NYU Langone Medical Center

Fall Conference 2010

Demand Control and Response with Virtual Chiller Plant Control

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Agenda

- Introduction
- Sustainability at NYU Langone Medical Center
- Chiller Plant History
- Virtual Plant Control with Load Shifting
- What's Next?

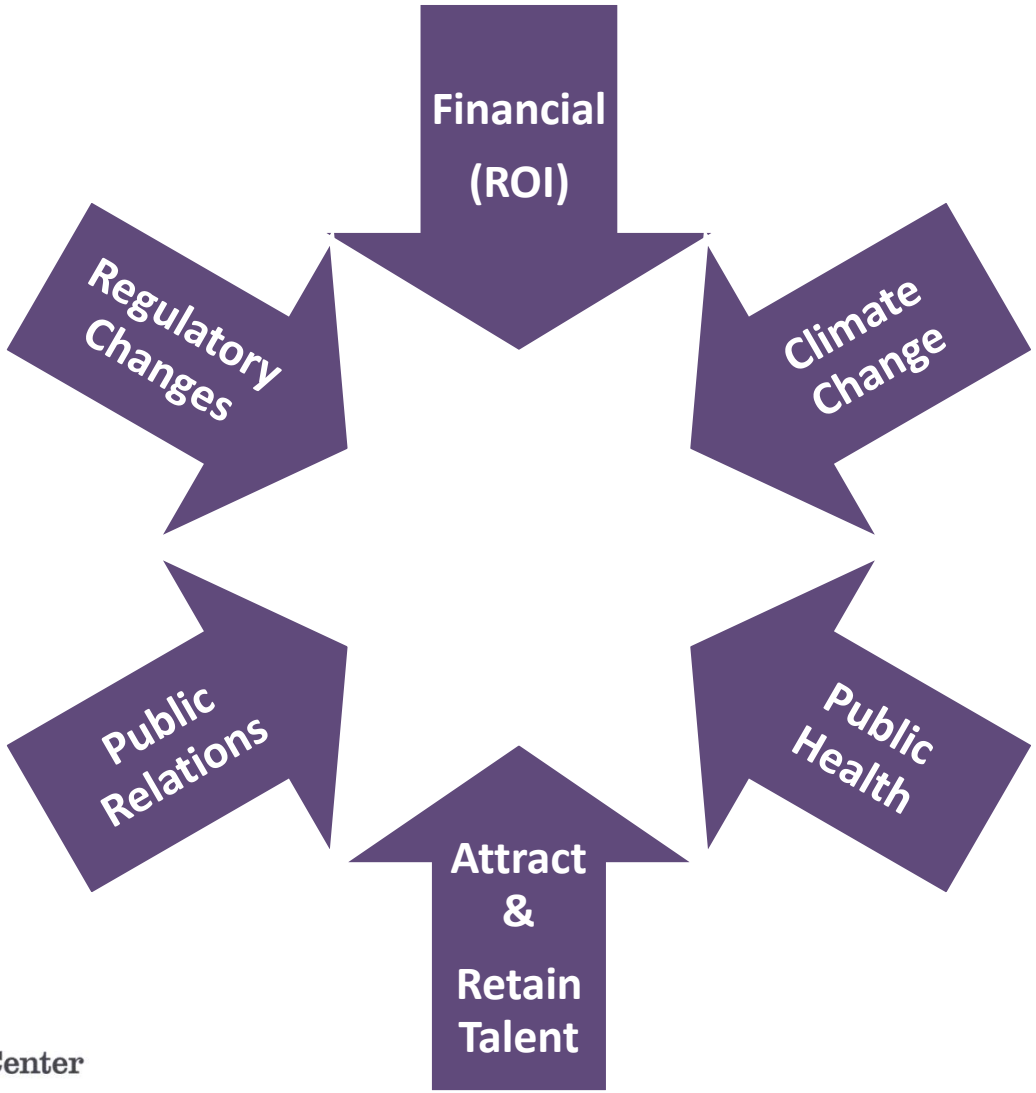
NYU Langone Medical Center

- Located in NYC on First Avenue between 30th and 34th streets
- Center of excellence for healthcare, biomedical research, and medical education
- Environmental Steward promoting Sustainability

