High Rise / Low Carbon: Advanced Ventilation Goes Mainstream

Building Energy Exchange and NYSERDA are pleased to host a High Rise / Low Carbon Series event focused on the advanced technology and benefits of modern ventilation systems used in high performance building retrofits. Join critical leaders in this field as they discuss how these innovative ventilation systems are addressing critical needs across all segments of the building sector, while also providing the foundation for full electrification.

Opening Remarks
Alexander Jahn, Senior Project Manager, NYSERDA

Presenters
Daniel Bersohn, Associate, BuroHappold Engineering
Benjamin Rodney, Vice President, Construction, U.S. East Region, Hines

Moderator
Benjamin Rodney, Vice President, Construction, U.S. East Region, Hines

Panelists:
Vinca Bonde, Sales Director, Energy Machines
Grace Kolb, Mechanical Engineer, AKF Group
Tony Abate, Vice President and Chief Technology Officer, AtmosAir

October 26, 2022 | 9 to 10:30 am | 1.5 AIA LU|HSW
Building Energy Exchange | be-exchange.org
Air-Water Systems and Ventilation Energy Recovery

October 26, 2022
Efficient HVAC Design Drivers

- **Transport energy efficiency**
  - Phase change > liquid > air

- **Generation efficiency**
  - Large temp difference -> good transport efficiency, bad generation efficiency

- If you move air get the best use out of it

- Think before you throw energy away
What Does Decoupling Mean?

- One sensor
- One setpoint
- One actuator
Regulated Airflow – VAV Box

6” inlet with regular (6”) casing

6” inlet with oversized (8”) casing

from Price Industries catalog
Induced Airflow – Active Chilled Beams

from Price Industries catalog
Decoupled Airflow – FPB/FCU

from Price Industries catalog
## Decoupling

<table>
<thead>
<tr>
<th>System type</th>
<th>Cooling</th>
<th>Dehum</th>
<th>Ventilation</th>
<th>Heating</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAV</td>
<td>VAV box damper</td>
<td></td>
<td>Reheat valve</td>
<td></td>
</tr>
<tr>
<td>FCU</td>
<td>Cooling valve</td>
<td></td>
<td>Vent damper</td>
<td>Heat valve</td>
</tr>
<tr>
<td>Induction units/ACB</td>
<td>Primary air + cooling valve*</td>
<td>Primary air</td>
<td></td>
<td>Heat valve*</td>
</tr>
<tr>
<td>FPB and Radiant</td>
<td>Cooling valve + primary air</td>
<td>VAV box damper</td>
<td></td>
<td>Heat valve</td>
</tr>
</tbody>
</table>

*No capacity without primary air flowing
### Decoupling

<table>
<thead>
<tr>
<th>System type</th>
<th>Primary Air</th>
<th>CFM/SF *</th>
<th>%OA*</th>
<th>Static</th>
<th>Typical flow %</th>
</tr>
</thead>
<tbody>
<tr>
<td>VAV</td>
<td>Size to cooling load</td>
<td>0.7-1.1</td>
<td>10-15</td>
<td>=</td>
<td>25-100</td>
</tr>
<tr>
<td>FCU</td>
<td>Size to vent load</td>
<td>0.1-0.2</td>
<td>100</td>
<td>=</td>
<td>70-100</td>
</tr>
<tr>
<td>Induction units/ACB</td>
<td>Size to dehum or induction load</td>
<td>0.3-0.4</td>
<td>30-40</td>
<td>+0.6”</td>
<td>80-100</td>
</tr>
<tr>
<td>FPB and Radiant</td>
<td>Size to dehum load</td>
<td>0.25-0.35</td>
<td>30-40</td>
<td>=</td>
<td>75-100</td>
</tr>
</tbody>
</table>

*Typical for office buildings. Please do your load and vent calcs properly for every project.

**Compared to VAV
Energy Recovery Ventilator
Energy Recovery Ventilators

Energy Recovery Ventilators
JUMP ON BOARD!
We’d love to hear from you

Daniel Bersohn
daniel.bersohn@burohappold.com

www.burohappold.com
Hudson Square
Sustainable Development

High Rise/Low Carbon:
Advanced Ventilation Goes Mainstream

345 Hudson Street
Empire Building Challenge

October 26, 2022
How do we marry a new development up to an existing 1930’s building?

345 Hudson | 900k SF | 17 Floors | 1930’s Vintage

555 Greenwich New Development

Hudson Square

THE DEPLOYMENT PLAN

- connect everything
- replace primary AHU with high energy recovery
- deep retrofit floors 2, 3, 7, 8 & 9
- move to ambient loop (add ASHP & dry coolers)
- enable data & AI solutions
- connect thermal storage - water tanks
- connect to GS&GW to share energy
- deep retrofit floors 10, 11, 13, 16 & 17
- deep retrofit floors 4, 5, 6, 12, 14 & 15
- complete ambient loop 100% electric building

345 FEATURES

- Steam Heating
- Natural Gas Boilers

555 FEATURES

- Floor Level Packaged Units
- All Electric
GLOBAL COLLABORATION

Without global collaboration we will fall short of our goals by 40 years. Hines has taken a position to collaborate with sustainability leaders in the industry to pave the path forward for real estate.

GLOBAL ENERGY-RELATED CO₂ EMISSIONS

Sources: IEA, Net Zero by 2050, July 2021
Electrify heating, eliminate economizer and move to hydronic based systems

Energy Arbitrage Loop

Remove on site fossil fuels and use the natural diversity and thermal storage within a building
DOAS/Heat Recovery

- Capable of delivering about 70% more OA than code minimum (assuming 1 person/150 sqft)
- Replaces single pass H&V steam fed unit served by natural gas boiler
- Heat exchanger about 85% efficient
- Reusing and sealing existing OA riser. Adding new GX riser. Bringing TX/GX back to unit
- Converting on floor CAV's to VAV's
Electrify heating, eliminate economizer and move to hydronic based systems

Potential energy reductions

<table>
<thead>
<tr>
<th></th>
<th>Heating Energy Reduction</th>
<th>Cooling Energy Reduction</th>
<th>Cooling Load Reduction</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing Building</td>
<td>71%</td>
<td>30%</td>
<td>14%</td>
</tr>
<tr>
<td>Heat Pump + AHU (All Air)</td>
<td>84%</td>
<td>65%</td>
<td>69%</td>
</tr>
</tbody>
</table>

Eliminating fossil fuels immediately reduces demand, by moving towards hydronic based systems we can reduce heating and cooling energy by 60% – 80%
discuss.

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thank you.

Scan to access our first High Rise / Low Carbon Partner Profile, showcasing Hudson Square Properties' 345 Hudson retrofit