NYC ACCELERATOR

Service Provider Program

Denise Milianta, Service Provider Specialist

What is NYC Accelerator?

- A City program to help control costs, meet local law compliance, boost building performance, increase energy savings, and reduce carbon emissions across NYC buildings
- This program provides free technical guidance to help the market accelerate the transformation of how our buildings are built and operated
- The NYC Accelerator team identifies building upgrade projects to help meet emissions limits established by LL97 of the Climate Mobilization Act
- NYC Accelerator also provides no-cost trainings and supports green workforce development

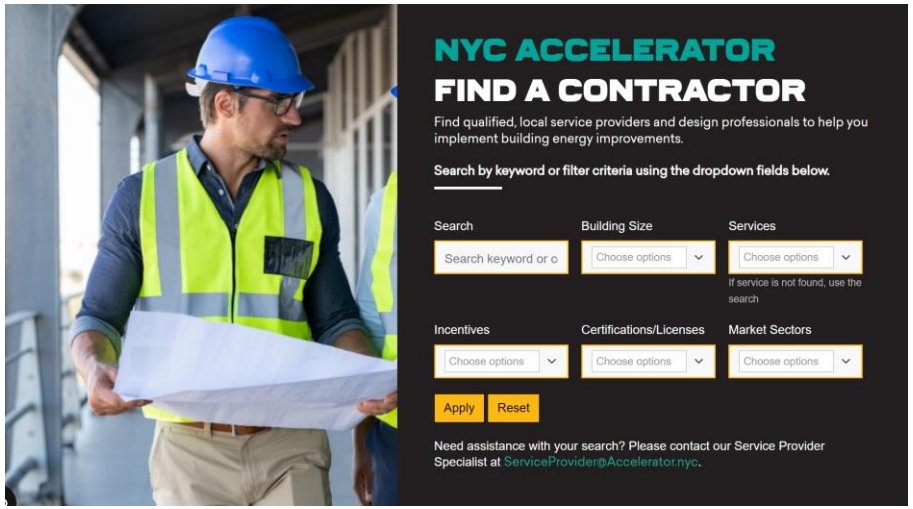
The Service Provider Program

Role of the Service Provider Program

- Actively refer building owners, facility, and property managers to the companies in the NYC Accelerator Service Provider Network.
- Encourage and enhance market transformation for the city.
- Support job creation, workforce development and economic opportunity, with a focus on M/WBE engagement.
- Build the Service Provider sector to accelerate the implementation of decarbonization projects.
- Create a Service Provider network that serves as an extension the NYC Accelerator Outreach Team.

Benefits to Service Providers

+ **Grow your business** through referrals from NYC Accelerator
+ Earn inclusion in **NYC Accelerator's Service Provider Lookup Tool**
    - **July: 1,967 views and 95 Email this Provider Clicks**



Benefits to Service Providers

+ **Access to our entire bench of account managers**
+ **Expand skills** and grow your team
+ **Participate in NYCA networking** events
+ **Gain access** to financing and solar specialists

Interested in Joining? Next Steps

- **Contact Denise Milianta, Service Provider Specialist at denise@accelerator.nyc**

- **Attend a virtual information session – held every Thursday at 11:00 a.m.** Click here to join the meeting

Local Law 97

Beneficial Electrification

August 14th, 2024

NYC Buildings

Course # S081424

LOCAL LAW 97: Beneficial Electrification

Presented by
Emily Hoffman, PE, CEM, LEED AP, and
Jean Kim, RA, CEM, CPHD, LEED AP

August 14, 2024

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Local Law 97: Beneficial electrification

Beneficial electrification is the use of highly efficient electrical equipment to replace direct fossil fuel use or very low efficiency electric equipment - a key strategy to decarbonize buildings. To encourage the early electrification of building heating systems, RCNY 103-14 of Local Law 97 allows BE deduction to be taken for electricity consumed by qualifying heat pump systems to demonstrate lower annual building emissions. The presentation describes the efficiency requirements, methods to determine electric consumption by the equipment, and specifies how the BE savings applies based on year of installation.

