“BUILDING ON STEAM”
132 YEARS OF SERVICE
Who We Are

• Largest district steam system in the U.S.

• Deliver energy at competitive costs
  – Invest in our system to maintain reliability and reduce risk

• Customer Focused
  – 1,703 customer accounts

• Long-Term Viability

• Leverage clean energy sources, energy efficiency, and new technologies
Customers and Uses of Steam

1. Metering/PRV Station
2. Energy Production
3. Heat/Hot Water Distribution Systems
4. Domestic Hot-Water Systems
5. Air-Conditioning
6. Condensate Collection and Reuse
7. Dry Cleaning
8. Cafeteria/Kitchen
9. Food Processing
10. Lab/Hospital
11. Cleaning
12. Recovered Space
13. Humidification
Trap Inlet and Outlet Valves – Leave Them to us

• These valves must remain open
• Only Con Edison employees can close these valves
• Each valve is tagged and we wire-sealed the trap inlet valves
Inside Steam Service Valve – Always Keep Open

- Close only in an emergency
- Valve tagged with a warning sign
- If the valve is closed, call us immediately at 1-800-75 CONED (1-800-752-6633) so we can open it.
Watch Your Valves and Traps to Prevent Water Hammer

• **Cause:** When condensate is not effectively removed

• **Most common type:** A traveling slug of water

• **Our #1 operational priority** is to prevent it

• A Con Edison Engineer must be present before the steam main can be put back into service

• If you think you have water hammer, shut down your steam system and call Con Edison
Bubble Collapse

Steam
Condensate
Slug Water Hammer
Recent Steam System Enhancements

• Vortex metering & Customer benefits
  – Can communicate with Building Management Systems (BMS)

• State-of-the-art remote monitoring on our distribution system
STEAM Conservation Tips

S  Shield Pipes and Valves from Heat Loss

T  Thermal Energy Recovery from Condensate

E  Ensure Vacuum at all Times, if Intended

A  Avoid Space Overheating

M  Maintain Steam Traps and Repair Leaks
Steam Meter Room Overview

- Trap inspection
- Tags & Seals
- Equipment operation and responsibility
Insulate piping and fittings

- Poorly maintained insulation
- Missing insulation on valves/fittings
- Proper insulation on pipes, valves, and fittings
## Insulation - Annual Economics

### Assuming Saturated Steam at 150 PSIG

<table>
<thead>
<tr>
<th>Pipe (per ft-year)</th>
<th>Size</th>
<th>Energy Lost, Bare</th>
<th>Energy Lost, Insulated</th>
<th>Energy Savings (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12”</td>
<td>12”</td>
<td>18.3</td>
<td>1.8</td>
<td>16.5</td>
</tr>
<tr>
<td></td>
<td>8”</td>
<td>12.9</td>
<td>1.3</td>
<td>11.6</td>
</tr>
<tr>
<td></td>
<td>4”</td>
<td>7.1</td>
<td>0.7</td>
<td>6.4</td>
</tr>
<tr>
<td>Gate Valve</td>
<td>12”</td>
<td>87.2</td>
<td>8.7</td>
<td>78.5</td>
</tr>
<tr>
<td></td>
<td>8”</td>
<td>58.0</td>
<td>5.8</td>
<td>52.2</td>
</tr>
<tr>
<td></td>
<td>4”</td>
<td>24.7</td>
<td>2.5</td>
<td>22.2</td>
</tr>
</tbody>
</table>

Based on data taken from US Department of Energy for heat loss and insulation efficiency
Condensate Re-Use and Thermal Recovery

• Install condensate heat recovery units
  – Preheat Domestic Hot Water (DHW)
  – Preheat Outside Air in Air Handling Units (AHU)
  – Heating fountains, swimming pools, spas

• Water Make-up/ Re-Use
  – Cooling tower, green roofs, toilets
  – Floor washing, watering plants
Condensate Re-Use and Thermal Recovery (Cont.)

• Condensate reuse guidance sketches are available at www.coned.com/steam

• Why re-use condensate?
  • Steam and water savings
  • The DEP charges for discharge into sewers. If you re-use condensate, you can apply to the DEP for a discount
  • Resulting water savings may help gain points in case the building is looking for LEED certification
Ensure Vacuum at all Times, if Intended

• If your steam system is designed to operate under vacuum, maintaining vacuum will ensure optimal operation.

