/Sqft	Total GHG Reduction	Total Energy Saved
\$3,186,600	\$1.73	7,469 Mtons	126,672,000 MBTU

Baseline Vs. Actual Performance - Total Energy



Step 4

Automated Benchmark Reporting

Analyze and download various energy reports vetted by industry experts. Examples include Monthly composite utility comparison reports, peak electric demand by day, carbon emissions by quarter, and more!

Design Custom Reports: Work with the Prescriptive Data team to customize meaningful reports for you to share with your team.



February 6, 2020
10:55 AM EST

PORTFOLIO OVERVIEW

AGGREGATE UTILITY -

Occupancy N/A
people

Electric Demand 17,125
kW

Electric Consumption 159,610
kWh

Steam Demand 53
Mlbs/hr

Steam Consumption 585
Mlbs

Water Consumption 130,186
Gallons

Natural Gas Consumption 12,345
Therms

APPS +

MY ACCOUNT +

2019 Utility Usage Comparison

345 PARK AVENUE > REPORT CENTER > REPORT VIEW

Report Details	January	February	March	April	May	June	July	August	September	October	November	December	YTD	Year
ELECTRIC														
Consumption, 2019 (kWh)	2,798,400	2,644,090	2,657,090	2,613,850	2,877,600	2,822,830	3,141,990	3,217,720	2,999,900	2,874,140	2,588,050	2,594,070	7,079,570	33,029,200
Consumption, 2018 (kWh)	2,701,240	2,336,030	2,313,600	2,665,940	2,754,630	2,695,640	3,030,730	3,076,130	2,864,010	2,870,690	2,463,260	2,519,870	7,545,380	32,481,900
Net Consumption Change	97,160 3%	-133,750 6%	-143,240 6%	-71,600 3%	-142,860 5%	-127,190 5%	-111,160 4%	-141,570 5%	-34,960 1%	-4,050 0%	-142,800 6%	-40,200 2%	374,190 5%	-1,947,400 6%
Norm Consumption, 2019 (kWh/degree day)	2,629.36	3,521.62	3,209.33	4,937.38	12,654	12,151.66	8,528.47	8,193.84	12,804.77	8,222.94	4,585.31	3,201.39	3,080.59	5,204.21
Norm Consumption, 2018 (kWh/degree day)	2,647.5	2,838.4	3,451.63	8,038.13	11,451.55	10,778.25	6,748.45	9,637.06	13,849.18	11,794.12	3,668.3	2,892.83	2,936.4	5,262.9
Net Norm Consumption Change	18.14 1%	-493.22 18%	-158.3 5%	-3,100.75 39%	-1,202.45 10%	-1,373.41 11%	-1,780.02 21%	-1,443.32 15%	-1,044.41 8%	-3,071.18 26%	-997.01 27%	-308.56 11%	-144.19 5%	-11.31 0%
Peak Demand, 2019 (kW)	5,767	5,960	5,875	6,475	6,817	7,127	7,194	7,239	7,265	6,973	6,561	6,396	6,980	7,265
Peak Demand, 2018 (kW)	5,844	5,555	5,413	5,588	6,801	6,509	6,671	6,691	6,685	6,498	6,180	5,721	5,844	6,821
Net Peak Demand Change	77 1%	-407 7%	-462 8%	-487 8%	4 0%	-468 7%	-523 7%	-548 8%	-580 8%	-174 3%	-381 6%	-475 7%	-118 2%	-444 6%
STEAM														
Consumption, 2019 (Mlbs)	10,852.4	6,743.71	7,955.97	5,058.4	10,840.6	12,071.4	17,228.1	19,071.3	14,143.8	9,308.15	7,359.45	7,792.77	21,920.4	120,066
Consumption, 2018 (Mlbs)	10,447.9	8,112.65	7,308.12	6,016.25	7,991.73	13,135	17,388.8	16,846	11,621.9	6,730.01	5,656.43	7,318.14	25,999.6	118,554
