

Part 494 Variance Application Form

version 1.6

(Submission #: HQC-CTWA-MV5AE, version 2)

Details

Submitted 5/22/2025 (0 days ago) by Audra Gale

Submission ID HQC-CTWA-MV5AE

Status Submitted

Active Steps Agency Review of Submission

Form Input

Application Information

Instructions

Provide the information requested in the fields below to begin your application.

Application Contact Information

Contact Information

First Name Ari
Last Name Goldstein

Title
Senior Vice President, Development

Organization Name
Extell Development Company

Phone Type	Number	Extension
██████	██████████	

Email
████████████████████

Business Address
805 3RD AVE
FL 7
NEW YORK, NY 10022-7586
USA

Business Ownership Status

Parent Company

Description of business activity or product description. Any supporting documents can be added below.

Extell is a full-service real estate development company based in New York City.

Description of Applicant's relationship to the product. (For example: product or system manufacturer, distributor, reseller, owner/operator, etc.) Any supporting documents can be added below.

Extell seeks this variance for VRF systems scheduled to be installed in its project located at 740 Eighth Avenue in Manhattan.

For which Part 494 section(s) is a variance being requested?

Section 494-1.4: Prohibitions

Attachments

NONE PROVIDED

Comment

NONE PROVIDED

Variance Request

Instructions

In this section, the Applicant will indicate the type of variance for which they are applying.

Please see [§ 494-1.8 Variances](#) for more information on the types of variances.

Which type of variance is this application for?

Impossibility

What is the length of time for which this variance is requested? (years, months, etc)

1

Provide the earliest date for when compliance will be achieved.

01/01/2028

Impossibility Variance Justification

Instructions

A complete application for an Impossibility Variance must demonstrate that the Applicant cannot comply with the regulatory requirements. To apply for this variance, the Applicant shall submit an Application that demonstrates the following criteria:

1. A compliant substance is not currently or potentially available or a component needed for repair is not currently or potentially available; and
2. A variance will not increase the overall risk to human health or the environment; and
3. The Applicant has used best efforts to anticipate and address the impossibility and any potential noncompliance, including minimizing any adverse effects of the greenhouse gas emissions related to noncompliance or making all efforts to repair all identified leaks and to operate and maintain equipment in accordance with manufacturer recommendations, where applicable.

Explain why the compliant substance(s) or component(s) are not currently or potentially available

Extell's project was designed and approved using R410A refrigerant prior the adoption of NYDEC's Part 494 rule. The leading manufacturers of VRF systems maintain that neither equipment with A2L refrigerants nor the critical specifications for designers are currently available, making it impossible for the building to use the new refrigerant. The new equipment (when available) will likely have different sizes and design requirements and are not a drop-in replacement for the equipment included in the building design. There are also NYC DOB/FDNY code changes that must be implemented to allow for new refrigerant. Even if this were resolved, it would require months of redesign and refilling. The costs to the project if this variance is not approved is estimated to be over \$100 million. Because the project is an active construction site and in order to achieve the EPA requirement for manufacturing or importing by January 1, 2026, the R410A VRF equipment has already been awarded and released.

Explain how an approved variance will not increase the overall risk to human health or the environment. Additional documentation can be attached below.

EPA granted a 2-year extension of the VRF system installation date (to January 1, 2028) for developers with permits issued prior to October 5, 2023. 89 Fed. Reg. 100381. EPA found that the extension would not increase risk to health or the environment because it would prevent the environmental harm caused by stranded inventory/re-construction of projects already well along on the construction timeline. Id. at 100384-85. The risk of stranded inventory is high, as Extell has already purchased systems needed for its project. VRF systems are only 0.49% of total HVAC equipment sold annually. Id. at 100383. Given that this extension will only apply to Extell's pre-permitted VRF systems, these systems will make up a miniscule fraction of total HVAC emissions that the DEC's Part 494 Rule intends to regulate. This variance will not yield significant emissions. Our projections show a reduction in emissions due to implementation of the Technical Requirements that reduce leaks.

Explain how the Applicant has put forth their best efforts to anticipate and address the impossibility and any potential noncompliance, including minimizing any adverse effects of the greenhouse gas emissions related to noncompliance or making all efforts to repair all identified leaks and to operate and maintain equipment in accordance with manufacturer recommendations, where applicable. Include any attachments as needed below.

To mitigate harmful GHG impacts from potential leakage of R410A refrigerant, the project will follow the attached Technical Requirements which include Appendix A Refrigerant Charging and Leak Prevention Requirements. This includes requirements for flared and brazed joints, pressure testing, leak testing and contractor certifications.

Attachments

[2025-05-22 Impossibility Justification Attachment.pdf - 05/22/2025 05:54 PM](#)

Comment

NONE PROVIDED

Compliance Plan

Compliance Plan Instructions

Provide a compliance plan that describes in detail how, if a variance is granted, compliance will be achieved as expeditiously as possible. The Compliance Plan must demonstrate all of the following criteria:

1. The method by which compliance will be achieved.
2. Milestone achievements and dates.
3. Description of any negative impacts to human health or the environment that may result from the granting of a variance.
4. A detailed explanation of efforts that may be implemented to curtail noncompliance in lieu of obtaining a variance.
5. A mitigation plan that demonstrates how the Applicant will reduce excess emissions of regulated substances to a level equal to or below what would have been emitted had the Applicant complied, and how the Applicant will mitigate any negative impacts to human health or the environment (see further below within this section).
6. A greenhouse gas analysis (see further below within this section, where applicable). For variance requests based on impossibility quantification of GHG emissions resulting from normal business-as-usual operations as it directly relates to the continued use of a regulated substance in sectors listed in section 494-1.4. This includes quantification of the direct emissions of regulated substances resulting from the manufacture, use, and disposal of equipment and products in New York State with all calculations, based on the average lifetime of the equipment or product that will continue to use prohibited substances. Applicant must include all calculations used to calculate GHG emissions estimates, including emission factors (e.g., refrigerant charge capacity and leak rate as defined in section 494-1.3, and regulated substances used over the average lifetime of the equipment, system, or product).

