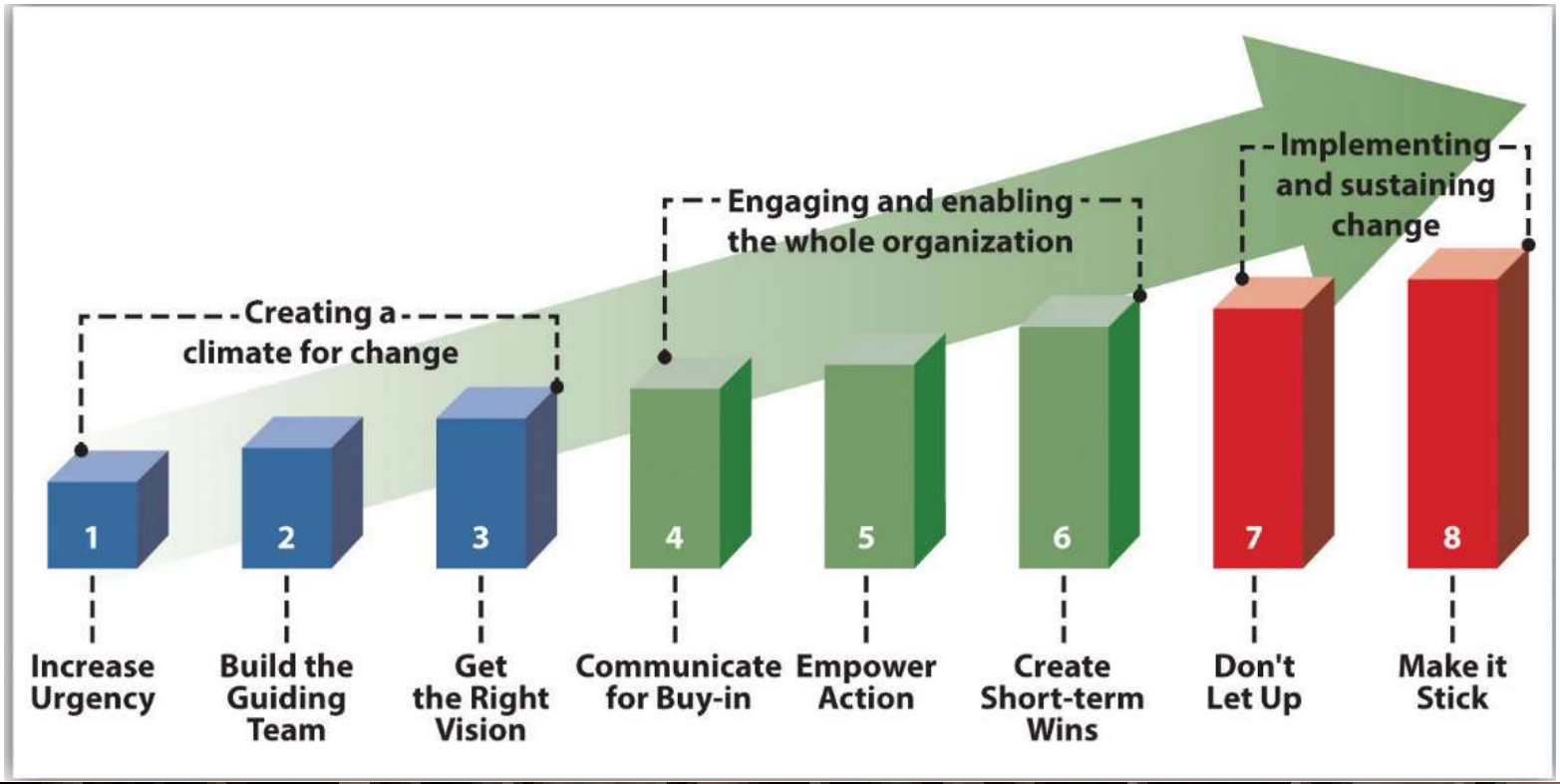
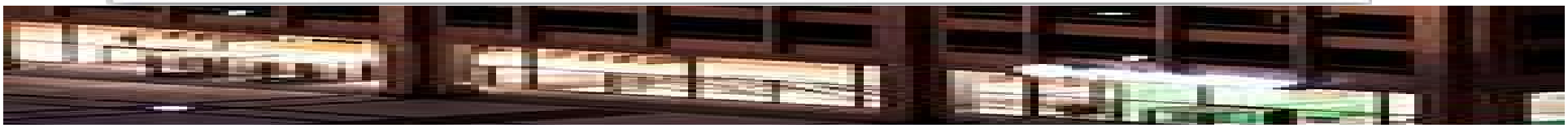

