



The Refrigerant Shift Nobody Is Ready For

New York is advancing one of the most aggressive refrigerant regulations in the country under 6 NYCRR Part 494. Unlike the current transition to A2L refrigerants, which is just beginning to reach the market, the next phase is far more disruptive and largely unrecognized outside the HVAC industry. For engineers, this is not theoretical. The dates exist. The equipment categories are defined. And the implications for system design are significant.

Most of the industry is focused on the current transition to lower-GWP refrigerants in the 400 to 700 range, which becomes the standard for most air conditioning and heat pump equipment in 2025. That shift alone has required redesign of equipment, updated safety standards, and retraining across the industry. However, New York is already moving beyond that baseline. The first clear step into ultra-low GWP comes on January 1, 2028, when many commercial refrigeration applications, including walk-in coolers and freezers, will be required to use refrigerants with a global warming potential of 10 or less. That is the opening move. The larger concern is what follows.

The state is positioning to expand these same ultra-low GWP limits into comfort cooling equipment in the early 2030s, generally understood to be in the 2032-2034 range. This would extend the requirement into rooftop units, split systems, heat pumps, and VRF systems. While the exact dates are still being finalized by equipment category, the direction is clear and the timeline is not far off. What makes this particularly significant is that New York is effectively alone in pursuing this level of restriction at this scale. Federal policy under the AIM Act is driving a transition to moderately low-GWP refrigerants, not ultra-low. Even California evaluated similar ultra-low thresholds and ultimately chose not to apply a broad GWP less than 10 requirement to comfort cooling systems, instead aligning with limits that reflect what can realistically be deployed today. New York is taking a different path.

From an engineering standpoint, a GWP threshold of 10 is not simply another refrigerant change. It eliminates nearly all conventional and emerging HVAC refrigerants, including those just being introduced. The remaining options are limited to CO₂, ammonia, hydrocarbons such as propane, and a small number of emerging alternatives. Each comes with significant tradeoffs involving pressure, flammability, toxicity, or system complexity. None are drop-in replacements. This distinction matters. The regulation applies to the manufacture, sale, and installation of new equipment, not to systems already in operation. However, as refrigerants are phased down and equipment availability shifts, existing systems will become increasingly difficult and expensive to maintain. Replacement-in-kind will not be possible. Over time, this creates a forced transition whether it is explicitly stated or not.

Retrofit is not a realistic path in most cases. These refrigerants require fundamentally different system designs, not minor adjustments. CO₂ systems operate at much higher pressures. Hydrocarbons introduce strict charge limits. Ammonia is generally restricted to industrial applications. In practice, compliance means full system replacement. At the same time, codes and standards are still catching up. Widespread use of these refrigerants across comfort cooling applications will require alignment across mechanical, fire, and building codes. That work is ongoing, but it is not fully resolved. The timeline is the core issue. Within a short period, the industry is expected to complete the current transition, develop and deploy an entirely new class of systems, update codes, and train the workforce. That is an aggressive schedule for a change of this magnitude.

Compounding this is the fact that the regulation is already being actively challenged by the industry. The Air-Conditioning, Heating, and Refrigeration Institute (AHRI) and Heating, Air-conditioning & Refrigeration Distributors International (HARDI), representing manufacturers and distributors, have filed legal action against New York State and are actively lobbying against the rule. Their position is direct. The timeline does not align with available technology, manufacturing capacity, safety standards, or field readiness. They have also raised concerns that the regulation creates a patchwork of requirements that conflict with the federal AIM Act and could lead to equipment shortages and long-term service issues.

For engineers, the impact is immediate. Systems being designed today will still be in service when these requirements take effect. That raises fundamental questions about long-term viability, serviceability, and replacement. New York has established a clear sequence. The current A2L transition is only the first step. The 2028 requirement for ultra-low GWP in refrigeration is already defined. Expansion into comfort cooling in the early 2030s is coming. This is not just an incremental change. It is a fundamental shift in how HVAC systems will be designed going forward, and it is happening faster than most of the industry realizes. Sage Engineering is actively monitoring these developments and will continue to provide updates as additional guidance, rulemaking, and industry responses evolve.