Compliance Plan Checklist: All items below are required.

The submitted compliance plan describes the method by which compliance will be achieved

The submitted compliance plan describes any negative impacts to human health or the environment that may result from the granting of a variance

The submitted compliance plan describes milestone achievements and dates

The submitted compliance plan includes a detailed explanation of efforts that may be implemented to curtail noncompliance in lieu of obtaining a variance.

The mitigation plan (see next form)

(For Impossibility Variance requests ONLY) Greenhouse gas (GHG) Emissions from Business-As-Usual Operations analysis (see next question, if applicable).

Compliance Plan Documents

[2025-05-22 Compliance Plan Attachment.pdf - 05/22/2025 05:56 PM](#)

Comment

NONE PROVIDED

Greenhouse gas (GHG) Emissions from Business-As-Usual Operations

For variance requests based on impossibility, quantification of GHG emissions resulting from normal business-as-usual operations as it directly relates to the continued use of any regulated substance in sectors listed in section 494-1.4.

This includes quantification of the direct emissions of regulated substances resulting from the manufacture, use, and disposal of equipment and products in New York State with all calculations, based on the average lifetime of the equipment or product that will continue to use prohibited substances.

Applicant must include all calculations used to calculate GHG emissions estimates, including emission factor and other factors, such as refrigerant charge capacity, leak rate (as defined in section 494-1.3), and regulated substances used over the average lifetime of the equipment, system, or product.

Business-as-Usual Emissions Checklist: All items below are required.

The submitted emissions assessment includes emission factors (e.g., refrigerant charge capacity and leak rate as defined in section 494-1.3, and regulated substances used over the average lifetime of the equipment, system, or product)

The submitted emissions assessment includes all calculations

The submitted emissions assessment includes quantification of the direct emissions of regulated substances resulting from the manufacture, use, and disposal of equipment and products in New York State that will continue to use prohibited substances in sectors listed in section 494-1.4 of this Part.

The submitted emissions assessment considers the average lifetime of the equipment, system, or product(s)

Business-As-Usual Emission Calculation Documents

[2025-05-22 GHG Assessment Summary and Methodology Attachment.pdf - 05/22/2025 05:57 PM](#)

Comment

NONE PROVIDED

Mitigation Plan

Submit a mitigation plan that demonstrates how the Applicant will reduce excess emissions of regulated substances to a level equal to or below what would have been emitted had the Applicant complied and how the Applicant will mitigate any negative impacts to human health or the environment.

The mitigation plan may include actions such as: to minimize usage of regulated substances, efforts to reduce leaks or venting of regulated substances, or actions to recycle or destroy high-GWP refrigerant(s).

For variance requests based on impossibility, the Applicant must include all calculations used to calculate emissions estimates, including emission factors. These calculations may include refrigerant charge capacity and leak rate as defined in section 494-1.3 and regulated substances used over the average lifetime of the equipment, system, or product.

Mitigation Plan Checklist: All items below are required.

The submitted mitigation plan demonstrates how the Applicant will reduce excess emissions of regulated substances to a level equal to or below what would have been emitted had the Applicant complied and how the Applicant will mitigate any negative impacts to human health or the environment

(For Impossibility Variance requests ONLY) The submitted mitigation plan includes all calculations used to estimate emissions, including emission factors.

Mitigation Plan Documents

[2025-05-22 Mitigation Plan Attachment.pdf - 05/22/2025 05:59 PM](#)

Comment

NONE PROVIDED

Confidential Business Information Declaration

Instruction

This section is for applicants to self-identify whether there is Confidential Business Information (CBI) in this application. For guidance on what CBI entails and the process, please review the Form instructions and 6 NYCRR Part 616.7.

If the Applicant self-identifies Confidential Business Information to be within this form, once determined by the Department, certain information for this specific process will be kept confidential with restricted access to the public (as described in 6 NYCRR Part 616.7) provided adequate justification is attached as supporting documentation to the application.

There is no confidential business information in this application



IMPOSSIBILITY VARIANCE JUSTIFICATION

MEMORANDUM

Date: 5/22/2025

To: New York State Department of Environmental Conservation

From: Ari Goldstein, Senior Vice President, Extell Development Company

Re: Impossibility Variance Justification for 740 Eighth Avenue

I. BACKGROUND

Extell is a full-service real estate development company based in New York City. Since 1989, Extell has developed residential, commercial, office, hospitality, and mixed-use properties across the country. Extell's company portfolio exceeds 25 million gross square feet of past and future developments and includes notable projects such as the Central Park Tower in New York City.

Extell's construction projects are large, highly complex, and are typically designed and permitted several years in advance of the actual start of construction. Extell's developments use heating, ventilation, and air conditioning ("HVAC") equipment containing hydrofluorocarbons ("HFC") that comply with state laws and local building codes. In particular, one ongoing Extell project, which is the subject of this variance request, has been designed to use variable refrigerant flow ("VRF") systems for heating and cooling. These systems are industry standard for large residential and hotel projects. And, as explained below, all relevant approvals secured to date have been on the basis of this key design element.