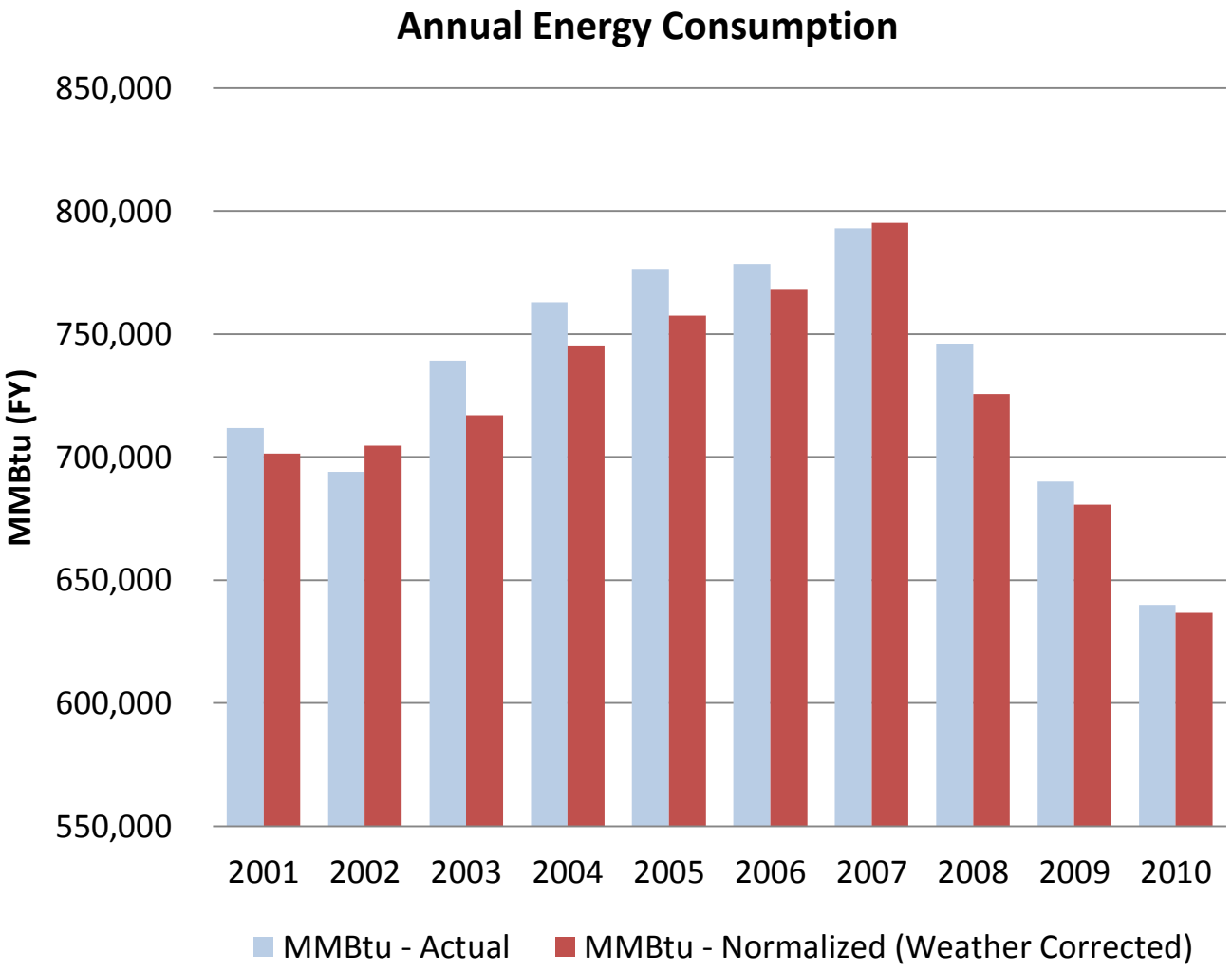
Sustainability

Meeting the needs of the present without compromising the ability of future generations to meet their own needs

Why Sustainability at NYU Langone?