Zeller Realty Group
311 S Wacker Smart Building Case Study
Consolato Gattuso
Senior Vice President

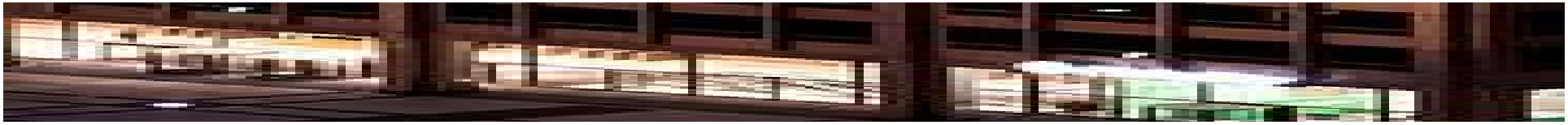
Everything is Change Management





Site Overview

- 311 S Wacker Drive
- 7th tallest building in Chicago
- Second largest concrete Structure in the world
- 67 floors
- 1.4 million ft2
- 14,000,000 kWh per year Base Building
- Multitenant commercial office building

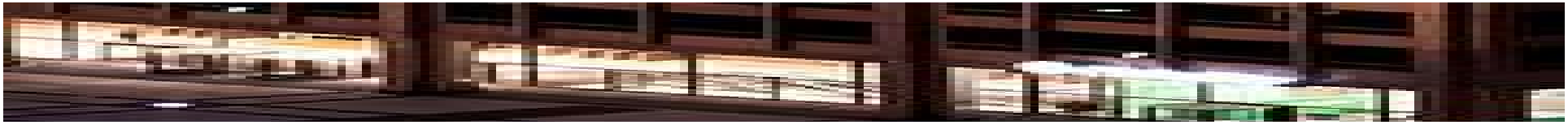


Site Overview

- Automation is Pneumatic
- Pneumatics disarray over time
- 944 Fan Powered Boxes
- Night Setback not operational 80% of the building
- Older BAS, somewhat open

Simple Question, Not So Simple Answer

- Rework pneumatics on each floor
  $30,000/Floor or $1.7 MM
- Convert all Fan Powered Boxes to DDC and bring signal back to BAS
  $2 Million Plus
- Convert thermostats to wireless and bring signal back to BAS
  Least cost solution but possible communication issues (~ $600,000)



What to do with the DATA

New influx of Data allows us

- Temperature in every space
- Every box damper position

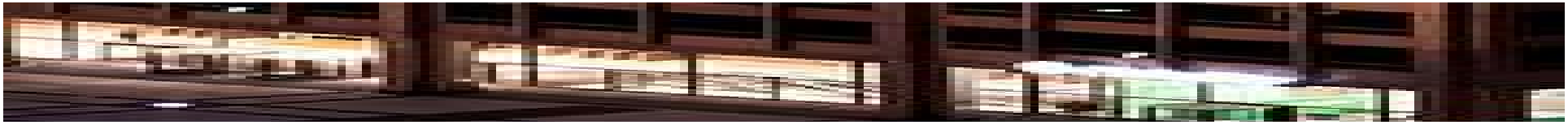
Cloud based Optimization :Air Handlers

- Real Time Static Pressure reset
- Real Time Discharge Temperature reset
- Optimized Start/Stop
- Identify problem areas/equipment