Learning Objectives

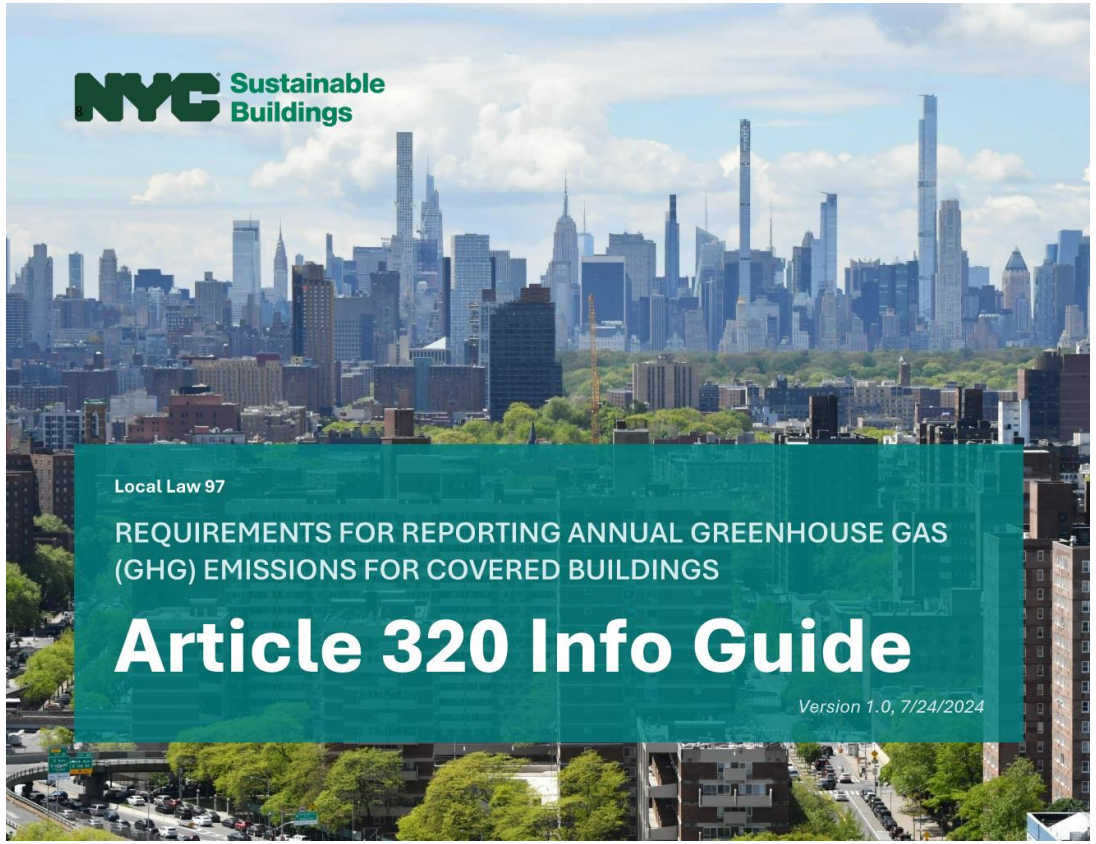
At the end of this course, participants will be able to:

1. Discuss the requirements for meeting the Beneficial Electrification equipment criteria requirements of RCNY 103-14 of Local Law 97, and how an owner can understand if their equipment complies.
2. Describe the benefits and energy savings opportunities of implementing highly efficient all-electric heating systems regardless of building typology.
3. Explain the 'Deemed' and 'Metered' approaches to determining the annual electricity consumption of qualifying equipment.
4. Discuss how the Beneficial Electrification Savings is banked and applied in future years, with an emphasis on the early action savings.