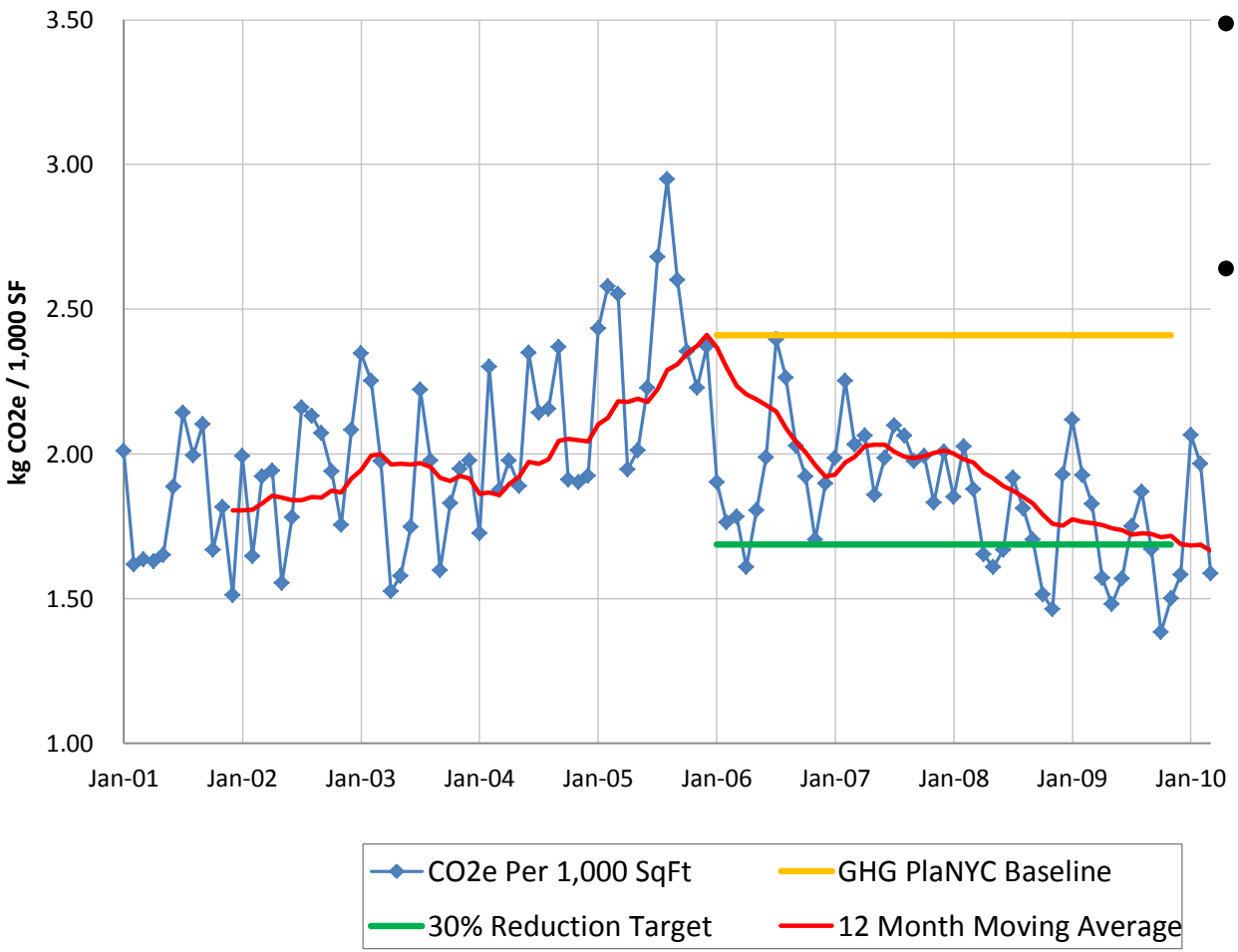
Energy Management: Accomplishments – Conservation



- $3.5 million savings in 2010
- Cumulative $7.7 million savings

  (Compared to 2007 Consumption)

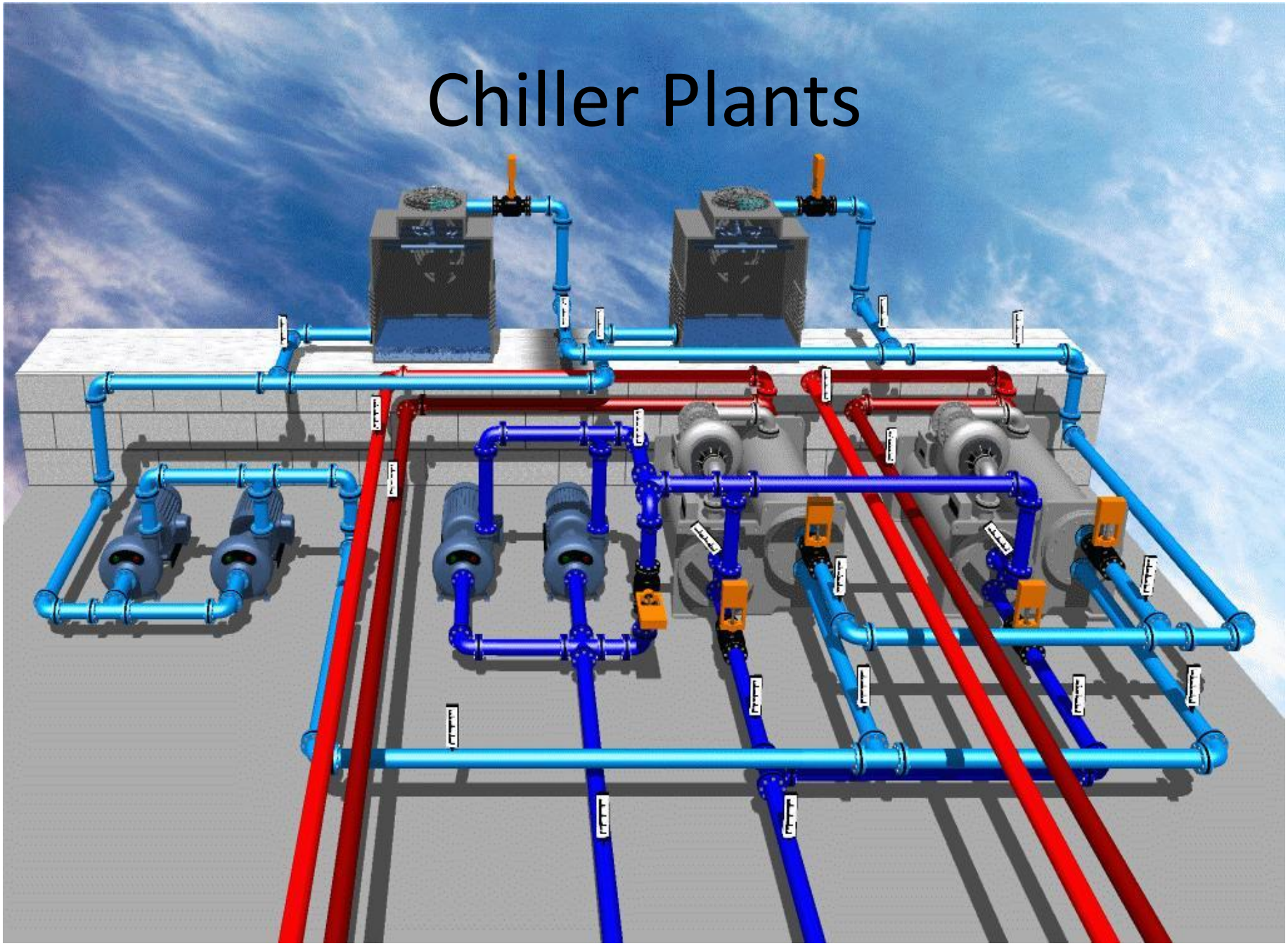
Energy Management: Accomplishments – GHG Reduction