Net Consumption Change	-104.5 1%	-1,370.94 17%	-657.25 9%	-57.85 1%	-2,957.87 37%	-163.4 1%	-100.7 0%	-2,225.3 13%	-2,521.9 18%	-2,578.14 28%	-1,613.02 22%	-475.63 6%	699.2 3%	-11,441 10%
Norm Consumption, 2018 (Mlbs/degree day)	9.91	9.64	9.91	11.26	48.15	55.84	46.79	48.56	62.47	31.39	9.77	8.84	20.53	10.28
Norm Consumption, 2019 (Mlbs/degree day)	19.24	9.88	10.08	18.01	52.52	33.47	38.61	52.78	56.2	27.65	8.46	8.42	10.08	19.28
Net Norm Consumption Change	9.33 9%	-0.74 8%	0.17 2%	6.75 60%	-14.68 30%	-3.32 6%	-8.18 17%	4.22 8%	-4.27 10%	-1.02 3%	-3.95 45%	-1.35 16%	0.24 3%	-1.25 6%
Peak Demand, 2019 (Mlbs/hr)	38.98	29.32	29.2	31.75	56.45	65.05	110.73	79.98	72.02	48.45	42	30.51	35.98	110.73
Peak Demand, 2018 (Mlbs/hr)	34.98	31.07	31.38	38.13	46.73	64.8	66.25	66.13	62.02	61.3	32.48	30.68	31.68	66.25
Net Peak Demand Change	-1 3%	-1.75 5%	-2.18 6%	-7.38 20%	-9.72 21%	-9.23 14%	-44.48 66%	-4.85 7%	-16.58 21%	-12.83 21%	-4.92 15%	0.18 0%	-1.99 6%	-44.48 66%
WATER														
Consumption, 2019 (Gallons)	1,720,980	1,816,340	1,160,720	2,091,400	3,834,990	4,237,610	5,480,380	6,977,140	4,299,400	3,331,380	1,847,240	1,497,580	4,997,580	23,376,500
Consumption, 2018 (Gallons)	1,800,450	1,488,110	1,062,070	2,025,160	3,070,050	4,184,070	5,447,560	4,844,380	4,011,990	3,076,340	1,902,450	1,748,960	5,251,130	38,061,700
Net Consumption Change	-80,370 5%	-28,190 2%	201,850 19%	-433,760 21%	-966,440 16%	-73,580 2%	-2,620 0%	-1,132,760 15%	-287,810 7%	-255,040 6%	-35,900 2%	-281,260 16%	254,080 5%	-1,314,800 4%
HEATING/COOLING DAYS														
Total Degree Days, 2019	1,064.3	699.7	806.8	529.4	227.4	233.3	368.4	392.7	226.4	349.6	638.4	797.8	2,570.8	6,333.2
Total Degree Days, 2018	1,020.3	821	728.3	334.1	238.8	250.1	449.1	319.2	296.8	243.4	668.4	869	2,569.6	6,148.5
Net Total Degree Day Change	44 4%	-121.3 15%	-78.5 11%	-195.3 57%	-11.4 5%	-17.8 8%	80.7 20%	-73.5 23%	-19.6 7%	-106.2 43%	30 4%	-71.2 8%	-1.2 0%	-184.7 3%
Avg Temperature, 2019 (F)	38.66	43.22	38.94	47.81	65.28	70.71	76.8	77.66	70.34	59.93	41.92	39.27	36.49	54.96
Avg Temperature, 2018 (F)	32.08	39.68	41.38	54.86	62.72	72.24	79.48	75.07	69.74	56.44	43	36.97	36.41	55.3
Min/Max Temperature, 2019 (F)	3,764.16	15,8376.04	27,0758.38	30,9179.54	46,2591.06	51,7791.23	50,9499.92	63,0593.34	52,7691.97	35,3679.92	13,8499.74	22,9259.56	3,778.04	3,793.92
Min/Max Temperature, 2018 (F)	2,9837.71	10,11664.08	17,8669.80	33,5878.79	43,0298.81	53,4392.25	64,3898.54	59,7990.64	49,1398.15	39,6398.61	22,2570	15,9567	2,0869.83	2,0869.54

Step 5

Integrate Solar, On-Site Generation, Fuel Cell & Battery Storage

Nantum connects to revenue grade meters directly from solar, wind, and on-site building batteries / thermal storage.

