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Ronald McDonald House
New York City

Comfort for families away from home was one of the key considerations for the retrofit at Ronald McDonald House New York.

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Home away from home



Ronald McDonald House New York is the charity's flagship location.

Re-energizing the Ronald McDonald House New York City

What began in 1974 as a Shamrock Shake-driven fundraiser to help families with sick children is today a network of 322 Ronald McDonald Houses in 57 countries. The first Ronald McDonald House (RMH), in Philadelphia, was meant to serve as a “home away from home” for families spending time in the city for cancer treatment.

More than 35 years later, the focus remains. Each house is a comfortable safe haven in close proximity to pediatric medical care. The New York City location is the largest facility of its type in the world.

Ronald McDonald New York, on Manhattan's Upper East Side, is unique because it's near 19 cancer treatment and major medical centers. The 13-story brick building, built in 1989, provides temporary housing to as many as 84 families. Though living space within the 70,000 square-foot structure is modern, the systems that served it were original until last year.

“The boiler and chillers were past their life cycle,” says Ike Beyer, owner of Integrated HVAC Systems and Services Inc., the specialized, 30-person mechanical company that partnered with Rochester-based MEP engineering firm, Energy Concepts, for the design/build retrofit that materialized in 2014. “As a non-profit organization, the project's payback and sustainability were equally important as the initial cost.”



Beyer worked with Chris Cafer, associate and senior mechanical engineer at Energy Concepts to design and install new systems at RMH. Both have LEED and CSBA (National Sustainable Building Advisor Program) accredited professionals on staff, and were early adopters of CHP (combined heat and power) — or co-generation technology.

Decades of experience ultimately would lead to a solution that surpassed facility managers' expectations of comfort and sustainability.

"From the inception of this project, the goal was to better serve children and families battling cancer," says Mel Farrell, BSEE, chief engineer at RMH New York.

"As such, we hand-selected the team who would move it forward. Energy Concepts has designed over 80 cogeneration plants in New York State ranging from 75kW to 10mW, and Integrated has flawlessly maintained our facility for years."

'If' before 'how'

In 2011, long before any plans for a retrofit were drawn up, Energy Concepts began a feasibility study to determine if a CHP plant would be right for RMH New York, or if an in-kind equipment replacement offered better value.



Jr. Mechanic Steven Snyder on top of Ronald McDonald House New York.

Needless to say, the two-phase project was formidable, but everyone involved had realistic timeline expectations when work began in December 2013.



The 12-cylinder IntelliGen CHP unit is mounted on the roof of the building.



Ike Beyer, owner of Integrated HVAC Systems and Services Inc, looks at the CHP unit.



Two, high-efficiency Laars NeoTherm boilers are used to supply backup heat and cooling to the structure.



Steven Snyder and Frank Zeires check electrical connections.



Installer Kenny White pipes the boiler injection loop.

"All applications are different, based on energy use trends and the physical structures themselves," Cafer says. "We took a holistic approach; energy models were developed based on past use and projected costs."

The study was funded in part by NYSERDA (New York State Energy Research and Development Authority). After two years of research and data collection, it was determined that on-site cogeneration equipment would provide the heating, cooling and DHW loads, while supplying 95 percent of the building's power needs.

"Making the changes necessary to convert to a CHP system would have yielded a seven or eight-year payback," Cafer says. "But the charity wanted to make huge strides toward sustainability, occupant comfort and cost avoidance, so the decision was made to remove nearly all old mechanical components and start with a clean slate. This only pushed the retrofit's simple payback out three more years, which is very impressive."

"It's more than just an energy consideration; it offers precise control for optimal comfort for kids staying here are going through chemo and radiation therapy."

— Ike Beyer, Owner, Integrated HVAC Systems and Services

Both Beyer and Cafer say the growing adoption of CHP technology in the Big Apple is growing (it's up nearly 400 percent in the past decade). Cafer says that Hurricane Sandy stirred great interest in co-gen. And while much of the grid was down, several buildings they worked in continued operation as usual, courtesy of well-designed CHP systems.

Hardware

Integrated HVAC Systems and Services installed a natural gas-fired IntelliGen CHP unit on the roof. The pre-packaged unit combines a roughly-600HP, 12-cylinder reciprocating engine with a 250KW generator to produce power for the building. Heat from the engine — up to 1.5 million BTU under full load — is rejected into a large plate-and-frame heat exchanger, isolating the CHP unit loop from the building's various needs for heat.

Three loads draw from the heat exchanger: DHW production, the building's two-pipe fan coil units when in heating

mode, and three new, 50-ton Yazaki absorption chillers on the 12th floor. "Absorption chillers are the nearest thing to a magic box," Cafer says. "You put hot water in and get chilled water out."

During the shoulder seasons, there's potential for the CHP unit to produce more thermal energy than the facility needs. In the event there's excess heat, there's a dry cooler on the roof for heat rejection.