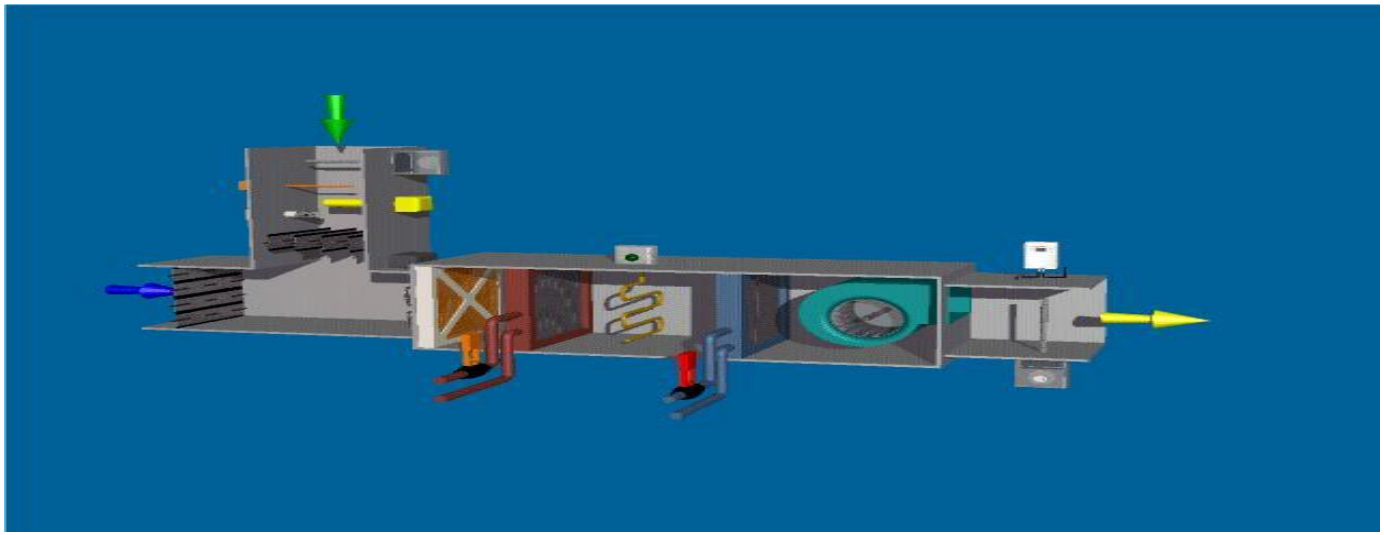
- 30.9% reduction in GHG Emissions
- 26,485 Metric Ton Annual Reduction in CO_2e Emissions

(Vs. 2005 baseline based on PlaNYC calculator)

Chiller Plants



Air Handling Unit



- Delivers Heating, Ventilation, and Air Conditioning to maintain comfort and a healthy indoor environment

NYU Medical Center
Using a Chilled Water Interconnect to Reduce Peak Demand and Energy Use

NYU Langone Medical Center

goldman copeland associates, p.c.

RESULTS

- First interconnect of this type to use both parallel and series flow
- Chiller interconnect **saved $500,000** (1985 prices) in annual operating costs – both demand & consumption
- Interconnected plants had **excess capacity** (6300 tons installed vs. 4300 ton peak load):
  - $75,000 in annual maintenance costs from mothballing plants
  - Avoided cost of adding 2000 tons of cooling ($3,400,000) as the campus expands
  - Greater backup

25 Years Later - 2007

- 3 main plants
- Take-offs were added and tertiary pumps were installed
- Reliability and efficiency issues
- Control systems were mostly manual.
- CHW loop was run segmented into 2 or 3 sections to maintai chw requirements

Chiller Plants on the Interconnect

Smilow Research Facility
- 3 –1200 Ton Electrical Centrifugal Chillers
- 2 – 250 Ton Plate and Frame Hx