More specifically, Extell is currently in the process of constructing an 890,000 gross square foot mixed-use commercial construction project at 740 Eighth Avenue in the Manhattan borough of New York City ("the Building"). The Building will be over 50 stories tall; the first floor of the Building will be retail space, and the remaining floors will be a hotel with over 1,000 rooms and other accessory hotel uses.

Design of the Building began in December 2020. Extell filed the building, including the R410A VRF systems, and received approval from the NYC DOB prior to October 5, 2023. This was prior to the United States Environmental Protection Agency ("EPA")'s adoption of the Technology Transitions Rule ("TT Rule") and before New York's current Part 494 regulations restricted the installation of VRF systems. Construction of the Building's foundation began in August, 2022, and was completed in February, 2024. The Building is now in a multi-year phased construction schedule. Installation of the VRF systems will be complete by January 1, 2028 and the hotel component of the building will be substantially complete in mid 2028. The completion date for the entire building, including all of the accessory components will be in 2029.

The hotel portion of the building is designed around the Daikin T-Series Water-Cooled VRF system. The design utilizes the RWEQ Series water-cooled condensers in the mechanical rooms on the guest rooms floors combined with the FXMQ fan coil units as the terminal box and the BSF branch selector boxes. This entire system is an R410A-based refrigerant system.

Specifically, the approved designs include the use of VRF systems with RWEQ-Series water-cooled condensers for cooling and heating of the hotel floors and FXMQ Fan Coil Units ("FCUs"). The condensers are between 8-tons and 12-tons. As designed, the refrigerant piping will run from the water-cooled condenser unit to a BSF series branch selector box. The selector boxes will vary in size from 4-port to 8-port. The refrigerant piping will then run from the branch selector box to an FXMQ series FCU at the terminal location. The tonnage of the FCUs ranges from 0.5-tons to 2-tons depending on the guest rooms. The designs also include similar water-cooled VRF



systems to feed the low voltage feeding rooms on the hotel floors. These condensers will range from 16-ton to 24-ton condensers with 2.5-ton to 4-ton FCUs.

All of the aforementioned VRF systems and supporting equipment have been included in Extell's approved design plans for the Building since the beginning phase of the design planning process in 2020. Due to the phased construction schedule for the Building and the compliance challenges set forth above, Extell will be unable to install the VRF systems by the January 1, 2027 NYS DEC compliance date for the Building. Accordingly, Extell cannot comply with the requirements set forth in Part 494 and requests a one-year impossibility variance to be able to install its permitted equipment until January 1, 2028. This variance would conform to what is allowed under the federal regulations.

Specifically, the Building will comply with the EPA rule issued in December 2024 that allows for the installation of R410A VRF systems by January 1, 2028 if the following conditions are met:

1. An approved building permit was issued prior to Oct 5, 2023,
2. The building permit approves the use of the prior refrigerant, and
3. VRF components are manufactured or imported into the US prior to Jan 1, 2026

Given the size of the Building and the phased construction schedule the VRFs will not be able to be installed until January 1, 2028 and we are requesting a variance until this date. Keep in mind that the definition of install for a VRF system is not easy to meet. The units are not simply purchased and installed on the floor like a pre-packaged air conditioner. For VRF systems it is required to build the foundations, superstructure, install façade, framing, then bring in the VRF components, which are not considered installed until all of the parts are connected and charged.

As described below, Extell's situation satisfies each of the impossibility variance criteria: (1) a compliant substance is not currently or potentially available; (2) a variance will not increase the overall risk to human health or the environment; and (3) Extell has used best efforts to anticipate and address the impossibility and any potential noncompliance. 6 NYCCR § 494-1.8(b)(1)(i-iii).

II. COMPLIANT SUBSTANCES ARE NOT AVAILABLE FOR THE BUILDING

There is currently no available compliant R32 VRF system that Extell could install in the Building. The Building was designed and permitted to accommodate R410A Daikin brand VRF systems. Daikin has informed Extell that it does not currently offer VRF systems with low-GWP refrigerants that could be dropped-in to the existing design of the Building. Further, manufacturers do not allow customers to choose their refrigerant when VRF systems are purchased – purchasers of VRF systems are provided with whatever refrigerant has been standardized for the particular piece of equipment. As a result, developers like Extell are unable to design buildings to accommodate VRF systems that use low-GWP refrigerants, because at this time, Extell does not have any information on the specifications and requirements of those systems or the refrigerants they will ultimately utilize. Most notably, Extell has already purchased the VRF systems that it plans to install in the Building.

VRF systems are commonly used in residential and hotel developments. They are energy efficient, small footprint, and low profile with favorable acoustics. There are no other HVAC technologies that can fit into the existing building design. Other systems, that may be less energy efficient, cannot be used without an extraordinary amount of redesign and refiling with significant cost impacts. The entire building is designed and coordinated around the VRF system, the VRFs have been ordered to comply with the construction schedule and the EPA import requirements, and building is actively under construction. The building was designed, filed, and approved before any EPA or DEC refrigerant changes were put into place.