Nantum allows sustainability teams to see how much energy has been generated daily, monthly, and annually.

Nantum can benchmark the energy generated as well as use past performance to provide generation predictions.

On-site generation allows Nantum to automate load shedding during high demand or demand response periods. It also allows for automated cost reduction when purchasing and storing energy during low price periods.

October 22, 2020
5:43 PM EDT

66° ☁

relative humidity: 93%
wet-bulb: 65°
wind: 1.64 mph se
*Powered by Dark Sky

345 PARK AVENUE [Change](#)

PORTFOLIO

COCKPIT

ACTIVITY +

DATA TYPE +

SENSORS +

APPS +

MY ACCOUNT +

Generation KPIs



Generated

18,638,800
kWh

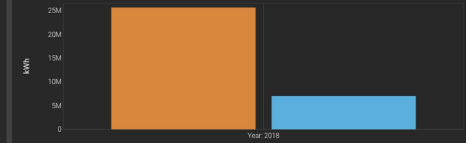


GHG Equivalent

5,386
metric ton

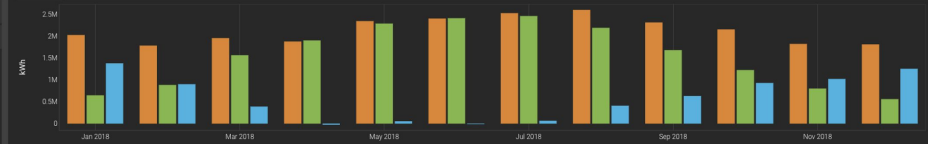
Total Consumption Vs. Utility Consumption (Yearly)

2018



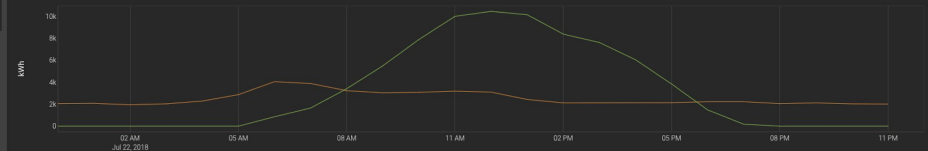
Total Consumption Vs. Utility Consumption (Monthly)

2018



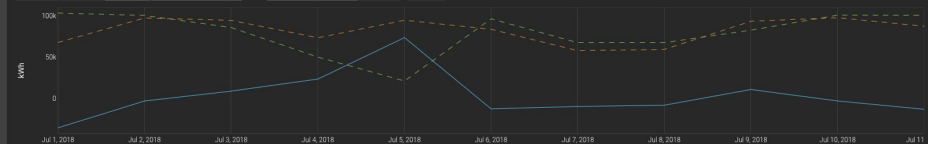
Total Consumption Vs. Total Generation

Custom 07/22/2018 TO 07/22/2018 Search < >



Total Consumption Vs. Utility Consumption (Daily)