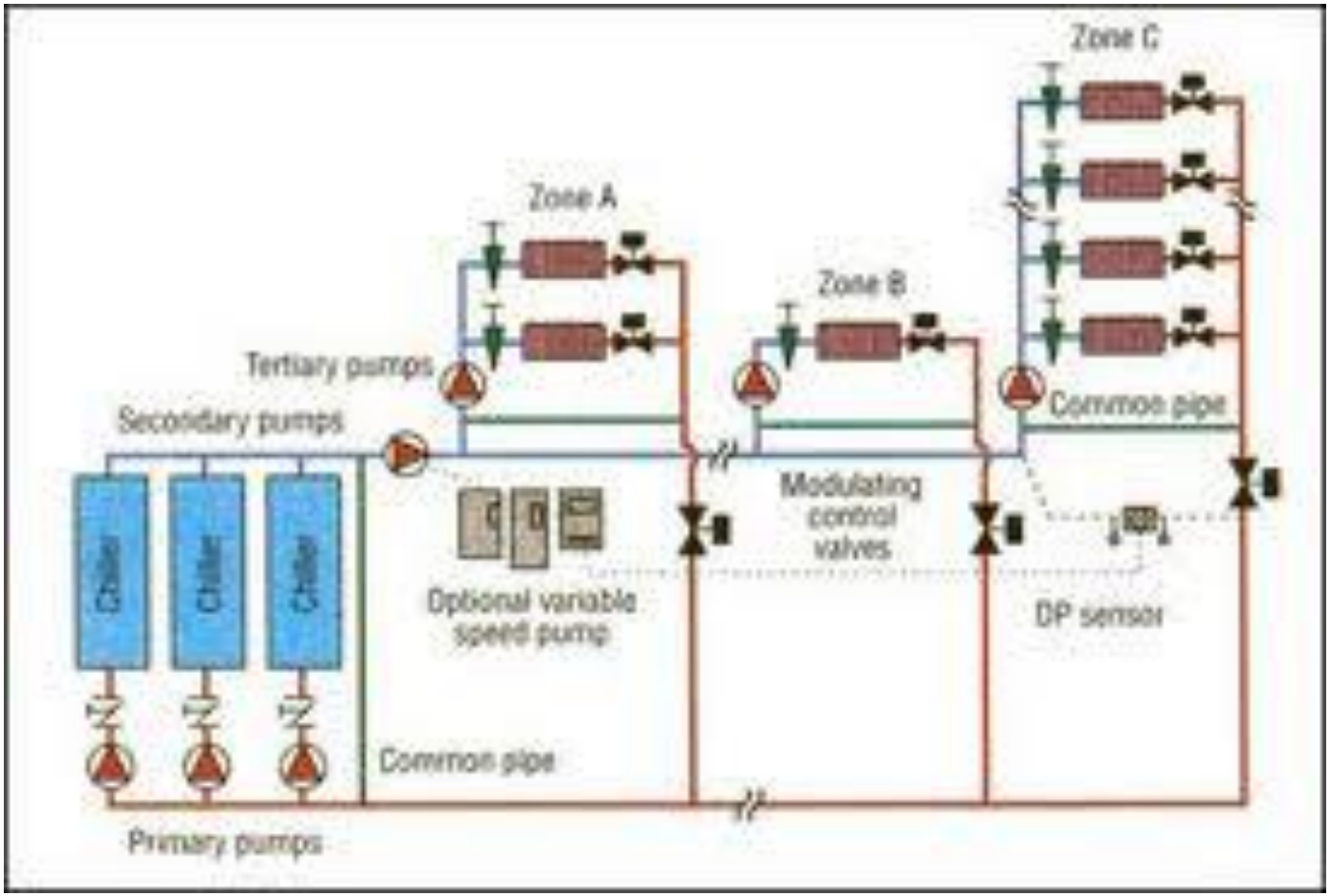
Skirball Institute
- 3–1200 Ton Electrical Centrifugal Chillers
- Chiller #3 has a VFD drive