EXTELL

Extell also cannot design buildings for the currently approved VRF systems and hope for a drop-in low-GWP refrigerant to become available for those systems, because VRF system refrigerants cannot be swapped 1:1 due to differences in pressures and allowable volumes between A1 and A2L systems. The varied size of different VRF systems impacts the entire design of the building – such as the number and size of closets and the required piping. To date, manufacturers have not been able to provide cut sheets – i.e., the size and performance specifications that building developers require for purposes of design and permitting -- or pricing estimates for VRF systems that use low-GWP refrigerants. Therefore, it is impossible for developers to know exactly how much additional space is required and how much the equipment will cost. Because the design of a building is so specific to the type of VRF unit that is intended for use, it is impossible for developers to modify their building designs to account for the additional space utilized by the new VRF equipment without the exact specifications of that new equipment. Because these systems and their specifications are not available, developers cannot place orders for the equipment and have no guarantee that such equipment, even if it exists by the compliance deadline, will be commercially available in the marketplace in the quantities needed for compliance. In addition, there are conflicts with the NYC DOB and FDNY codes for the new refrigerant that have not yet been issued.

Even if the foregoing were resolved, it would require months of redesign and refile. **The costs to wait for new equipment design information from the manufacturers, redesign, refile, and pause then restart construction is estimated to be over \$100 million in additional interest and carry costs, real estate taxes, fees, and insurance.** Further, because the project is an active construction site and in order to achieve the EPA requirement for manufacturing or importing by January 1, 2026, the R410A VRF equipment has already been awarded and released. Thus, design modification for Extell's Building is simply not possible at this point and Extell is unable to meet NYS DEC's January 1, 2027 VRF installation deadline.

III. A VARIANCE WILL NOT INCREASE THE OVERALL RISK TO HUMAN HEALTH OR THE ENVIRONMENT

A variance would not increase the risk to human health or the environment. The United States Environmental Protection Agency ("EPA") has already approved an extension of the VRF system installation deadline for projects that received building permits prior to October 5, 2023. *See* 89 Fed. Reg. 100381 (Dec. 12, 2024) ("VRF Rule"). In doing so, EPA found that this extension would not cause harm to human health or the environment. *Id.* NYSDEC should reach the same conclusion.

Without a variance, Extell's R410A VRF systems will be stranded equipment. EPA has acknowledged that stranded equipment causes environmental harm and economic burden. *See* Technology Transitions Rule, 88 Fed. Reg. 73098, 73213 (Oct. 23, 2023). In contrast, there is very miniscule environmental benefit to preventing the installation of Extell's pre-permitted VRF systems. According to EPA, VRF systems only make up less than one percent of all HVAC equipment sales are for VRF systems. 89 Fed. Reg. at 100383. When further limiting that already small universe of VRF systems to those that were pre-permitted for installation prior to DEC's rule, the number shrinks substantially. EPA found that allowing that small universe of pre-permitted VRF systems to be installed nationwide would not harm human health or the environment. *Id.* at 100381. Accordingly, approving a variance only for Extell's pre-permitted VRF systems will not have an impact on human health or the environment. In contrast, without a variance, Extell will have stranded VRF systems that it will need to dispose of and will face substantial delays; both activities could cause more environmental harm than if the variance was granted.

Furthermore, based on the attached GHG Assessment and Mitigation Plan, we do not believe that this variance will yield significant emissions compared to a compliant strategy. In fact, our projections show a reduction in emissions due to the implementation of the Technical Requirements shown in the attached that reduce refrigerant leaks.



IV. EXTELL HAS USED ITS BEST EFFORTS TO ADDRESS THE IMPOSSIBILITY AND ANY POTENTIAL NONCOMPLIANCE

Based on our GHG Assessment and our Mitigation Plans, we do not believe that this variance will yield significant emissions compared to a “compliant” strategy – in fact would yield significantly less. This is because of rigorous protections to reduce refrigerant leaks, outlined in our Technical Requirements.

V. SUMMARY

In summary, it is not possible for this project to comply with the DEC’s VRF installation completion date of January 1, 2027. We request that DEC allow until January 1, 2028, which is when the VRF installation will be complete for this project and is consistent with the EPA rules published in December 2024.

If the analysis that we have provided is not sufficient to DEC we would request that our application be considered in parallel under the Economic Hardship category. Alternatively, in lieu of a variance we would request an enforcement discretion memo that simply states that DEC will conform to EPA’s rules issued in December of 2024 with respect to VRF installation deadlines for projects that were filed prior to October 5, 2023.

Lastly, we request that if NYS DEC accepts the variance that it not be subject to a public review process. Firstly, because the variance requested herein is consistent with the one granted to HPD, and secondly, the project has a signed term sheet and is on track to close on construction financing prior to the 30 days that it would take for a public review process.



COMPLIANCE PLAN

MEMORANDUM

Date: 5/22/2025

To: New York State Department of Environmental Conservation

From: Ari Goldstein, Senior Vice President, Extell Development Company

Re: Impossibility Variance Compliance Plan for 740 Eighth Avenue

We are requesting until January 1, 2028 to complete installation of VRFs containing R410A. This request is based on the following.

The project meets the criteria in the rule published by EPA in December 2024 that allows until January 1, 2028 for installation of VRFs that meet the following criteria:

- An approved building permit was issued prior to Oct 5, 2023
- The building permit approves the use of the R410A refrigerant
- VRF components will be manufactured or imported into the US prior to January 1, 2026

The project needs until January 1, 2028 because it is a large building (over 1,000 feet tall with over 1,000 hotel rooms) and installing VRF systems in a new construction building is a time-intensive process. The units are not simply purchased and installed on the floor like a pre-packaged air conditioner. For VRF systems it is required to build the foundations, superstructure, install façade, framing, then bring in the VRF components, which are not considered installed until all of the parts are connected and charged.