Last 30 Last 90 Custom 07/01/2018 TO 07/11/2018 Search < >



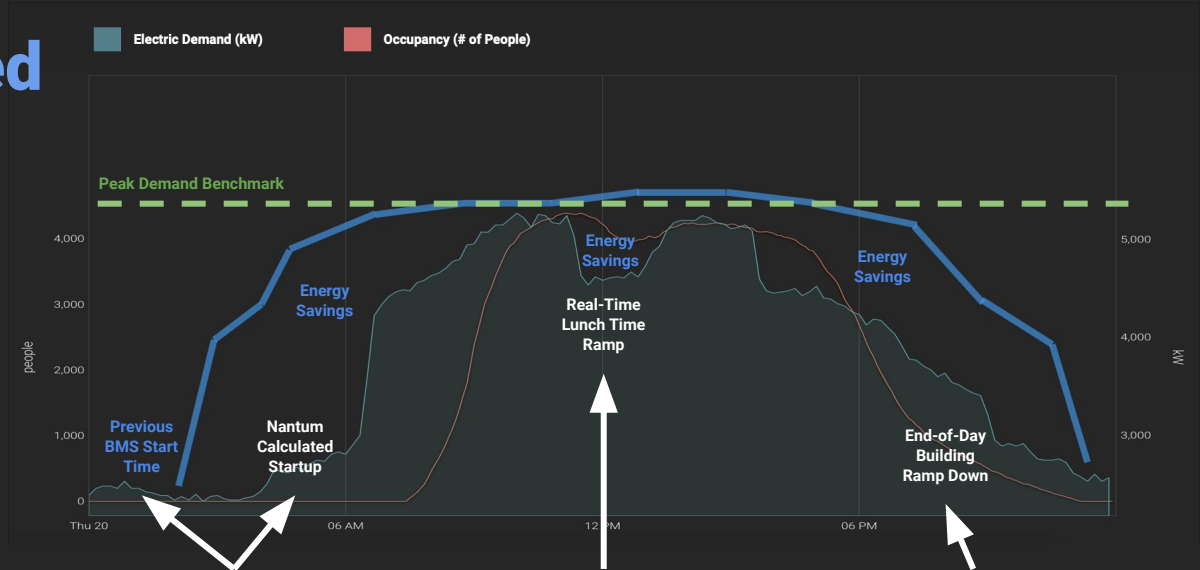
A.I. Occupancy-Based Energy Reduction Automation (ECMs)

Connect:

- BMS [or] Wifi Thermostats
- Occupancy sensors [or] Access Control
- Interior Temperature Sensors
- Indoor Air Quality Sensors

Nantum OS uses artificial intelligence and machine learning to automate spaces using the least amount of energy to maximize occupant comfort.

- ML Prediction of occupant arrival and departure times (including lunchtime).
- Only cool or heat spaces that have actual people in them.



Calculated Startup

Nantum looks at historical BMS performance, occupancy data, and weather prediction to provide a recommended (or automated) building startup time. Use the least amount of energy to reach interior comfort.

Mid-Day Ramps

Nantum correlates building occupancy with BMS setpoints and fan speeds to reduce building energy usage. As occupants leave and enter the building, Nantum adjusts your BMS.

End Of Day Ramp Down

Nantum correlates a building's thermal inertia with end of day occupancy, to ramp down the BMS as people leave the building, all in real-time.