Tisch Hospital
- 3–2000 Ton Steam Turbine Chillers
- 1000 Ton Plate and Frame Hx

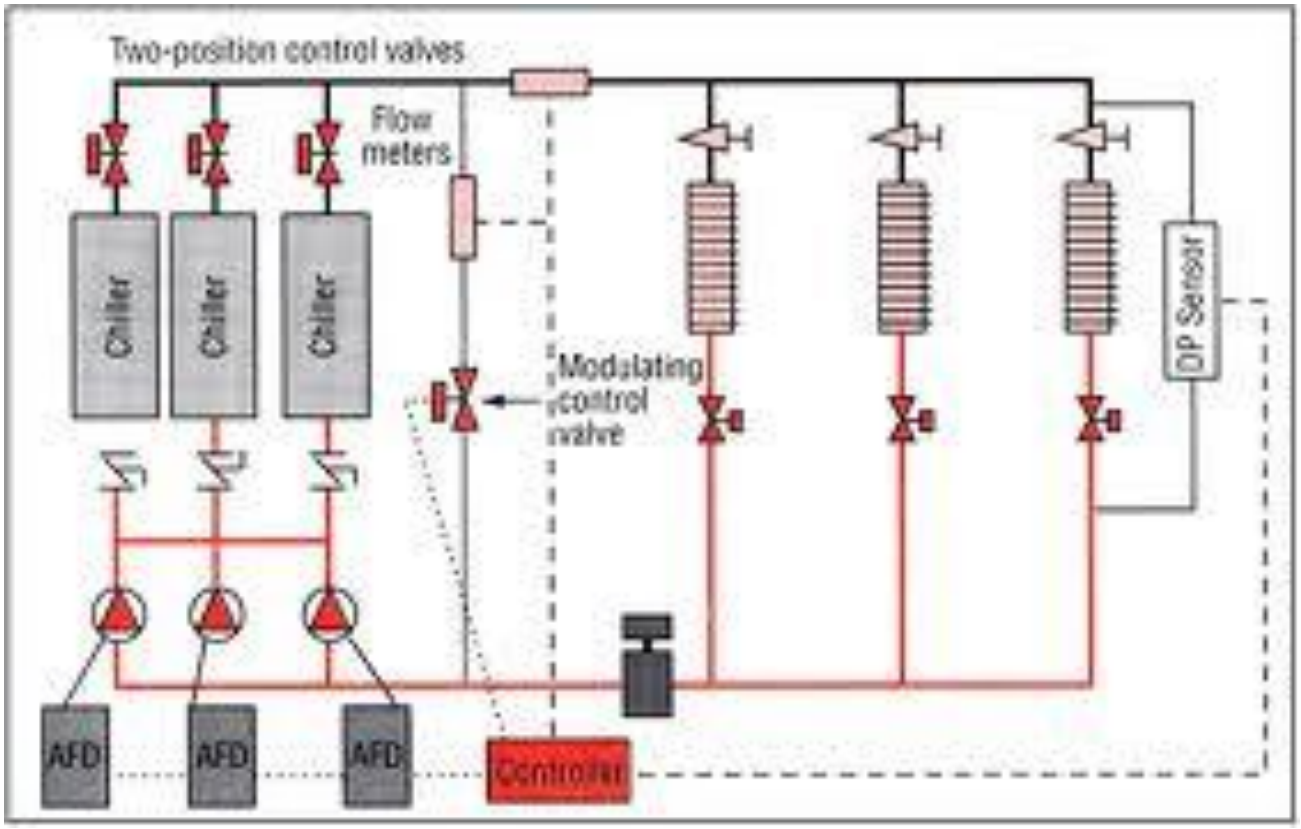
Chilled Water System Upgrade

- NYSERDA funded study and project to radically change our CHW loop
- Tertiary and primary pumps were removed or bypassed to create a variable primary flow chilled water system
- Chilled water instrumentation was installed throughout the loop to enable proper control
- Plant programming sequences were developed and implemented

Primary, Secondary, Tertiary Chiller Plant (previous system)



Variable Flow Primary Chiller Plant (Upgraded System)