• Loss of vacuum may occur if:
  • Traps are not maintained
  • Leaks
  • Pumps not working properly
Improve Space Heating

• Temperature Control
  – Reduce Overheating
  – Lower Space Temperature

• Controls through
  – Building-Wide: Building Management System (BMS)
  – Local: Thermostatic Radiator Valves
  – Steam A/C Turbine Chiller
Trap Inspection

• Blow-through can cause
  – Increased return condensate temperature
  – Steam balancing problems → occupant discomfort

• Routine maintenance to reduce these issues

• Typically less than 1 year payback
# Steam Trap Evaluation

<table>
<thead>
<tr>
<th>STEAM PRESSURE</th>
<th>TRAP SIZE</th>
<th>STEAM FLOW</th>
<th>LOSSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(150 psig)</td>
<td>TD</td>
<td>Hourly</td>
<td>DAILY</td>
</tr>
<tr>
<td>150</td>
<td>½</td>
<td>105</td>
<td>2.5Mlb</td>
</tr>
<tr>
<td>150</td>
<td>¾</td>
<td>152</td>
<td>3.6Mlb</td>
</tr>
<tr>
<td>150</td>
<td>1&quot;</td>
<td>230</td>
<td>5.5Mlb</td>
</tr>
</tbody>
</table>
Steam Leaks

• Sources:
  – Flanges and gaskets
  – Valve stems and bonnets
  – Pipes
Physical Improvements

Leaks

• Annual Potential Savings from Steam Leak Repairs

<table>
<thead>
<tr>
<th>Leak Pressure (PSI)</th>
<th>Hole Size (inches)</th>
<th>Steam Loss (lb/hr)</th>
<th>Consumption Savings (Mlb)</th>
</tr>
</thead>
<tbody>
<tr>
<td>165</td>
<td>1/16</td>
<td>22</td>
<td>188.5</td>
</tr>
<tr>
<td>45</td>
<td>1/16</td>
<td>6</td>
<td>52.6</td>
</tr>
<tr>
<td>15</td>
<td>1/16</td>
<td>2</td>
<td>17.5</td>
</tr>
<tr>
<td>165</td>
<td>1/8</td>
<td>86</td>
<td>754.1</td>
</tr>
<tr>
<td>45</td>
<td>1/8</td>
<td>23</td>
<td>201.5</td>
</tr>
<tr>
<td>15</td>
<td>1/8</td>
<td>8</td>
<td>70.1</td>
</tr>
</tbody>
</table>
Steam Best Practices Report

• Available on the website www.coned.com/steam
STEAM REPAIRS
Building Repairs

- Must Conform with the NYC Building Code
  - December 2011 NYC added insulation requirements to the Building Code
- Remember: Asbestos abatements require a final Air-clearance Report
- Major repairs and any welding on Meter Station require coordination with Con Edison Steam Engineering
- Take advantage of Con Edison outages
  - Please remember to notify Con Edison Steam of your repairs
  - Generally, Con Edison system repairs are scheduled between 11:00 p.m. – 6:00 a.m.
NEW TECHNOLOGIES AND STRATEGIES
Typical Configuration

Typical Customer Configuration with Heating, Hot Water, and/or Low Pressure Steam AC

- In most buildings, the pressure of the incoming steam must be reduced prior to being distributed throughout the facility
  - Pressure reducing valves are typically used to step down the steam pressure.
Steam Turbine Generator Application

- Steam Turbine Generators are devices that can be used for steam pressure reduction in parallel with pressure reduction valves
  - These units use incoming high-pressure steam to produce electricity and output low-pressure steam.
Direct Heat Exchanger (DHX) Systems (*non-potable application*)

**Indirect Heat Exchanger System**
Shell and Tube HX

- HW In
- Steam In
- CW In
- Steam and Cond Out
- CW Out
- Lost Energy

**Direct Heat Exchanger System**

- Steam In
- CW In
- HW Out

More of the Steam Energy is utilized
DHX Systems

Application

• Extracts more energy from your steam supply
• Applicable to customers with hot water distribution and/or production
• Could reduce customer bills due to the reduced steam consumption through the reuse of condensate energy
• If a customer is installing one of these devices, they need to submit a new load letter so we can determine if any meter size modifications need to be made
Steam Operations