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Understanding Section C406 in the 2025 NYS Energy Code – Part 2

Getting the Most Plumbing Credits Under C406

The C406 energy credits are divided into four main categories; Envelope (E), HVAC (H), Service Water Heating (W) and Lighting/Power (L, P, Q). This article focuses on plumbing (Service Water Heating) in Section [C406.2.3](#). These credits are straightforward and low-cost compared to HVAC and envelope and in many cases they can cover a meaningful portion of the required credits.

How Plumbing Credits Work (C406.2.3)

Plumbing credits are broken into:

- Water heating system selection (W01–W03)
- Distribution and system measures (W04–W07)

For most projects, plumbing credits can be achieved with a very simple approach:

Select a primary water heating system:

- Heat pump water heater W02 ([C406.2.3.1.2](#)) , or
- High-efficiency gas W03, ([C406.2.3.1.3](#)) or
- Point-of-Use heaters W05 ([C406.2.3.3](#))

Add both of the following to W02 or W03:

- W04 increased pipe insulation ([C406.2.3.2](#))
- W06 thermostatic balancing valves ([C406.2.3.3](#))

Other less likely credits:

W01 – Heat Recovery / Renewable Water Heating ([C406.2.3.1.1](#)) is another option for water heaters but difficult to implement unless a waste heat source is available or solar water heating is entertained. Either option is expensive and more complex than most Owners are willing to consider.

W07 – Adding heat trace in lieu of the W04 increased pipe insulation. W04 is less expensive and more practical.

W08 – Adding meters in R-2 occupancies only.

W09 – R-2, R-4, I-1 and R-1 occupancies only. This credit requires a reduction of water usage per Table C406.2.3.5 for dwelling units, sleeping units and guestrooms.

Example Credit Calculations:

The majority of systems that an engineer in Albany, NY will design will likely be in Business, Assembly, Residential or Institutional occupancies. The table below shows the typical achievable points in those occupancy types in Albany's Climate Zone 5 for the three water heating options. The Heat Pump and High-Efficiency Gas columns include credits for Measure W04 (Increased Pipe Insulation) and Measure W06 (Thermostatic Balancing Valves).

Occupancy Group	Heat Pump Combo (W02+W04+W06)	High-Eff Gas Combo (W03+W04+W06)	Point of Use (W05)
R-2, R-4, I-1 (Multi-family / Congregate)	98	29	N/A
R-1 (Hotel / Motel)	37	13	N/A
A-2 (Restaurant)	29	10	N/A
B (Office)	10	13	20
I-2 (Hospital / Healthcare)	5	3	N/A

**Credits for W03 are adjusted to 30% of base value for Group I, R, and A occupancies due to likely high-input system requirements (> 1,000 MBH) as required by [C406.2.3.1.3](#).*



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Reroofing, Snow Loads, and Roof Insulation Under the 2025 Codes

Reroofing projects are often bundled with other capital work, such as building upgrades or rooftop replacements, even when the existing roof has not yet failed. In those cases, reroofing is typically viewed as a non-structural scope item.

Under the 2025 New York State codes, that assumption is no longer always valid.

The 2025 Building Code of New York State adopts ASCE 7-22, which increases ground snow loads in parts of New York. At the same time, the 2025 Energy Code increases required roof insulation values. Increased insulation reduces heat loss through the roof, which lowers natural snow melt and can result in greater snow accumulation remaining on the roof for longer periods.

For existing buildings, this interaction can increase actual roof snow loads beyond what the original structure was designed to support. As a result, a reroofing project that appears non-structural at first glance may require structural review.

New York State explicitly addressed this condition during code rulemaking. Sections [C503.1](#) and R503.1 of the 2025 Energy Code state:

“Alterations shall not create an unsafe or hazardous condition or overload existing building systems.”

The Department of State further explains that this provision:

“allows a designer/owner to use resources such as an engineering analysis to show the limitations of the capacity of the existing structure to safely support additional loads resulting from increased insulation requirements.”

“In cases where the increased insulation would overload the capacity of the existing structural elements, the Energy Code permits engineering analysis to be used to limit the amount of required insulation to an amount which does not create an unsafe or hazardous condition or overload an existing building system.”

The intent of the code is not to force automatic structural reinforcement, nor to bypass energy requirements, but to require coordination. Structural engineers play a central role in evaluating existing roof capacity and informing insulation and reroofing decisions.