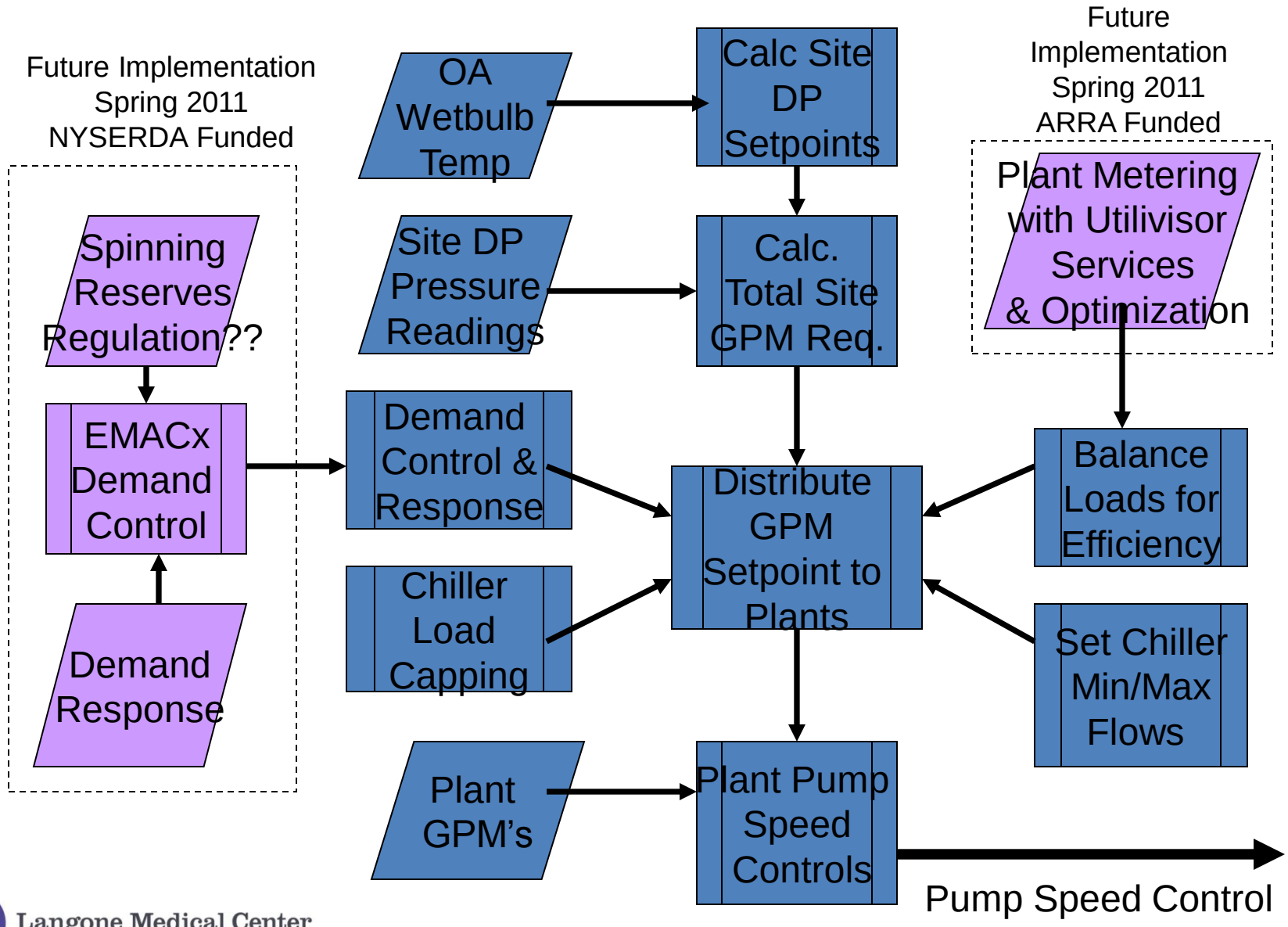
Additional Opportunity Remained

- The typical CHW plant DP control was found not to be as effective as it should
- Frequent DP setpoint changes were required
- Inefficient operation and chiller trips when one plant's pumping interfered with another's.
- There was a tendency to run DP setpoints too high.
- No demand control or chiller optimization

Plant Programming Goals

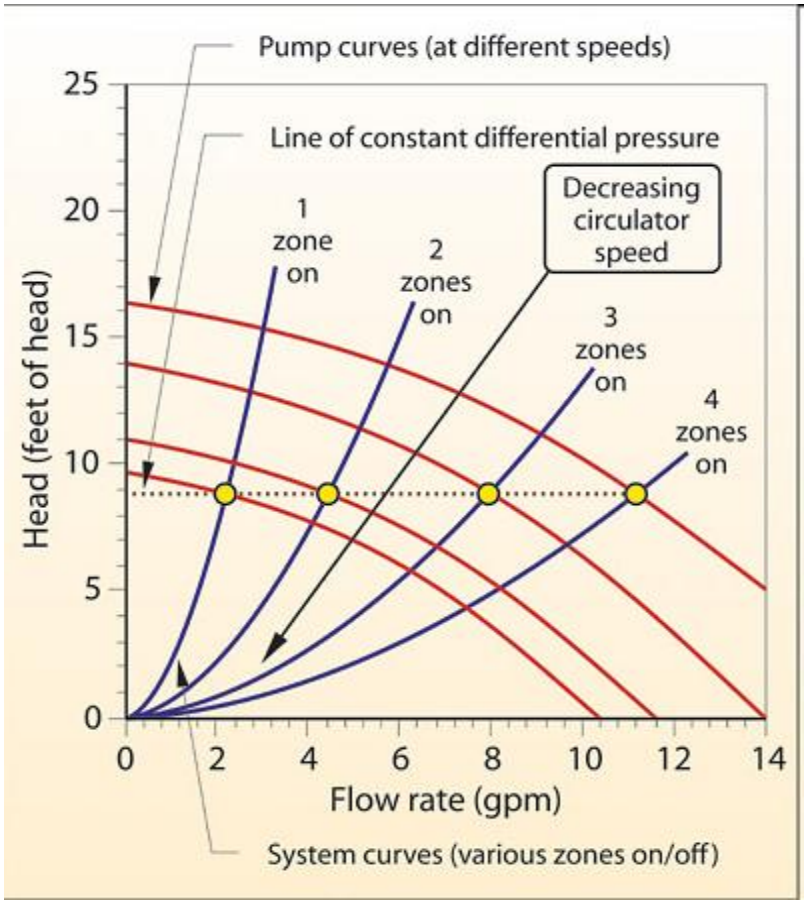
- Correct pump load sharing problems between plants
- Efficient and effective delivery of chilled water.
- Demand control and plant optimization
- Modular fashion so that specialized systems for demand control/response and plant optimization can be integrated at a later date.