Agenda

1. Overview of Beneficial Electrification
2. Requirements
3. Banking of BE Savings
4. Deemed vs Metered Approach
5. Example Calculations
6. FAQ

Location in the 320 Guide



https://www.nyc.gov/assets/buildings/pdf/article_320_guide.pdf

1. **Overview of Beneficial Electrification**
2. Requirements
3. Banking of BE Savings
4. Deemed vs Metered Approach
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Key points

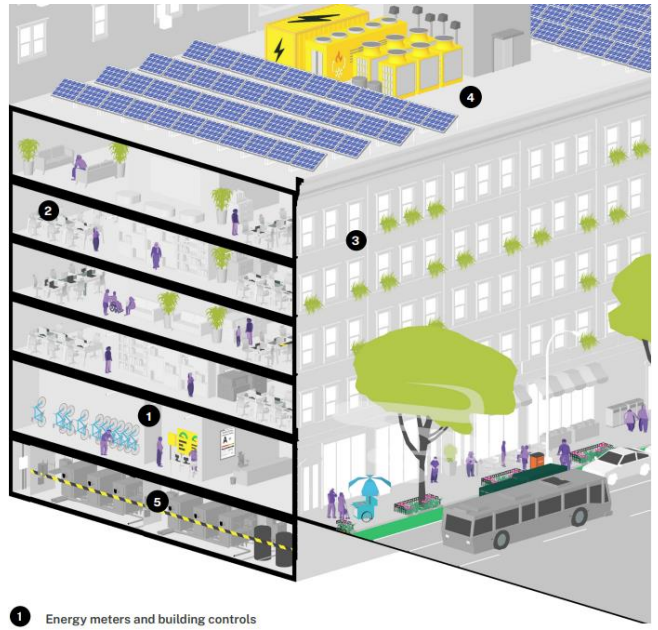
- **Beneficial electrification** (“BE”) :
  - *The installation of high-efficiency electric-based equipment to replace fossil fuel-using equipment or low-efficiency electric-based equipment*

- Applies a **negative emissions coefficient** to electricity used by qualifying BE equipment, thus creating a GHG savings or deduction against a building’s total emissions.

- Specifically applies to heating, domestic hot water, and cooling system upgrades in existing buildings.
  - *Cooking equipment is not eligible*
  - *EV charging is addressed separately in Buildings Bulletin 2021-019*

Overall context

- "Beneficial" means that emissions are reduced even when electricity use increases. Other positive impacts of BE:
  - Accelerates equipment development and manufacturing
  - Deepens the labor pool for installation and maintenance
  - Reduces operation and maintenance cost
  - Fosters development of a more robust grid
- Location within LL97 is 1 RCNY §103-14(d)
  - Originally proposed in the Local Law 97 Advisory Board Report
  - BE is also a central topic of the Mayor's Office's PowerUp NYC report, where strategic phasing and partial electrification are addressed in relation to financing and equity.
- Implement Beneficial Electrification with Holistic approach
  - In addition to electrifying building equipment, improve other building efficiencies, e.g., reducing heating/cooling loads by improving building envelope, upgrading lighting, etc.



Source: PowerUp NYC

Ground rules

- BE deductions are subject to certain limitations:
  - Equipment must be installed and operational **prior to 1/1/2030**
  - BE Deductions generally may only be used through reporting year 2035
  - Equipment must meet minimum efficiencies, if applicable.
  - Certain types of equipment (e.g., water-source heat pumps, heat-pump chillers) must be separately metered to be eligible
  - **Does not apply to new buildings** where there is no existing equipment to replace

- BE deduction may be reserved to use in a future reporting year if not needed during the year in which they were generated.

Early action incentive

- BE emissions coefficient is determined by the year of installation and operation.
- Early installation receives double the deduction. This helps motivate building owners to take proactive steps toward building electrification, no matter how incremental.
- For qualifying equipment installed and operating prior to **1/1/2027**, BE deduction is

  -0.00130 tCO2e/kWh
- For qualifying equipment installed and operating between **1/1/2027** and **12/31/2029**, BE deduction is

