Take the Heat! Part 1: Geo & Wastewater

In this new two-part series focused on building decarbonization, NYSERDA and BE-Ex have called upon industry experts to highlight projects deploying breakthrough heat recovery solutions across the commercial and multifamily buildings sector.

opening remarks:
Molly Kliick, Project Manager, NYSERDA

presentations by:
JP Flaherty, Managing Director, Global Head of Sustainability and Building Technologies, Tishman Speyer
Ed Yaker, Amalgamated Housing Cooperative
Mariel Hoffman, Director of Energy Engineering, EN-POWER GROUP

moderator:
Greg Koumoullis, Project Manager, Customer Energy Solutions, Con Edison

panelists:
Mariel Hoffman, Director of Energy Engineering, EN-POWER GROUP
Jay Egg, President, Egg Geo
JP Flaherty, Managing Director, Global Head of Sustainability and Building Technologies, Tishman Speyer
Ed Yaker, Treasurer, Amalgamated Housing Cooperative

31 Chambers Street
New York, NY

November 15, 2023
9 to 10:30 am

1.5 AIA LU | HSW
Breaking New Ground with Geothermal
About Us

At Tishman Speyer, we are building for the future. We provide exceptional spaces and destinations for approximately 1,900 customers across 30 key markets.

1,900 CUSTOMERS WORLDWIDE
$67.1B AUM
82M ft² OWNED & OPERATED

NORTH AMERICA EAST COAST
- BOSTON, MA
- GREENWICH, CT
- NEW YORK, NY
- NORTHERN VA
- PHILADELPHIA, PA
- PITTSBURGH, PA
- WASHINGTON, DC

NORTH AMERICA WEST COAST
- BOULDER, CO
- LOS ANGELES, CA
- SAN DIEGO, CA
- SAN FRANCISCO, CA
- SEATTLE, WA

NORTH AMERICA MID WEST
- CHICAGO, IL

NORTH AMERICA SOUTH
- AUSTIN, TX
- NASHVILLE, TN

BRAZIL
- BELO HORIZONTE
- RIO DE JANEIRO
- SÃO PAULO

EUROPE
- AMSTERDAM, NL
- BERLIN, DE
- FRANKFURT, DE
- HAMBURG, DE
- LISBON, PT
- LONDON, UK
- MADRID, SP
- PARIS, FR
- VIENNA, AT

INDIA
- PUNE

CHINA
- BEIJING
- SHANGHAI
- SHENZHEN
- SUZHOU

Markets, AUM, and square footages listed as of December 31, 2022.
In June of 2021, Tishman Speyer set a goal to reach operational net zero carbon across its entire global real estate portfolio by 2050 or sooner.

1. Invest in Energy Efficiency
2. Purchase Renewable Electricity
3. Install Onsite Renewables
4. Electrify away from Scope 1
5. Purchase REC and/or Offsets
Empire Building Challenge – 520 Madison

520 Madison Avenue, built in 1982 by Tishman Speyer, is a 44-story office tower in the heart of Midtown Manhattan, home to major financial services firms like Jeffries, Citadel, and Davidson Kempner.

Building Characteristics:

- Façade: granite stone attached to steel framing
- Heating: ConEdison steam
- Heat Distribution: Two steam heat exchangers (upper and lower zone) for hot water perimeter radiators
- Cooling: Chilled water system and 6,600-ton onsite ice plant
- Cooling Distribution: Chilled water fed to six central building fans, two condenser water loops (main and tenant)
- EUI: 172 kBTU/ft²
- Carbon Emissions: 2,034 mtCO₂e
Empire Building Challenge – Project Process

In 2022, NYSERDA put out a call for the second round of the Empire Building Challenge – Tishman Speyer saw an opportunity to apply with 520 Madison Avenue.

Net Zero Plan
- Looked at all realistic intervention possibilities in accordance with our net zero roadmap with our in-house engineering team

Application to EBC
- Worked with JB&B and Brightcore to map feasibility of geothermal at 520 Madison
- Applied to EBC and was selected as a second-round candidate

EBC Grant Award & Project Kickoff
- Signed agreement with NYSERDA to move forward on the geothermal scope
- Project kicked off in August
Constraints and Challenges

Geothermal + Operating Property: Let’s Make it Work
Logistical constraints of drilling in an existing building with limited space, building undergoing other major capital work, incorporating the business plan and rent roll

How We Fund This: Looking Beyond the Capital Stack
Utilizing clean heat incentives from local utility (ConEdison) as well as the geothermal credit from the Inflation Reduction Act

Forging a New Path: We Need the Right Partners and Equipment
Not many examples of this project in the real world, gathered a team of experts to create a roadmap for this unique opportunity
AMALGAMATED HOUSING COOPERATIVE: THE ROAD TO DECARBONIZATION

EN-POWER GROUP

AMALGAMATED HOUSING COOPERATIVE
AHC is the oldest affordable limited equity housing cooperative in the nation built in 1926.

AHC has about 1,500 apartments across thirteen buildings.

Asset value under AHC ownership and management is $650,000,000.

We aim to maintain AHC as an affordable housing COOP.