Virtual Chilled Water Plant Control Logic



CHW DP Setpoint Reset

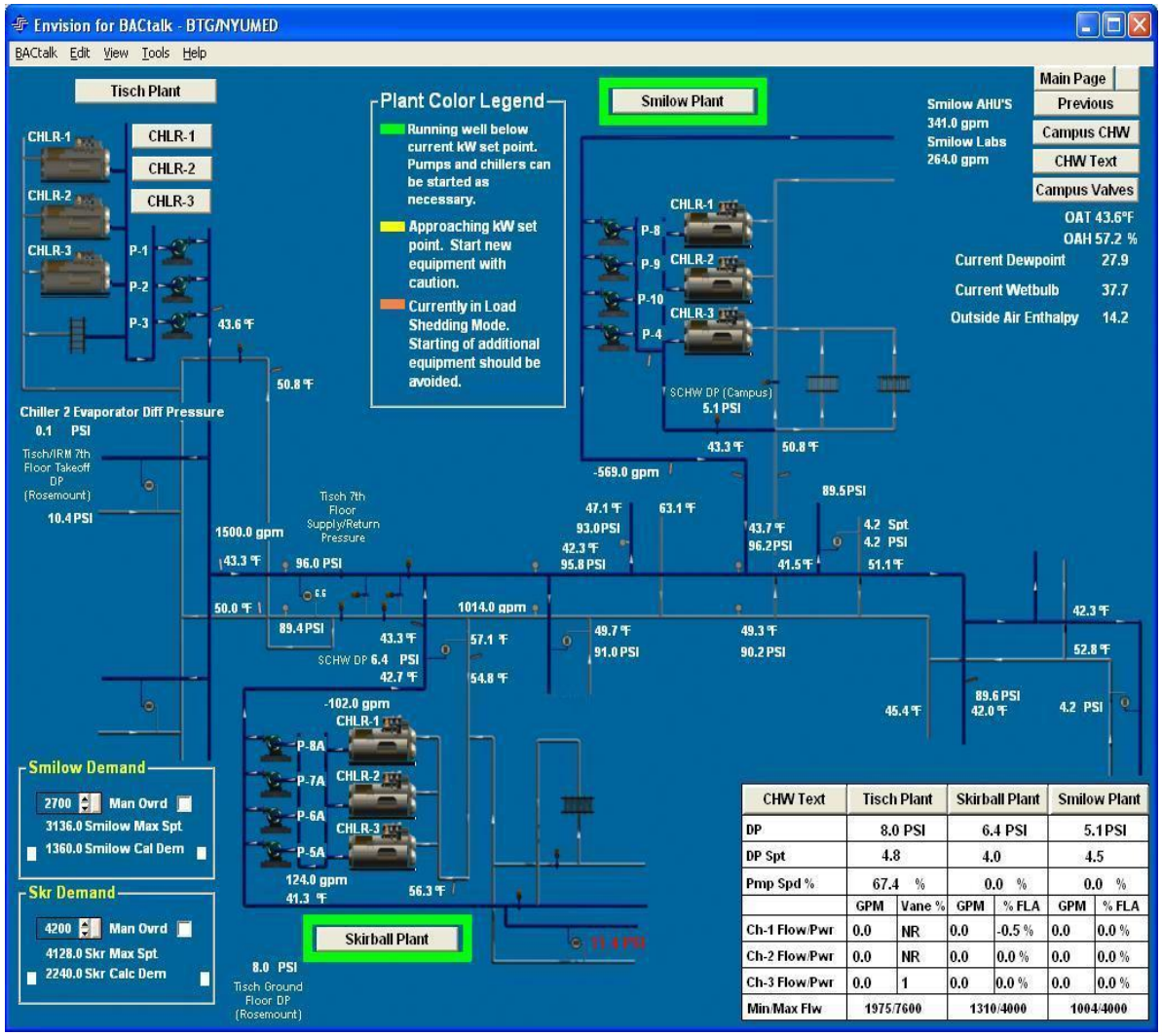
- Differential pressure (DP) setpoint is directly proportionately reset by outside air wetbulb temp
- Chilled water valves tend to open more when DP is lower thus lowering the system curve and saving pumping energy



Plant GPM Setpoints

- The initial system total GPM setpoint is determined based upon worst case DP vs DP setpoint
- Once the total system GPM setpoint is known, flow is shifted from one plant to another as necessary for efficiency, demand control, and min/max flow and capacity limits to optimize performance.

Present System



- At a glance data gathering of key system performance indicators
- Point and click penetration to more detailed system information

Benefits of Virtual Plant Control and Load Shifting

- Reduce energy use by controlling chillers at their most efficient points
- Optimize use of inexpensive electricity
- Demand control and response
- Prevent chiller current limiting and loss of chw temps

Benefits of Virtual Plant Control and Load Shifting

- Smooth transitions on startup, shutdown, and fuel switching
- Improved performance and delivery of the chw product
- Improved equipment protection
- Elimination of pump load sharing problems and chiller trips

What's Next??

- 8 megaWatt Cogen Plant
- 800,000 SF Acute Care Hospital
- 400,000 SF Science Building
- 30% more in Carbon Reductions

Commitment Brings Exciting Times!!!

Questions???

Langone Medical Center