  -0.00065 tCO2e/kWh

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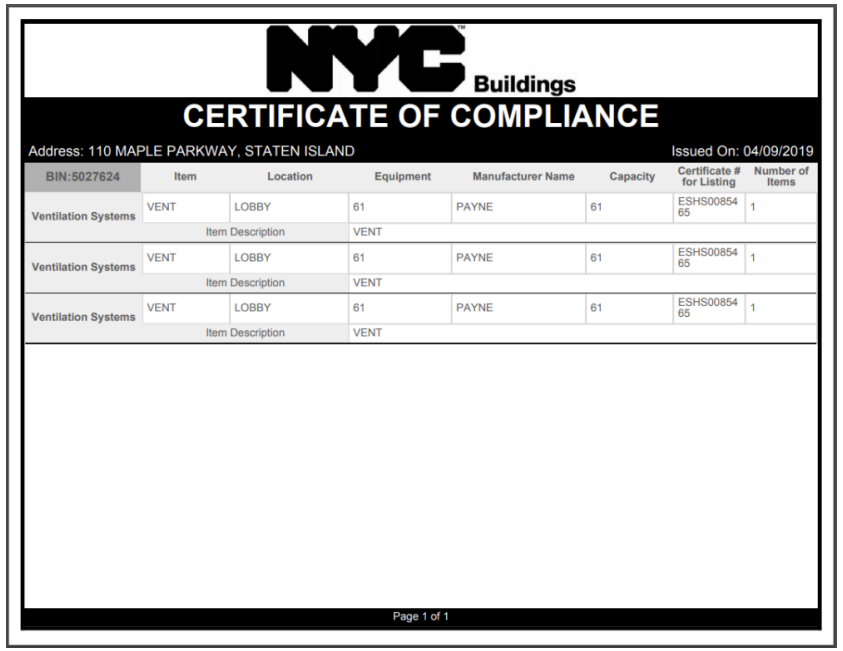
Documentation of installation

- For equipment requiring a work permit,
  - Provide **Letter of Completion** (“LOC”) for the equipment along with the associated DOB job filing number
  - Certificate of Compliance ("CoC")

- For equipment not requiring a work permit,
  - Provide paid itemized invoices and time-stamped photographs

- The date of the CoC or the photograph counts as the date of installation



NYC Buildings

CERTIFICATE OF COMPLIANCE

Address: 110 MAPLE PARKWAY, STATEN ISLAND — Issued On: 04/09/2019

BIN:5027624	Item	Location	Equipment	Manufacturer Name	Capacity	Certificate # for Listing	Number of Items
Ventilation Systems	VENT	LOBBY	61	PAYNE	61	ESHS00854 65	1
	Item Description		VENT				
Ventilation Systems	VENT	LOBBY	61	PAYNE	61	ESHS00854 65	1
	Item Description		VENT				
Ventilation Systems	VENT	LOBBY	61	PAYNE	61	ESHS00854 65	1
	Item Description		VENT				

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Equipment databases

- Representative lists of heat pumps that can function effectively in NYC:
  - Energy Star Cold Climate Heat Pumps
  - Northeast Energy Efficiency Partnerships (NEEP) Cold Climate Heat Pumps

Cold Climate Considerations

Many new ENERGY STAR certified ASHPs excel at providing space heating even in the coldest of climates, as they use advanced compressors and refrigerants that allow for improved low temperature performance. If you live in a climate where winter temperatures regularly dip below freezing, talk to your contractor to choose an ENERGY STAR unit suited to your particular home. When you ask your contractor for an ENERGY STAR certified cold climate ASHP, you can be confident that your new AHSP system will deliver the heating performance and efficiency benefits you expect on even the coldest winter days. A good contractor will work with you to determine the size and potential integration with a back-up heating system that will work best for your home.

Climate ASHP technology has improved significantly over the past several years, and many ASHP systems are capable of delivering heating capacity and efficiency at low outdoor temperatures. The ENERGY STAR certification requires third-party verified performance for low temperatures, testing ASHPs down to 5°F. Testing cold climate ASHP performance at 5°F ensures that your ASHP will provide all the heat you need to keep your home comfortable all winter. Your cold climate ASHP will continue working at temperatures below 5°F, but pairing it with a back-up energy source will heat your home the most efficiently when temperatures are even lower.

