REDUCING ENVIRONMENTAL IMPACT THROUGH ADAPTIVE REUSE

KEY CONSIDERATIONS FOR ASSESSING THE CONDITION OF EXISTING HYDRONIC EQUIPMENT

> **"Decarbonization and electrification are two of the largest shifts impacting our industry today,** and they directly affect modern hydronic system design. The days of simply relying on nonrenewable resources like coal and natural gas are behind us."
>
> —
>
> Nick Tabar, sales engineer, R.L. Deppmann

Bell & Gossett
a xylem brand

Currently, buildings account for 40% of global energy-related carbon emissions, with a large portion coming from existing structures. Consequently, decarbonizing existing building stock is essential to transform the built environment to one that is healthy, resilient and net zero-emissions.

With nearly 70% of buildings today expected to exist for the next 30 years, emission reduction efforts must shift from new construction to more sustainable approaches like adaptive reuse.

A sustainable alternative to new commercial development, **adaptive reuse involves retrofitting an existing building with the latest environmental technologies** while conserving natural resources and minimizing waste. Even while adaptive reuse poses many benefits, it is imperative that building professionals consider the full scope of an adaptive reuse project before embarking on one.

Assessing equipment for potential reuse

The successful execution of adaptive reuse projects requires careful planning and implementation. A comprehensive assessment of existing hydronic system components and current building conditions offers a better understanding of the original system design and overall equipment selection. **Energy audits, building performance evaluations and environmental impact assessments provide valuable insights into the building's energy consumption, resource usage and environmental footprint.**

When assessing the condition of existing hydronic equipment for potential reuse in a commercial building retrofit, consider the following key factors.

04
EQUIPMENT AGE AND REMAINING LIFESPAN

05
ENERGY EFFICIENCY

06
LOAD CALCULATIONS

07
SYSTEM INTEGRATION

08
CODE AND REGULATORY COMPLIANCE

01 Equipment age and remaining lifespan

Evaluate the age and condition of hydronic equipment, such as boilers, pumps and piping, to help estimate their remaining useful life. Older equipment may be less efficient and more prone to failure.

It's also important to consider ongoing maintenance and operational costs associated with reusing existing equipment as well-maintained equipment will last longer. **As part of its commitment to sustainability and efficiency, Xylem engages in routine audits to assess the sustainability and efficiency of its programs – from its supply chain and order fulfillment, to foundational product analysis to improve overall product life cycle.**

Xylem's recent sustainability report shows progress in these efforts, engaging suppliers in sustainability initiatives through audit programs and corrective action plans.

ONGOING

PROGRESS TO 2025
Continue to evolve and progress both remote and on-site assessments

02

Energy efficiency

Adaptive reuse projects typically produce between **50 to 75% less embodied carbon** than new structures. Electrification of hydronic HVAC systems during adaptive reuse provides additional opportunities to improve energy performance and reduce carbon emissions in existing structures.

Properly assessing and optimizing an existing hydronic system can maximize energy savings during electrification, as demonstrated in the case of a historic hotel renovation.

HISTORIC HOTEL RENOVATION ACHIEVES ENERGY EFFICIENCY WITH HYDRONICS

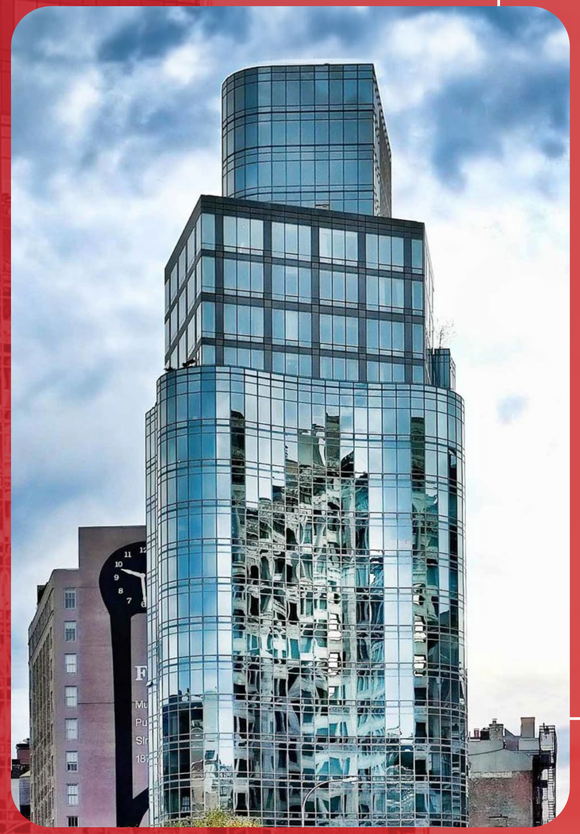
The Shinola Hotel, a 129-room boutique hotel housed in what was the more than a century-old T.B. Rayl Company building, is an example of an adaptive reuse property which retrofitted a hydronic system.