Step 7

Automate Peak Demand Charge Avoidance

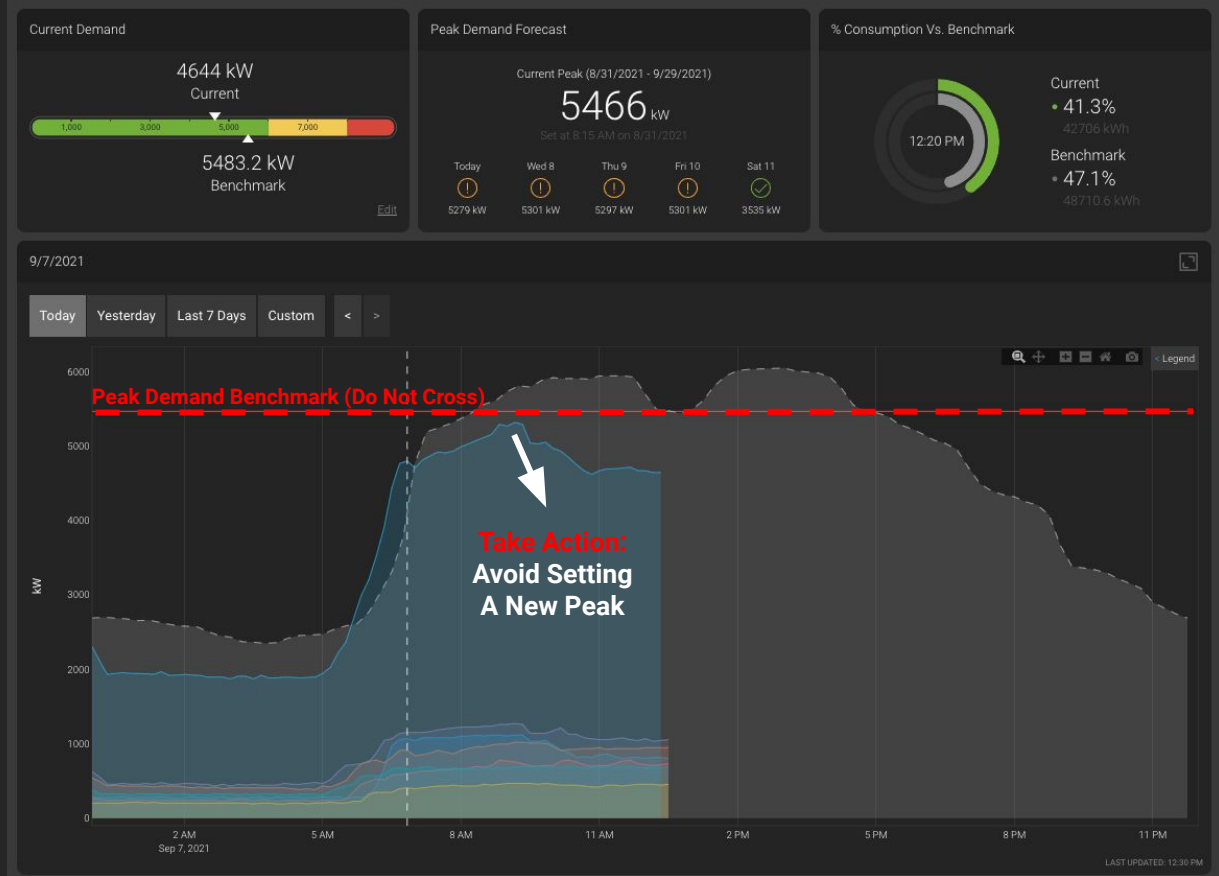
Nantum OS helps real estate operators reduce peak demand charges, which typically represent more than 50% of the average monthly electric bill.

Real Estate and Sustainability teams can:

- Visualize Electric Peak Demand Benchmark (the do not cross this line) in real-time.
- Customize and design automation rules that limit peak demand charges without compromising occupancy comfort.

Electric Demand
345 PARK AVENUE - DATA DETAIL

Rename Graph



Step 8

Automate Portfolio Demand Response Programs

Facilitate and streamline your manual demand response efforts with Nantum's ADR app to maximize your demand response revenue.

Leveraging the OpenADR Protocol, Nantum ADR allows you to track and manage your portfolio's demand response efforts in a single view.

- Define a unique automation program for your sites based on building audits conducted by certified energy professionals.
- Automate demand response programming and see DR events trigger and execute based on the utility's signal.