Based on our GHG Assessment and Mitigation Plan, we do not believe that this variance will yield significant emissions compared to a “compliant” strategy – in fact our projections show a reduction in emissions. Details for how we arrived at this are outlined in the Mitigation Strategy (outlining how the project will reduce refrigerant leaks) and GHG Assessment Methodology (which compares the emissions from our proposed Mitigation Strategy to a “Compliant Strategy” which assumes the projects would be redesigned using R32 refrigerant and follow the legal requirements for leak protections rather than enhanced protections which were written specifically to address R410A). This is because the project has rigorous protections to reduce refrigerant leaks.

Note that in the absence of this variance being granted, the project would need to be halted to allow for design information to be provided by manufacturers of VRF equipment using R32 refrigerant (such information does not exist today), NYC DOB and FDNY would need to issue regulations regarding R32 refrigerant, the project would need to be redesigned and refiled with DOB, and new equipment would need to be purchased. It is estimated that this delay would cost the project over \$100 million in additional interest and carry costs, real estate taxes, fees, and insurance. Furthermore the prior released equipment would need to be discarded and new equipment would need to be purchased when available, which would be a significant additional cost.

If this variance were not granted it would also be inconsistent with DEC’s stated efforts to align with EPA regulations and the enabling law that requires DEC to implement regulations to minimize costs, be equitable, and consider potential burdens and costs associated with regulatory action.



MITIGATION PLAN

MEMORANDUM

Date: 5/22/2025

To: New York State Department of Environmental Conservation

From: Ari Goldstein, Senior Vice President, Extell Development Company

Re: Impossibility Variance Mitigation Plan for 740 Eighth Avenue

To mitigate harmful GHG impacts from potential leakage of R410A refrigerant, the project will meet the following requirements.

- o Requirements for flared joints at valves and equipment connections and brazed joints for all other connections to minimize leak potential
- o Requirements for pressure and vacuum testing to catch leaks before refrigerant pipes are enclosed and systems are operational
- o Final leak tests during charging and provision of a charging report
- o Requirement that all technicians working with refrigerant charging and connecting refrigerant piping:
 - o Have reviewed and certified in writing that they have received and read Appendix A - Refrigerant Charging and Leak Prevention Requirements
 - o Be certified to EPA 608 and shall have copies of their certification on-site.

We believe, based on industry accepted values and input from Daikin, the supplier of the equipment, that these requirements will reduce refrigerant leaks and the resulting emissions by at least 50%. As such, the estimated GHG emission impact of the variance request is, per our calculations, LESS than what a “compliant” strategy would yield:

- o A “Compliant Strategy” where this cohort of projects would switch to R32 refrigerant (once available) using standard installation practices, would result in ~11,031 tons of CO₂e
- o Our proposed “Mitigated Strategy” where leaks reductions are reduced by 50% (25% for units over 50 lbs) by complying with our Technical Requirements would result in ~11,025 tons of CO₂e.
- o The GHG Impact of our proposed Mitigated Strategy, compared to the “Compliant” Strategy, yields ~ 5 tons less than a compliant strategy.

Thus we believe that the excess impacts of this variance request are mitigated by our efforts to reduce refrigerant leaks. Furthermore since Extell is the developer and owner of the building and the property will be managed by an affiliate of Extell known as Extell Hospitality Services, we will be able to ensure that the Mitigation Plan is implemented.

To mitigate impacts for emissions we are not offsetting, Extell projects typically go above and beyond code requirements for climate resilience. Specifically:

- o Floor Resistance: New construction projects elevate residential units, critical



equipment, and at least one point of egress above the 2080 sea-level rise adjusted design flood elevation along with other flood resiliency measures.

- o Extreme Heat: Air conditioning is provided in all new construction projects.
- o Generators: Emergency generators are provided above code requirements
- o TOD: Extell builds in great density in urban centers thus mitigating the impacts of car-based emissions
- o Energy Efficiency: Extell meets and often exceeds code requirements (which are increasingly high standards in NYC) for energy efficiency, including through the use of additional insulation and efficient building systems that also comply with NYC and NYS goals for reducing carbon emissions by using electric based systems that can support renewable energy sources.

Overall goals to reduce GHG emissions.

- o Extell avoids significant tons of CO₂e each year with our development approach and rigorous standards and programs including by reducing onsite combustion of fossil fuels and increasing electrification requirements. Refrigerant leaks are minimized by using packaged systems or hydronic loop systems where possible and by using equipment with lower GWP or natural refrigerants to achieve GHG emissions reductions.

TO further reduce the impact of refrigerant leakage Extell commits to:

- o Provide guidance about the importance of end-of-life refrigerant recycling, including posting signage in mechanical rooms.
- o Ramping up efforts to push design teams away from central VRF systems that rely on field-installed refrigerant piping and toward packaged systems where leak risk is reduced and systems with natural refrigerants. This includes prioritizing these strategies in new projects, providing guidance during the early phases of design and receiving training and resources from industry leaders to keep abreast of best practices.
- o Continuing to work with our engineering consultants to pilot and promote best practices for decarbonization.

TECHNICAL REQUIREMENTS

Refrigerant Charging and Leak Prevention

Comply with refrigerant charging and leak prevention requirements in Appendix A.

Required Systems Testing

- Ensure that filters on indoor units are clean and free of construction dust
- Provide a written report of test results (above) including:
 - note any errors, diagnostic faults, corrections, etc,
 - startup tests,
 - final refrigerant charge (pounds, ounces).
 - date and time of test
 - System tag
 - Company and technician name
- For further commissioning requirements, refer to the Energy Code and to: [Commissioning Requirements - New York City Commercial Code](#).