Eligible equipment

Equipment Type	Minimum Efficiency	Test Procedure
Service hot water heat pumps with max current 24A at 250 V	NA	10 CFR Part 430, Subpart B, Appendix E; or other test procedure approved by the Department.
Service hot water heat pumps with Input capacity > 12kW and ≤ 50kW	NA	AHRI 1300-2013; or ASHRAE 118.1-2012; or 10 CFR Part 431.106, Subpart G, Appendix E; or other test procedure approved by the Department.
Unitary heat pump equipment – air source only	> 1.5 COP @ 5°F outdoor dry bulb (maximum heating capacity)	AHRI 210/240-2023, or AHRI 340/360-2022, as applicable
Variable refrigerant flow (VRF) multi-split heat pump – air source only		AHRI 1230-2021
Packaged terminal heat pumps		AHRI 310/380-2017
Single package vertical heat pumps		AHRI 310/380-2017, or AHRI 390-2021, as applicable

Note: Equipment and systems not listed in the table that otherwise meet the definition of beneficial electrification shall have a coefficient of performance (COP) for the system equivalent to greater than 1.5 when the outdoor dry bulb temperature is 5°F or lower, where the COP of the system is calculated based on the energy required for all parts of the system to deliver the peak capacity.

Efficiency requirements

- Table included under the definition of BE in 1 RCNY §103-14(a)

- Service water heating:
  - No minimum efficiency, only requires that a heat pump is used

- Space heating:
  - Test temperatures may not include 5°F exactly, so any test result at ≤ 5°F showing greater than 1.5 COP (as reported by the manufacturer) is acceptable

Equipment not listed in Rule table

- Such equipment may not use the Deemed electric use approach and must instead use the Metered electric use approach.
- Per the Article 320 Info Guide, this includes equipment following test procedures:
  - ISO 13256-1 & 13256-2
  - AHRI 365, 470, 550/590, 840, 870, 1160, 1360
  - CSA C368.1

Test procedure reference in BE table	Exclusions	Test procedure for excluded equipment
10 CFR Part 430, Subpart B, Appendix E	n/a	n/a
AHRI 1300-2013	"...heat pumps or water heaters covered in...ISO Standard 13256-1 & 2...AHRI Standard 1160 or...AHRI Standard 870 [or] Air-Cooled or Water-Cooled Heat Reclaim Condensers covered in...AHRI Standard 550/590..."	ISO 13256-1 & 13256-2 *(to be replaced by AHRI 600)* AHRI 1160 AHRI 870 AHRI 550/590

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Banking of GHG Savings accrued from BE (overview)

- If the GHG savings derived from BE are not needed for LL97 compliance during the calendar year in which it was generated, it can be banked for future use.
  - The final year that banked BE savings can be used varies between 2034-2036 based on the date of equipment installation; see chart on next slide

- Banked BE savings are subject to limitations on use:
  - A year's banked BE savings are allowed to be applied to a single future year report, i.e., a year's BE savings cannot be divided to be used for more than one future year.
  - Excess BE savings left after applying to a year's report are not to be carried over to future years use.
  - Multiple years of banked BE savings are not to be combined, i.e., only one year of banked BE savings may be used in any given future reporting year.

Banking of Deductions accrued from BE (table)

- Remember that the BE GHG savings is twice as large for equipment installed and operating prior to 2027 (darker hatch in the chart below)
- 2029 is the final year in which the BE GHG savings can be generated

		year in which Beneficial Electrification savings can be applied												
		2024	2025	2026	2027	2028	2029	2030 to 2034				2035	2036	
year in which qualifying equipment is first installed and operational	2024 or earlier													← any 6 years
	2025													← any 5 years
	2026													← any 4 years
	2027													← any 3 years
	2028													← any 2 years
	2029													← any 1 year

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Metered electric use approach

- Complex installations create a BE deduction based on measured energy consumption:
  - Individual (not aggregate) heating capacity of equipment **≥ 100 tons** (1,200,000 Btu/h), rated at an outside air temperature of 5°F
  - Test procedures **not listed** in the Rule table, e.g., Water Source Heat Pumps (WSHP), HP Chillers
  - Equipment eligible for the Deemed approach may also use Metered approach