February 6, 2020
10:55 AM EST

PORTFOLIO OVERVIEW

AGGREGATE UTILITY

Occupancy	N/A
	people
Electric Demand	17,125
	kW
Electric Consumption	159,610
	kWh
Steam Demand	53
	Mlbs/hr
Steam Consumption	585
	Mlbs
Water Consumption	130,186
	Gallons
Natural Gas Consumption	12,345
	Therms

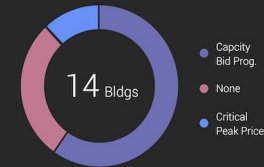
APPS

- Demand Response
- Report Center
- Savings Calculator

MY ACCOUNT

Portfolio Summary

Participating Program by Type



Demand Response Savings YTD



LOAD REDUCTION

695 kW



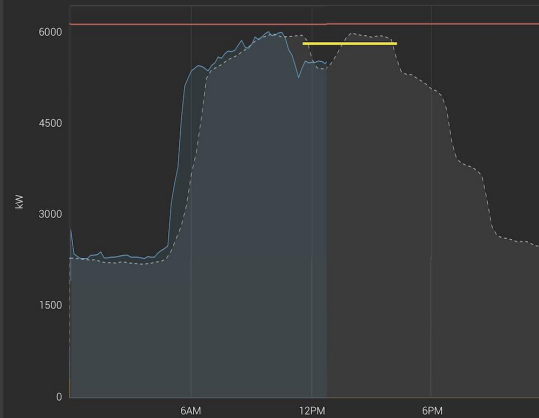
DOLLAR SAVINGS

\$99,014

Commitment Factors

Parameters	Values
Committed Load Shed (kW)	75
Price (\$ per kW)	10
Performance Factor (%)	33
Est. Total Settlement (\$)	250

Event Summary



DR Event Schedule

REMAINING TIME

3 hr 12 min

- Stage 1: Tenant Lighting (Executed (11:31 AM))
- Stage 2: Lobby Lighting (Executed (12:08 PM))
- Stage 3: Ground Elevators (Unscheduled)
- Stage 4: Ramp AHUs to 90% (Unscheduled)
- Stage 5: Lower Demand for Chillers (Unscheduled)
- Stage 6: Ramp AHUs to 80% (Unscheduled)

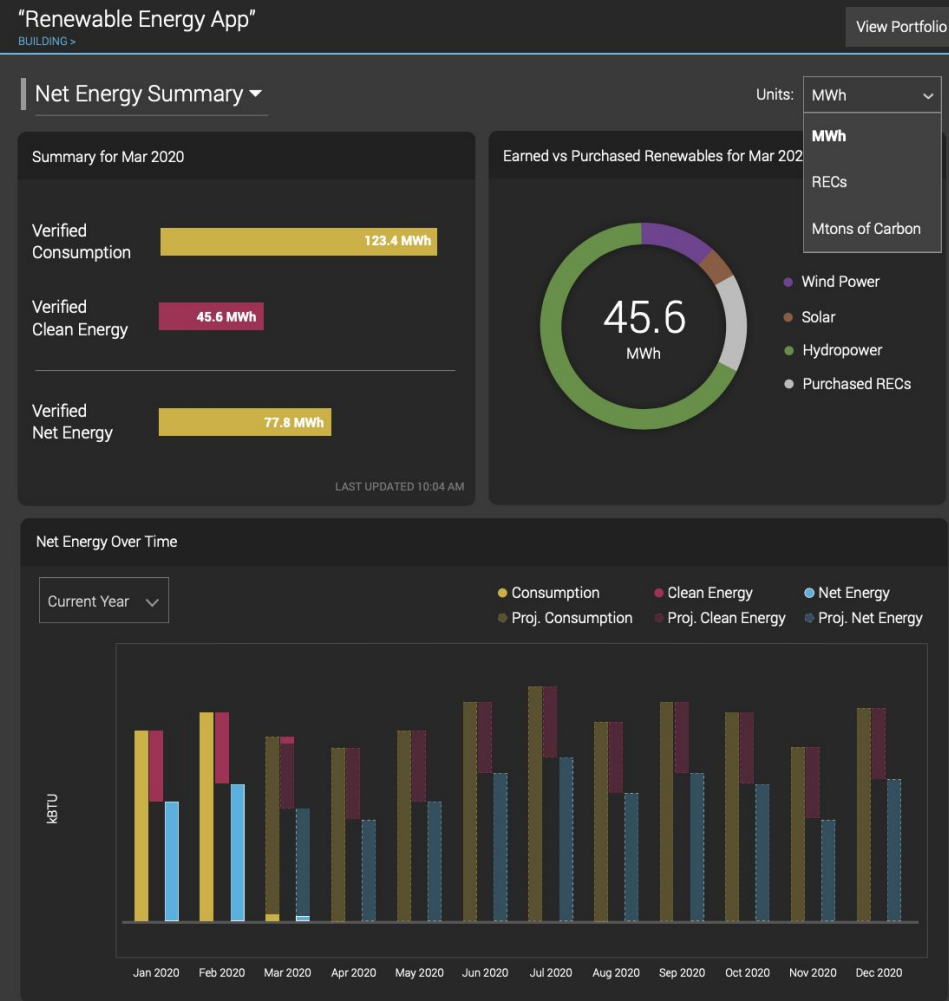
Description: Lorem ipsum dolor sit amet, consectetur adipiscing elit, sed do eiusmod tempor incididunt ut labore et dolore magna aliqua. Ut enim ad minim veniam, quis nostrud ullamco.