Refrigerant Charging and Leak Prevention

Comply with refrigerant charging and leak prevention requirements in Appendix A.

TECHNICAL REQUIREMENTS

Appendix A - Refrigerant Charging and Leak Prevention Requirements

Introduction

Refrigerant charging and leak prevention is critical for several reasons:

1. Refrigerant leaks contribute substantially to climate change. The beneficial effects of electrification can be lost if refrigerant leaks.
2. Refrigerant leaks can harm system energy efficiency, further contributing the climate change, and increasing the cost of electricity to the building.
3. Refrigerant leaks can cause poor comfort, including inadequate heating in winter and inadequate cooling in summer, resulting in substantial health risks and also in potential code violations for indoor temperature control.
4. Refrigerant overcharging increases compressor wear & tear and energy use.

General

- Certified analog gauges shall be used for pressure measurements and digital gauges for vacuum measurements.
- Minimize refrigerant pipe lengths by utilizing a water cooled VRF system with water cooled condenser units installed on each floor.
- Use continuous line sets unless the length of refrigerant piping is longer than standard line sets.
- Use brazed joints in less accessible locations.
- Protect line sets from damage during transportation and storage, before installation.
- Allow for pipe expansion, and properly support and protect line sets.
- Avoid enclosing line sets in wall cavities, where they cannot be inspected and where they may be inadvertently punctured. By installing water cooled condenser units on each floor the refrigerant line sets will be run in the ceiling with no need to run vertically through wall partitions. If line sets are enclosed in a wall, there must be a proposed method to protect the line sets from being accidentally punctured
- Avoid joints in hidden locations such as wall cavities, where leaks are harder to find and repair. Where joints must be located in such locations, provide an access panel at each joint to allow finding and repairing leaks at joints.
- All technicians working with refrigerant charging and connecting refrigerant piping shall:
 - Have reviewed and certified in writing that they have received and read Appendix A - Refrigerant Charging and Leak Prevention Requirements (this document).
 - Be certified to [EPA 608](#) and shall have copies of their certification on-site.
- Contractor shall confirm pipe lengths by field measurements of refrigerant piping (line sets), the total length of one pipe only (not the total length of both pipes), from the connection at the water cooled condenser to the fan coil unit. Calculate the refrigerant charge to add using manufacturer requirements. Submit this record of measured pipe lengths and refrigerant charge calculation with the charging report (see Quality Control below).

TECHNICAL REQUIREMENTS

Flare Joints

- To be used for valve connections and equipment connections only.
- Cut tubing, leaving a few inches of slack in case a flare is defective and must be re-made.
- Use a good quality tubing cutter, work gradually to avoid deforming the tubing, and inspect to make sure that the cut is square.
- Deburr to remove the thin lip of copper inside the tubing but be careful not to gouge or thin the tubing wall
- Some line sets come shipped from the factory pre-flared. Inspect carefully for damage in transport. If damaged, cut tubing and make new flares.
- Use good quality flaring tools that have the following features:
 - A gauge or stop that ensures that tubing is positioned at the correct depth
 - An “eccentric” cone that rolls around the interior of the tubing, forming it into shape
 - A clutch that disengages the cone when the flare is complete
- Use battery-powered flaring tools to anneal the copper and make it less brittle.
- Check the size and roundness of the flare using a flare sizing gauge.
- Prior to assembly, inspect the flare to ensure that it is symmetrical and that contact surfaces are clean, shiny, and free of scratches.
- Apply a thin coat of refrigeration oil or an approved assembly lubricant to the contact surface to improve the seal and to the back of the flare nut to keep it from binding.
- Align the cones and hand-tighten the flare nut.
- Tighten the flare nut to the manufacturer-recommended torque using a torque wrench. If the assembly is too loose, the surfaces will not form a good seal; if it is too tight, the flare will crack or split. Torque specs are found in manufacturers’ instructions and range from around 13 ft-lbs for ¼” tubing to around 56 ft-lbs for ⅝” tubing. Use a torque wrench with a digital gauge.
- Only use flare nuts supplied with the equipment. Manufacturers’ torque specs are for OEM flare nuts, which tend to be longer (with more threads) and of better quality than aftermarket ones.
- If subsequent testing reveals a leak at any flare connection, do not attempt to tighten it further; cut out the defective flare and make a new flare.

Brazed Joints

- Use brazed joints in all locations except for valve connections and equipment connections.
- Flow nitrogen through the tubing while brazing to prevent formation of copper oxide scale, and safety concerns around open flames.

Pressure Testing

- Inspect lines sets for damage such as kinking.
- Fill the system with nitrogen for a standing pressure test. Once the system is pressurized, isolated, and allowed to stabilize, it must hold steady for a specified period. Pressurization should be done gradually so that catastrophic leaks are caught with minimal waste. The

TECHNICAL REQUIREMENTS

target pressure, specified by the manufacturer, is typically 550 psig.

- Test for a minimum of 24 hours.
- Measure the outdoor air temperature in the shade at the beginning and end of the test. Correct for the air temperature by 1 psi for each degree Fahrenheit change in temperature. Note that if the outdoor air temperature increases, an increase in pressure could still indicate a leak. For example, if outdoor air temperature increases by 6 degrees, we would expect an increase in pressure of 6 psi. A smaller increase, for example 3 psi, indicates a likely leak. If any deviation from expected pressures is found, a leak should be suspected, investigated, and repaired.
- Apply an approved leak-testing solution (not household dish detergent) to all flares and other site-made connections. Check each fitting for bubble formation, using a flashlight and inspection mirror when necessary to inspect areas that are hidden.
- Make a record of test results using the standard test record card, below (fill out the card and include it in the photo).