And… Our original Goal Night Setback

Cloud based Optimization :Chiller Cooling Tower

- Real Time Optimized Start/Stop
- Real Time Chilled Water reset
- Real Time Condenser Water reset
- Real Time control of cooling tower fans based on wet bulb temperature
- Identification of issues with the chiller plant

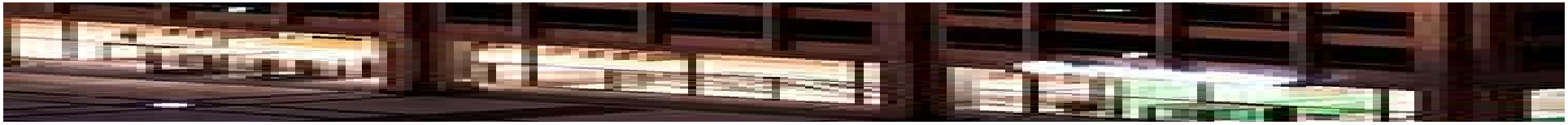


Estimate of Energy Savings

311 S. Wacker Drive WPT + IntelliCommand Energy Savings Estimate

SUMMARY

Savings Strategy	Est. Reduction of HVAC Energy Consumption	kWh Savings	$ Savings @ $0.10 per kWh	Comments
Programmable Setback (Reheat)	9%	710,107	$71,011	See Reheat Setback model
Duct Static Pressure Reset	6%	501,671	$50,167	See Duct Static Reset sheet
Optimal Start/Stop	3%	222,965	$22,296	See Optimal Start/Stop sheet
Deadband Setpoints	4%	321,069	$32,107	See Deadband setpoint sheet
Supply Air Temp Reset	2%	144,481	$14,448	See Supply Air Temp sheet
Setpoint Enforcement/Auto Calibration	3%	240,802	$24,080	Based on empirical data from other projects
Total	26.7%	2,141,095	$214,110	



Project cost

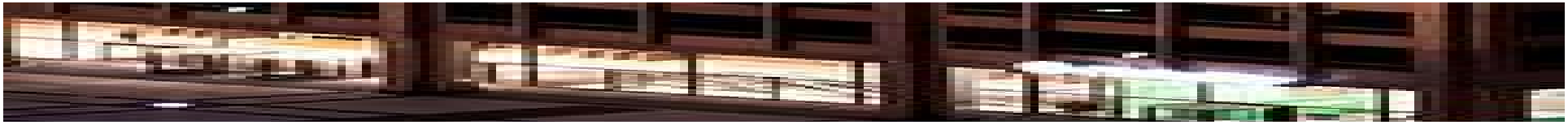
Wireless thermostats and network
Smart Building system
Modifications to BAS for BacNet
In-house installation of Thermostats (Engineers on Overtime)
Electrical installation of network and electrical connection

$800,000 3.75 Years

Simple Payback

ComEd Rebate

$380,000 ~2 Years



Issues…. You Bet

Installation

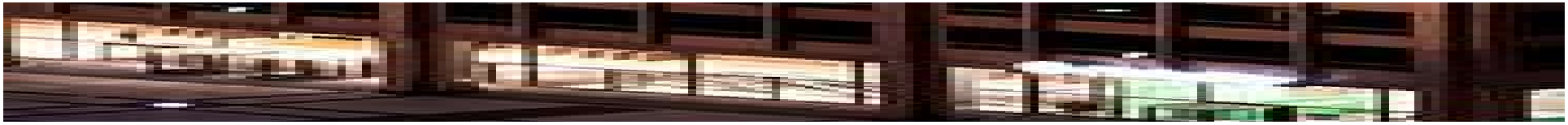
- Needed a Booster antenna for IntelliCommand
- Needed additional BCx Boxes for the BAS
- Half the T'Stats needed a firmware update

After the Install

- Educating tenants on new thermostats
- Dealing with Tenants insisting on 55 F
- Software tweaks… Three systems
- Lots of concrete… Wireless System No Bueno at first