The full New York State code interpretation is available [here](#).

Bottom Line:

Under the 2025 codes, reroofing projects may trigger structural considerations due to the combined effects of increased snow load assumptions and higher insulation requirements. The Energy Code explicitly allows structural engineering analysis to guide compliant solutions, including reduced insulation thickness, but this requires early coordination among the owner, architect, and structural engineer.





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UPCOMING LIVE WEBINARS AND SEMINARS

This month's lists of free live webinars and seminars is below. Each offers at least one PDH and qualifies as a *Course of Learning* – a format that includes traditional classroom-style courses or live webinars with real-time interaction with an instructor. As a reminder, New York State requires that 18 of the 36 total continuing education hours for professional engineers be completed through *Courses of Learning*.

All webinars listed below are free. The ASHRAE and ASPE meetings are in-person and have a cost of \$50 reimbursed by Sage for Sage employees.

Date	Topic	Host	Time (ET)	Registration Link
April 7	Advancing Higher Education Campuses with High-Performance Applied HVAC Systems	NoonPi	1:00 PM – 2:00 PM	Register here
April 8	Using HPDs, EPDs and LCAs in Design	GreenCE	12:00 PM – 1:00 PM	Register here
April 16	ASPE Capital Region Chapter Meeting (Topic TBD) (In-Person)	ASPE Capital Region NY	11:30 AM- 1:00 PM	Register here
April 21	ASHRAE Northeast April Meeting – Centrotherm Plant Tour & Life Member Night (In-Person)	ASHRAE Northeast Chapter	5:00 PM – 8:00 PM	Register here
April 23	Pressure Boosting in the Context of Energy Optimization	Caleffi (Coffee with Caleffi)	1:00 PM – 2:00 PM	Register here
April 23	Optimizing Cooling Tower and Chiller Systems for Part-Load Efficiency	Compressed Air Best Practices / Industrial Utility Efficiency (Sponsored by ABB)	2:00 PM – 3:00 PM	Register here
April 30	Integrating Lighting and Controls with Practical Applications	Consulting-Specifying Engineer / WTW Media	2:00 PM – 3:00 PM	Register here
April 30	Critical Power: Focus on Data Center Power System Design Best Practices	Consulting-Specifying Engineer / WTW Media	2:00 PM – 3:00 PM	Register here





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HVAC & Energy Upgrades NY State Military Museum, Saratoga Springs, NY

Upgrading building systems in a 120-year-old armory is never straightforward. At the Saratoga Military Museum, the challenge was not just replacing aging HVAC equipment, it was doing so while preserving artifacts, maintaining operations, and respecting a historic structure.

Sage Engineering led a multi-phase HVAC and energy upgrade project for the 33,000-square-foot facility, originally constructed in 1905. The existing systems lacked the temperature and humidity control required for proper artifact preservation and had reached the end of their useful life.

The work was executed in three carefully planned phases to align with funding constraints and maintain continuous museum operations. The first phase, completed at approximately \$1.3 million, focused on the basement level and core mechanical systems. This included replacing the aging steam heating system with a central air handling unit, a dedicated unit for critical spaces, and a steam-to-hot-water heat exchanger. A building management system was also installed to support future expansion.

The second phase, completed at approximately \$1.8 million, addressed the museum exhibition and drill hall spaces. Outdated split-system units were replaced with 4-pipe fan coil units served by a new air-cooled chiller. Significant electrical upgrades were required to support the increased load associated with the modern HVAC systems.

The third phase, completed at approximately \$2.5 million, focused on ventilation and system expansion. A high-capacity heat recovery ventilation unit and new ductwork improved air distribution throughout the building. The remaining steam systems were replaced with high-efficiency hot water boilers, and HVAC systems were extended into administrative areas. This phase also required coordination with structural and architectural elements, including exterior modifications subject to historic preservation requirements.

The project was delivered in close collaboration with Spring Line Design (architecture), Jade Stone Engineering (electrical), and Adelaide (hazardous materials design), ensuring full coordination across all disciplines and compliance with state and preservation requirements.

This project highlights the importance of phased design, system integration, and coordination in occupied, historically sensitive facilities. The result is a modern, energy-efficient HVAC system that supports both preservation and performance while maintaining the integrity of the historic armory.