Drawing and Vacuum and the Vacuum Test

- Once the system has been successfully pressure-tested, evacuate the system.
- Use a correctly sized vacuum pump. If a vacuum pump is oversized, it can draw a vacuum too quickly and create ice from humidity in the system. If a vacuum pump is undersized, it will not draw a vacuum quickly enough. The purpose of evacuation is to remove air and moisture from the system, and as a secondary leak check.
- Use a digital vacuum gauge. Do not use an analog vacuum gauge.
- Once the system is pulled down into a deep vacuum of maximum 200 microns, isolate the system from the vacuum pump, and observe changes in vacuum pressure. If the system remains below a decay target of 500 microns after 10 minutes or more of isolation, the system passes. If the system fails, it may be because air is entering through a leak or because excess moisture remains in the system. If the initial deep vacuum or decay target vacuum specified by the manufacturer are less than 200 and 500 microns, respectively, use the manufactured- required vacuums. The triple vacuum procedure will be used, and this procedure above will be used for the final of the three vacuums.

Charging the System and Final Leak Checks

- Charge the system with refrigerant. Use a digital scale to accurately measure the required refrigerant into the system.
- Write the total measured liquid line lengths and final total charge in the provided record documents for turnover.

Quality Control

- Provide a refrigerant charging report, including:
 - the name of the project
 - address
 - heat pump tag (if more than one system)
 - measured line lengths
 - pounds/ounces of added refrigerant charge

TECHNICAL REQUIREMENTS

- a copy of manufacturer instructions
- a copy of this Appendix A signed by all technicians who perform pipe connections and/or refrigerant charging
- photographs of electronic leak tests

Equipment Controls:

A 7-day programmable thermostat is required, per the energy code. Controls shall be fixed, wall-mounted types that are simple and easy to read.



GHG ASSESSMENT SUMMARY & METHDOLOGLOY

MEMORANDUM

Date: 5/22/2025

To: New York State Department of Environmental Conservation

From: Ari Goldstein, Senior Vice President, Extell Development Company

Re: Impossibility Variance GHG Assessment Summary & Methodology for 740 Eighth Avenue

To determine the GHG impact of this variance request, we compared the following outcomes: A “Business as Usual Strategy” where the project was installed with R410A in the absence of the Technical Requirements, a “Compliant Strategy” where the refrigerant would be replaced with R32, which is allowed, and a “Mitigated Strategy” where this project would be installed with R410A but following the Technical Requirements. To assess this, we performed the following analysis, based on industry standards and input from Daikin, the supplier of the equipment:

- 1) We calculated the total amount of refrigerant for each heat pump system in each project based on information provided by the Engineer of Record:
 - a) Pounds of R410A per heat pump (including equipment + field charge) based on the VRF system type, system size/ capacity, total estimated refrigerant piping length, and estimated # of refrigerant connections
 - b) Quality checked by system size/ capacity
 - c) Equipment lifetime of 20 years was assumed
- 2) We then estimated the GHG emissions for each system based on:
 - a) GWP20 of 4715 for R410A and 2690 for R32, per DEC’s requirements
 - b) Leakage rates of 10% for commercial VRF and 6% for residential systems, per Part 494-1.3 (47)
 - c) End of life disposal: 10% loss
- 3) We then calculated emissions for each project under several scenarios:
 - a) BAU Scenario: As designed with R410A, but without leak protections that are not required by code
 - b) Compliant Scenario: The same system, as if the projects were designed with R32 in lieu of R410A and using standard installation practices
 - c) Mitigated Scenario: As designed with R410A, but assuming a mitigated leak rate due to the Technical Requirements, for which we assumed a 5% leak rate for VRF and 3% for multi-splits (a 50% reduction). For units 50 lbs or greater the assumed rate is 7.5% (a 25% reduction).
 - d) The GHG Impact when comparing the Mitigated Scenario with the Compliant Scenario
- 4) We then converted the GHG Impact into a “cars on the road” equivalent using the EPA’s [Greenhouse Gas Equivalencies Calculator | US EPA](#), which notes that each 1,000 tons of CO₂e is equivalent to 233 car years (cars driven for 1 year)

Further detail is provided in Appendix A, Summary of GHG Assessment



Appendix A: Summary, GHG Assessment for 740 8th Avenue VRF System



Business as usual (BAU R410a @ 10% leakage/yr^{[1][2]})

Compliant case: R32 @ 10% leakage/yr^{[1][2]}

Mitigated case: R410a @ 5% leakage/yr (7.5% >= 50lbs), mitigated by Technical Requirements^{[3][5]}

Emissions are expressed using GWP20 equivalent (metric tons of CO2)