"The developers not only took a legacy building and gave it a facelift inside, but they also upgraded the heating and cooling system," said Alan Jones, senior director of product management, Xylem. "From a sustainability standpoint, you're not only looking at energy consumption but at the total mass of the units and the disposal cost replacement costs of all the hardware involved."

03

Load calculations

Accurate load calculations are essential to assess whether existing equipment has sufficient capacity to meet the new heating and cooling load requirements, especially if the building's usage or zoning needs have changed. This requires designers to consider established engineering principles of performance applied in hydronic system design and operation.



ASTOR PLACE ENERGY IMPROVEMENT PROJECT

The 21-story Astor Place tower in New York City is advancing the ideals of energy conservation and sustainability. Through a collaboration among Xylem, building manager Related Management Co. and the Sustainable Engineering Lab at Columbia University, a retrofit of the building's hydronic HVAC system tested the assumptions of energy efficiency.

The Astor Place Energy Improvement Project consisted of three steps:

1. Conducting an energy assessment of the hydronic system
2. Updating the system with technologically advanced pumps and controls
3. Adjusting the system in real time to evaluate the effects of the HVAC modifications. Right-sized pumps paired with variable frequency drives delivered a 95% reduction in pumping energy, far exceeding expectations

04

System integration

Hydronic systems have smaller piping networks compared to bulky air ducts, allowing for better space utilization. Evaluating the existing hydronic system helps determine if it can be integrated with new electric systems, helping reduce costs and maximize usable floor space.

"Hydronic systems can deftly accommodate energy source upgrades due to their extreme flexibility and long system life. They can easily handle a new energy source. **Using water source heat pumps as your basic hydronic system allows for easy building upgrades and additions in the future without changing out all existing equipment."**

—

Chris Edmonson, president, JMP Co.

05 Code and regulatory compliance

Ensure that existing hydronic equipment complies with current building codes, energy standards and environmental regulations. Non-compliant equipment may need to be replaced or upgraded. Such standards are regularly updated and determined by organizations like ASHRAE, the governing society responsible for developing building design as well as energy efficiency standards and guidelines for the new construction environment.

KEY UPDATES TO THE ASHRAE ENERGY EFFICIENCY STANDARD FOR EXISTING BUILDINGS:

The latest edition of the ANSI/ASHRAE/IES Standard for Energy and Emissions Building Performance Standard for Existing Buildings includes carbon emissions performance requirements for existing buildings, as well as emissions targets for dozens of building types.

KEY UPDATES INCLUDE:

New metrics for establishing greenhouse gas emissions targets, along with continued improvements to energy efficiency and performance in existing buildings

Building requirements to:

- Establish an energy management plan incorporating efficient, low-carbon equipment into capital replacement
- Achieve energy and emissions performance goals
- Implement an operations and maintenance program for continued building performance

Energy audit and decarbonization assessment and a separate compliance process for building types that do not have energy or emissions targets

Guidance for jurisdictions seeking to develop their own energy consumption and/or greenhouse gas emissions targets

AS THE COMMERCIAL BUILDING INDUSTRY ACTIVELY WORKS TOWARDS A MORE SUSTAINABLE, ENERGY-EFFICIENT FUTURE, it's imperative to assess existing hydronic equipment conditions to help building owners and designers make informed decisions to achieve sustainability goals and maximize energy savings.

LEARN MORE | >

STAY TUNED FOR OUR FULL WHITE PAPER ON ADAPTIVE REUSE LAUNCHING IN OCTOBER.

Bell & Gossett
a xylem brand

BUILDING BETTER FUTURES