AHC is an early adopter of energy efficiency.
Two AHC buildings, **Tower 1 and Tower 2**, will participate in EBC. The Towers share many characteristics:

- Built in 1968 (Tower 1) & 1971 (Tower 2)
- 20 Floors
- **Heating**: High-pressure steam from the complex's dual-fuel boiler plant
- **Cooling**: Single-stage steam absorption chiller
- **Distribution**: Dual temperature loop
EN-POWER’s Roadmap to Decarbonization

1. Retrofit Heating & Cooling Distribution System (Piping and Fan Coils)
2. Install Wastewater Energy Transfer System
3. Upgrade Ventilation & Lighting System
4. Upgrade Envelope
5. Install Ground Source Heat Pump System
6. Install Control System & Variable Frequency Drives
7. Install Submetering & Solar PV System
8. Electrify Appliances (Laundry & Stoves)
Retrofit Heating & Cooling Distribution System (Piping & Fan Coils)

System

- **Replacement of 1,200 fan coil units (FCUs)**, which have outdated permanent split capacitor (PSC) motors, with high efficiency FCUs with electronically commutated (EC) motors.

- **Innovative method for re-piping** includes installing 2-pipes in a shared configuration, allowing for the benefits of a 4-pipe system, by using a single pipe system with individual FCU circulators.
Retrofit Heating & Cooling Distribution System (Piping & Fan Coils)

Benefits

- Lower cost
- Improved efficiency
- Reduced carbon and energy consumption
- Less maintenance
- Lower heating distribution temperature of 140°F from 160-180°F
- Heating & Cooling
- Increase in resident comfort & satisfaction
- Critical step for future GSHP
Install Wastewater Energy Transfer (WET) System

System

- **Extract heat from the wastewater** to preheat hot water in The Towers.
- Will be used initially for DHW production and be an enabling step to reduce heating/cooling loads for the later ground source heat pump (GSHP) system.
- Then integrated into the GHSP system in order to provide additional energy for heating and cooling loads.
Install Wastewater Energy Transfer (WET) System

Benefits

- Modular design to allow for redundancy and resiliency in case of equipment failure
- Enabling step for GSHP
- Reduces geothermal boreholes from 300 to 220 (~ 27% load), saving at minimum over $500,000 in drilling costs
- Allows for elimination of fossil fuels
- Example case for other buildings at AHC
Thank you

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AHC Board Treasurer
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## Con Edison Thermal Energy Network Proposed Pilots

Design engineering to commence in January 2023 and construction tentatively scheduled for Q1 2025

<table>
<thead>
<tr>
<th>Location</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Chelsea</strong></td>
<td>- Multifamily NYCHA buildings in Manhattan in a disadvantaged community&lt;br&gt;- Tests use case of data center waste heat&lt;br&gt;- Retrofits existing buildings, with the opportunity to connect to new construction upon rebuild of the Fulton Houses campus (see Appendix for details)</td>
</tr>
<tr>
<td><strong>Mount Vernon</strong></td>
<td>- Up to 76 buildings in a disadvantaged community including small residential, commercial, and community buildings&lt;br&gt;- Uses heat from geothermal borehole fields&lt;br&gt;- Potential to retire leak-prone gas pipe</td>
</tr>
<tr>
<td><strong>Rockefeller Center</strong></td>
<td>- 3 high-rise mixed-use buildings in the heart of Manhattan&lt;br&gt;- Tests sharing of multiple waste heat technologies (cooling towers, ice storage, and steam condensate) through an inter-building “marketplace”</td>
</tr>
</tbody>
</table>
## Con Edison Incentive Programs – Heat Recovery

Con Edison provides *installation incentives* for Heat Recovery projects which result in energy savings.

### C&I – Energy Efficiency Program

<table>
<thead>
<tr>
<th>Incentives</th>
<th>Incentive Rate(^1)</th>
<th>Heat Recovery Technologies Incentivized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electric</td>
<td>$0.45/kwh</td>
<td>Systems that beneficially reuse waste heat for space conditions or DHW</td>
</tr>
<tr>
<td>Gas</td>
<td>$8/therm</td>
<td>Heat recovery ventilators (HRV), and energy recovery ventilators (ERV)</td>
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<tr>
<td>Steam</td>
<td>$80/MLbs</td>
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### C&I and MF - NYS Clean Heat Program

<table>
<thead>
<tr>
<th>Systems Incentivized</th>
<th>Ground Source Heat Pumps Incentives(^1)</th>
<th>All Other Heat Pump Technologies Incentivized</th>
<th>Heat Recovery Technologies Incentivized</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><em>Existing &amp; New Construction</em></td>
<td><em>Existing Buildings</em></td>
<td></td>
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<tr>
<td>Full Load Space Heating</td>
<td>$100-$225/MMBTU</td>
<td>$70-$200/MMBTU</td>
<td>Heat Recovery Chillers</td>
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<tr>
<td>Full Load Space Heating +Envelope</td>
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<td></td>
<td>Heat Pump Chillers</td>
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<tr>
<td>Partial Load Space Heating</td>
<td></td>
<td></td>
<td>HRV/ERV</td>
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<tr>
<td>Custom Hot Water Heating</td>
<td></td>
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<td>WSHP</td>
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<td>Waste to Energy Technologies</td>
</tr>
</tbody>
</table>

\(^1\) Project Incentives cannot exceed 50% of the project cost for eligible measure(s) or 100% of each measure cost. Total incentives are capped at $1,000,000 for all projects, per account per year.

C&I/MF Business Development Manager: Laziza Rakhimova, rakkimoval@coned.com
C&I Program Manager: Danielle Sitro, sitrod@coned.com
Visit www.coned.com for more information on Incentives & UTENs
discuss.

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