Greenhouse Gas (GHG) Assessment for 740 8th Ave. Hotel VRF Systems							GHG Impact of Mitigated R410a Case	
GHG Impact Summary for Water Cooled VRF System	Total Cooling Tons	[BAU - R410a] Total Refrigerant (lbs)	[Compliant - R32] Total Refrigerant	[BAU - R410a] Total GHG Emissions	[Compliant - R32] Total GHG Emissions	[Mitigated - R410a] Total GHG Emissions	Emissions Delta vs. R32 Compliant (tons CO2e)	Car Year Equivalent ^[4]
Grand Total	425.7	4577	4305	20556	11031	11025	(5)	2569
WCCU-4-1	23.00	63.09	58.96	283.35	151.08	215.89	64.81	50.30
WCCU-5N-1B	7.67	28.16	26.44	126.47	67.75	66.25	(1.50)	15.44
WCCU-5N-2	9.50	34.46	32.30	154.77	82.76	81.07	(1.69)	18.89
WCCU-5S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-5S-2	7.67	29.25	27.53	131.37	70.54	68.81	(1.73)	16.03
WCCU-6N-1	7.67	32.48	30.76	145.88	78.82	76.41	(2.41)	17.80
WCCU-6N-2	9.50	34.46	32.30	154.77	82.76	81.07	(1.69)	18.89
WCCU-6S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-6S-2	7.67	29.25	27.53	131.37	70.54	68.81	(1.73)	16.03
WCCU-7N-1	7.67	32.48	30.76	145.88	78.82	76.41	(2.41)	17.80
WCCU-7N-2	9.50	34.46	32.30	154.77	82.76	81.07	(1.69)	18.89
WCCU-7S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-7S-2	7.67	29.25	27.53	131.37	70.54	68.81	(1.73)	16.03
WCCU-#N-1 (8-19FL)	7.67	389.76	369.12	1,750.51	945.81	916.93	(28.88)	213.65
WCCU-#N-2 (8-19FL)	9.50	416.52	390.60	1,870.70	1,000.85	979.89	(20.96)	228.31
WCCU-#S-1 (8-19FL)	9.50	414.72	388.80	1,862.61	996.24	975.65	(20.59)	227.33
WCCU-#S-2 (8-19FL)	7.67	351.00	330.36	1,576.43	846.50	825.75	(20.75)	192.40
WCCU-20-1	15.33	52.11	48.68	234.04	124.74	178.32	53.58	41.55
WCCU-22-1	23.00	58.89	54.76	264.49	140.31	201.52	61.20	46.95
WCCU-#N-1 (21-33FL)	7.67	427.57	405.21	1,920.32	1,038.29	1,005.88	(32.40)	234.37
WCCU-#N-2 (21-33FL)	9.50	452.79	424.71	2,033.59	1,088.25	1,065.22	(23.04)	248.20
WCCU-#S-1 (21-33FL)	9.50	449.28	421.20	2,017.83	1,079.26	1,056.96	(22.30)	246.27
WCCU-#S-2 (21-33FL)	7.67	387.27	364.91	1,739.33	935.03	911.08	(23.95)	212.28
WCCU-34N-3	7.67	33.22	31.50	149.20	80.71	78.15	(2.56)	18.21
WCCU-34N-4	9.50	34.50	32.34	154.95	82.87	81.16	(1.70)	18.91
WCCU-34S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-34S-3	7.67	29.79	28.07	133.79	71.93	70.08	(1.84)	16.33
WCCU-35N-3	7.67	33.22	31.50	149.20	80.71	78.15	(2.56)	18.21
WCCU-35N-4	9.50	34.50	32.34	154.95	82.87	81.16	(1.70)	18.91
WCCU-35S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-35S-3	7.67	29.79	28.07	133.79	71.93	70.08	(1.84)	16.33
WCCU-36N-3	7.67	33.22	31.50	149.20	80.71	78.15	(2.56)	18.21
WCCU-36N-4	9.50	34.50	32.34	154.95	82.87	81.16	(1.70)	18.91
WCCU-36S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-36S-3	7.67	29.79	28.07	133.79	71.93	70.08	(1.84)	16.33
WCCU-37N-3	7.67	33.22	31.50	149.20	80.71	78.15	(2.56)	18.21
WCCU-37N-4	9.50	34.50	32.34	154.95	82.87	81.16	(1.70)	18.91
WCCU-37S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-37S-3	7.67	29.79	28.07	133.79	71.93	70.08	(1.84)	16.33
WCCU-38N-3	7.67	33.22	31.50	149.20	80.71	78.15	(2.56)	18.21
WCCU-38N-4B	9.50	33.09	30.93	148.62	79.25	77.85	(1.41)	18.14
WCCU-38S-1	9.50	34.56	32.40	155.22	83.02	81.30	(1.72)	18.94
WCCU-38S-3	7.67	29.79	28.07	133.79	71.93	70.08	(1.84)	16.33
WCCU-39-1	21.00	67.05	62.82	301.14	160.97	229.44	68.47	53.46

References:

- [1] <https://dec.ny.gov/regulatory/regulations/proposed-emergency-recently-adopted-regulations/climate-change>
 - Potential leakage rates of 10% for commercial VRF, per Part 494-1.3 (47) & (22)
- [2] https://www.epa.gov/sites/default/files/2020-12/documents/hu_e11veemissions.pdf
- [3] https://www.ipcc-nggip.iges.or.jp/public/2019r/odf/3_Volume3/19R_V3_Ch07_ODS_Substitutes.pdf
 - 2019 Refinement to the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Chapter 7. Table 7.9, Default Estimates for Charge, Lifetime, and Emission Factors for Refrigeration and Air-Conditioning Systems.
- [4] <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>
 - 1,000 tons of CO2e is equivalent to 233 car years (cars driven for 1 year).
- [5] See Technical Requirements
 - Mitigation of leakage rate assessed in part via testing / reduction of field piping joints. Refer to Part 494-1.3 (47) Table (i).
- [6] 2019 ASHRAE Handbook—Applications. Chapter 38, "Owning and Operating Costs," Section 1, Table 4, Comparison of Service Life Estimates.
 - 20 Year equipment service life assessed for water cooled condensers.