STEAM AIR CONDITIONING INCENTIVE PROGRAM
Year Two Improvements

• Implemented Improvements:
  – All incentives have increased
  – Addition of Single Stage Absorption Chillers
  – Addition of Custom Project Option
    • Incentives will be reviewed and determined on a case-by-case basis.
  – The incentives will be available to all customers within the Manhattan electric networks.

• Projects must be completed and fully operational by June 1, 2016
# Equipment Incentive Levels

<table>
<thead>
<tr>
<th>Steam AC Equipment Type</th>
<th>Capacity Range</th>
<th>Incentive Level ($ per ton)</th>
<th>Incentive Limit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Steam Turbine Chiller</td>
<td>Less than or equal to 1,700 tons</td>
<td>$600</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Greater than 1,700 tons</td>
<td>$525</td>
<td></td>
</tr>
<tr>
<td>Double Stage Steam</td>
<td>All</td>
<td>$480</td>
<td>Up to 65% of the delivered equipment cost</td>
</tr>
<tr>
<td>Absorption Chiller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single Stage Steam</td>
<td>All</td>
<td>$325</td>
<td></td>
</tr>
<tr>
<td>Absorption Chiller</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Custom Chiller Project</td>
<td>All</td>
<td></td>
<td>Incentives determined on a case-by-case basis. Con Edison shall review the required material to determine the incentive offering for each eligible project.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Large Project Bonus</th>
<th>Electric Avoidance (kW)</th>
<th>Bonus</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>500 – 999</td>
<td>+10% of base incentive</td>
</tr>
<tr>
<td></td>
<td>&gt;= 1000</td>
<td>+15% of base incentive</td>
</tr>
</tbody>
</table>

Projects must be completed and fully operational by: 

June 1, 2016
### Maintenance Incentive Levels

- Steam Chiller Maintenance Incentive (available for projects that have received the equipment incentive)

<table>
<thead>
<tr>
<th>Maintenance Incentive Type</th>
<th>Incentive Level</th>
<th>Incentive Limit</th>
<th>Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maintenance Costs</td>
<td>$5 per ton annually</td>
<td>$3,000 annually</td>
<td>Up to ten years on an annual schedule</td>
</tr>
<tr>
<td>(Must have service contract w/ manufacturer)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Monitoring Bonus</td>
<td>$2 per ton annually</td>
<td>$1,000 annually</td>
<td></td>
</tr>
</tbody>
</table>

Note – Both types of maintenance funding are contingent on submission of an executed preventive maintenance contract with the chiller manufacturer, or an authorized service provider, and invoices for the maintenance expenses incentivized by Con Edison.

Projects must be completed and fully operational by June 1, 2016
Program Information

• Joint effort between Energy Efficiency and Steam Operations
• Contact us today:

  Program Staff
  Targeted Steam AC Incentive Program
  212-460-2011
  steamAC@coned.com
  www.conEd.com/steamAC
PROGRAMS
Monthly Customer Seminars

• **Free** Steam Safety, Efficiency, and Maintenance seminar at Con Edison’s Training Facility in Long Island City, NY
  • CEU credits available

• Open to building owners, managers, engineers, and maintenance staff
  • Consultants to building owners with proper authorization

• If you support a Steam Customer, you can attend by receiving a consent letter from our customer

• To register, contact: steamcommunications@conEd.com
Reducing our Carbon Footprint

• LEED credits for Steam Customers

• Fuel burn ~ 94% Gas in 2013

• Reduced carbon emission rates by 37% since 2007

• Increased Gas Burning Capability at 59th & 74th St Stations
Energy Assessment Program

- Free one-time energy efficiency assessment for customers
  - Steam Benchmarking

- An engineer reviews the steam system and makes site-specific and common recommendations such as:
  - Steam trap maintenance and/or assessment
  - Terminal unit controllability and monitoring
  - Condensate recovery
  - Insulation
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QUESTIONS?