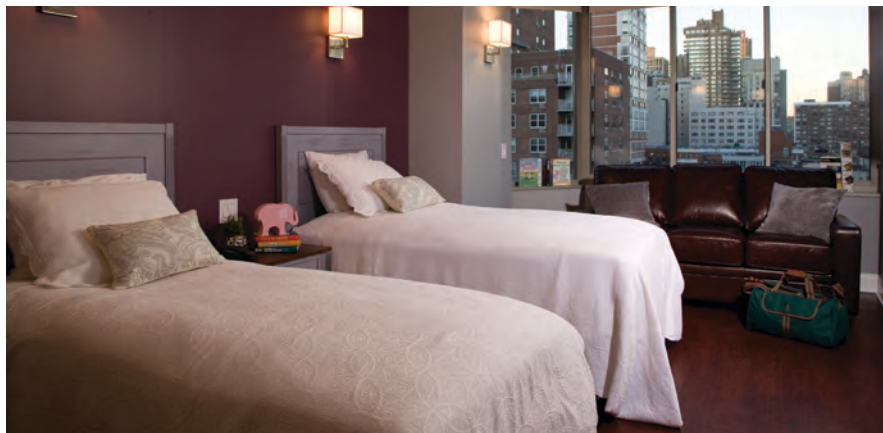
"Being that the absorption chillers are now the only source of cooled water, both the heating and cooling elements in the building are entirely dependent on a source of hot water," Beyer says. "During maintenance of the CHP unit, or in the unlikely event of failure, we needed complete redundancy in the form of condensing boilers. This is the case with almost every co-gen application."

A pair of Laars NeoTherm condensing boilers provides double redundancy. The larger, at 1.7 MMBTU, more than matches the output of the CHP unit. It alone is able to condition the building regardless of the season. The second, 1 million BTU boiler is in place for further peace of mind. If the CHP unit is turned off for any reason, the boilers fire together, each modulating to roughly 50 percent to meet design load.

"The contribution of the boilers in this situation is critical, even more so than in a conventional heating application," says Don Rathe, president of Rathe Associates, the manufacturer's representative firm that helped specify components for the hydronic system and supplied the boilers. "In addition to carrying the heating and snowmelt loads, the cooling system would also go down if the boilers failed to run."

Integrated also replaced the building's existing domestic hot water equipment with two 85-gallon instantaneous, indirect-fired water heaters. A new BAS simplifies the otherwise complex systems, and a snowmelt zone outside now keeps guests safe and eliminates costly winter sidewalk maintenance. Lighting throughout the structure was updated with LED fixtures, a joint project between Integrated and IESG-NY (Innovative Energy Solutions Group – New York), and also partially funded by NYSEEDA.

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Maintaining operation

With all rooms full, Beyer, Cafer and Farrell faced the monumental task of renovating three systems without displacing occupants from a single room or letting comfort levels drop. Their second largest challenge was working within the small, existing mechanical spaces.

"Because the project started in heating season, we began to demolish the old chillers on the 12th floor while the existing boilers in the basement remained online," Beyer says. "Meanwhile, the CHP unit, new boilers and chillers were all rigged to the roof at one time."

Ronald McDonald New York, on Manhattan's Upper East Side, is unique because it's near 19 cancer treatment and major medical centers.

Once the old chillers were removed, the CHP and absorption chillers were installed in time for cooling season, at which point the old boilers were broken down and hauled out. The downstairs boiler room then became a pump room, supplying almost all circulation for the entire structure. All heat exchangers and DHW production equipment are here as well.

Given their small footprint, high efficiency, and Beyer's familiarity with the NeoTherm line, the boiler selection process was brief.

"We've used Laars boilers for years now, even in conjunction with other CHP projects," Beyer says.

Control and comfort

Over the summer, 2,200 square feet of sidewalks and approach in front of the main entrance were removed and re-poured, but not before PEX was tied down to provide a snowmelt solution. For this portion of the project, Rathe donated material, while Integrated donated manpower to ensure safe winter passage for all guests.

After walking over the clear sidewalk and into the building's lobby, visitors now can interact with a screen that displays all the mechanical components and how they cooperate to meet the energy needs within the building.

The display screen also shows energy use and production in realtime, courtesy of a full BACnet control system made by Reliable Controls. Among other things, the new controls were necessary to operate the final component of the retrofit, which is still in the planning phases and slated to begin later this year.

"We're looking to replace the existing two-pipe fan coils with a four-pipe system," Beyer says. "It's more than just an energy consideration; it offers precise control for optimal comfort for kids staying here are going through chemo and radiation therapy. A four-pipe system will allow us to provide heat to one room and air conditioning to the next." **FC**



With 322 locations around the globe, Ronald McDonald House strives to make life easier and more comfortable for families traveling for children to receive cancer treatment.