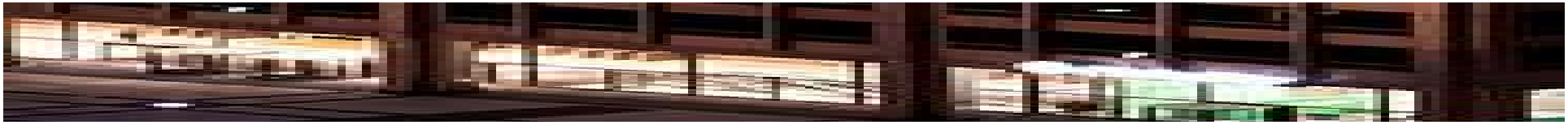
Results

- Air handler Static Pressure was reduced from 2.4 inches to .8 inches
- Chiller Plant Bypass issue was found and corrected
- Equipment found running 24/7
- Found blown Chiller fuse prior to complaints
- Overcooling issue found on chiller

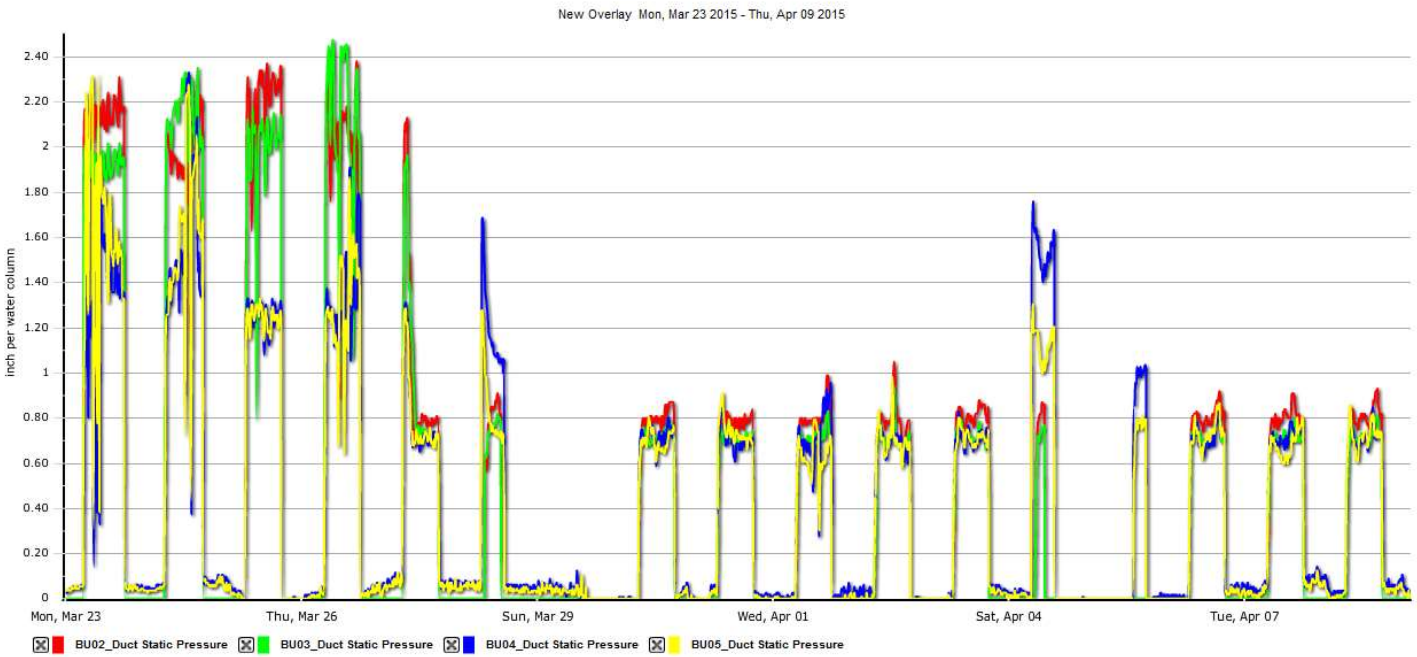


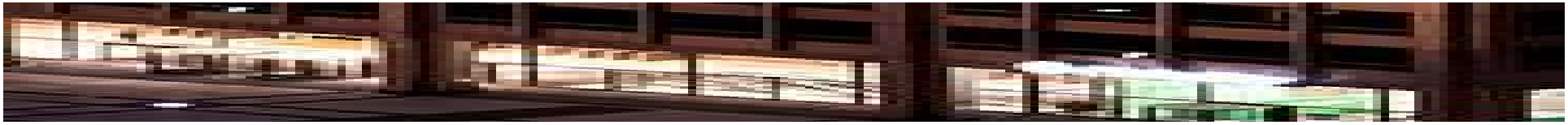
Results

- Fault detection has found issues with chillers, 75 FPB, Air Handlers. Solved prior to tenant complaints
- Chillers now run 12% less
- Night Purge has delayed chiller start times 4 to 5 hours per day when applicable. At times chiller starts at 1:00 PM or not at all