Step 9

Procure Renewable Energy & Create Renewable Energy Credits (RECs)

Through the KPMG CAI consortium, Nantum OS allows users to visualize energy generation traced back to its original source as well as the amount of RECs that have been purchased over a specific period of time.

The RECs can be matched with demand / consumption data to help solve challenges around Net Zero Carbon, and more specifically in NYC, Local Law 97 to help buildings get under LL97 thresholds or be fully dependent on renewable energy.



Carbon Zero Validation With KPMG Carbon Accounting

Project Description

Implementing KPMG's Climate Accounting Infrastructure (CAI) to capture provable environmental data from real estate to measure energy consumption to facilitate energy optimization, energy cost reduction, purchase renewables, estimate emissions, and enable accurate environmental reporting to internal and external stakeholders following standards such as SASB, TCFD and New York City's Climate Mobilization act (Local Law 97)

Approach

- Develop the methodology to capture near-real time data from building management systems, utility meters, utilities, renewable assets, enterprise systems, and others third party data providers
- Deploy CAI on client's cloud infrastructure to integrate data from IT-OT systems at the individual client buildings for measuring energy consumption and supplied energy mix
- Estimate carbon footprint at the individual building and the portfolio level considering consumption of different natural resources, onsite electricity generation, offsite electricity, energy mix, and earn and burn of offsets
- Enable the tracking of client progress toward decarbonization goals and disclosure reporting in compliance to regulations and industry standards

Success Factors

- Measure carbon footprint at the building and portfolio level
- Lower the cost of building operations and emissions through energy efficiency, energy cost optimization, transition to renewables, and retrofiting
- Enable the path to tokenize renewable energy certificate and trade credits with and across the portfolio

Climate Risks

"Enable visibility into economic losses that impact capitalization and help avoid insolvency"

Standards (Disclosures)

"Report emissions footprint to key stakeholders"

Energy Transition

"Lower energy cost and transition to renewables across portfolio"

Emissions Offsets

"Derive paths to prevent, reduce, eliminate or remove emissions from an enterprise footprint"

Regulations

"Compliance to regulatory disclosure needs and lower carbon liabilities (Taxes)"

Emissions Footprint

"Measure energy consumption and operational efficiency of real estate to lower carbon footprint and operating cost"

Energy Demand



Consumption Assets

Energy Supply



Generation Assets (Onsite/ Offsite)

Schedule Demo

Gary Chance

VP, Marketing & Partnerships

Gary@PrescriptiveData.io

www.PrescriptiveData.io