- Hot and Cold calls reduced 20%
- Kingsley HVAC scores rose 2% to 11%



Static Pressure Reset



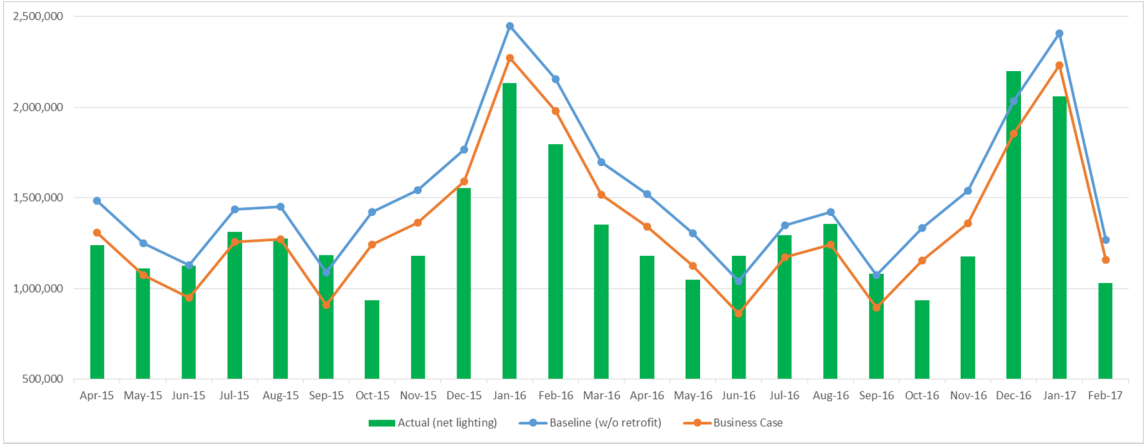


Night Purge Operation September 28th 2016

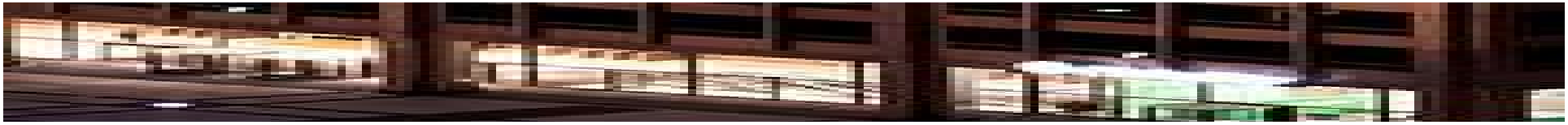
Night Purge Operation June 8th 2016

Results:
Energy Savings Exceeded Business Case by 10%

	kWh/Year	Savings (kWh/yr)	Savings ($/yr)	Savings ($/sq-ft)	HVAC Energy Reduction
Baseline without WPT	17.9 million	-	-	-	-
Target business case	15.8 million	2.1 million	$214,110	$0.14	26%
Actual M&V with WPT	15.5 million	2.4 million	$234,677	$0.16	29%



Questions



Thank You