Equipment Type	Minimum Efficiency	Test Procedure
Service hot water heat pumps with max current 24A at 250 V	NA	10 CFR Part 430, Subpart B, Appendix E; or other test procedure approved by the Department.
Service hot water heat pumps with Input capacity > 12kW and ≤ 50kW	NA	AHRI 1300-2013; or ASHRAE 118.1-2012; or 10 CFR Part 431.106, Subpart G, Appendix E; or other test procedure approved by the Department.
Unitary heat pump equipment – air source only	> 1.5 COP @ 5°F outdoor dry bulb (maximum heating capacity)	AHRI 210/240-2023, or AHRI 340/360-2022, as applicable
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Note: Equipment and systems not listed in the table that otherwise meet the definition of beneficial electrification shall have a coefficient of performance (COP) for the system equivalent to greater than 1.5 when the outdoor dry bulb temperature is 5°F or lower, where the COP of the system is calculated based on the energy required for all parts of the system to deliver the peak capacity.

Metered electric use approach

- Measuring requirements:
  - Separately metered by utility; or
  - Separately sub-metered (revenue-grade) by owner; or
  - Connected to energy tracking software

- Documentation requirements:
  - Document hourly, monthly, and annual electricity consumption
  - Documentation may be requested by the Department
  - Owners to retain the records for a minimum of 6 years

Deemed electric use approach

- Deemed approach is a methodology to estimate electricity consumption based on:
  - Equipment capacity
  - Average user demand, based on building type
  - Year of installation

- Only certain sizes and types of equipment qualify:
  - Air-source heat pumps or heat pump water heaters listed in the Rule table - meeting the test procedures and minimum efficiencies, AND
  - Individual (not aggregate) equipment heating capacity **< 100 tons** (1,200,000 Btu/h) - heating capacity rated at outdoor air temp of 5°F

- Precludes the need for separately metering equipment

Deemed electric use calculations

- Air-Source Heat Pumps (ASHPs)
  - Equation 103-14.14

$$AS_{de} = \left(\frac{HC}{3.412}\right) \times \left(\frac{1}{1.51} \times EFLH \times SF\right) \quad \text{(Equation 103-14.14)}$$

Where:

AS_{de} = Annual electric energy use associated with beneficial electrification for an air source heat pump (ASHP) used for space heating in units of kWh.

HC = Heating capacity of ASHP equipment rated at an outside air temperature of 5°F, in units of kBtu per hour.

$EFLH$ = Equivalent full loaded hours for the occupancy type served by the ASHP pursuant to guidance issued by the Department.

- Heat Pump Water Heater (HPWH)
  - Equations 103-14.15 and 103-14.16

$$WH_{de} = (GPD) \times (14.2 \times CF) \quad \text{(Equation 103-14.15)}$$

Where:

WH_{de} = Annual electric energy use associated with beneficial electrification for a heat pump water heater (HPWH) used for water heating in units of kWh.

GPD = Daily hot water usage in gallons per day (GPD) based on heat pump water heater usage rates pursuant to guidance issued by the Department.

CF = Heating capacity of HPWH as per Equation 103-14.16.

$$CF = (C/PL) \quad \text{(Equation 103-14.16)}$$

Where:

CF = HPWH Capacity Factor. The ratio of installed HPWH capacity to peak service hot water load, limited to a maximum value of 1.0.

C = The aggregate capacity of HPWH equipment in units of kBtu/h.

PL = Peak load factor multiplied by the associated occupancy metric (i.e., 1,000 square feet, number of people, number of dwelling units, number of students, etc.) from Peak Service Hot Water Load Table

Equivalent Full Load Hours (EFLH)

- **Heating EFLH =** Equivalent full loaded hours of heating for the occupancy type served by the ASHP pursuant to the Department's guidance
- Guidance taken from tables in the NYS DPS Technical Resource Manual (TRM), **Appendix G**
  - **Updated Yearly** -- Typically at the end of every year, effective date January 1st of the following year
  - For CY 2024, please refer to NYS DPS TRM, anticipated to be updated and become effective January 1st, 2025
- Definitions for occupancy groups are in TRM **Appendix A**

	Large Commercial			
	CAV econ	CAV noecon	VAV econ	Fan Coil
Community College	1,396	1,237	423	n/a
Dormitory	n/a	n/a	n/a	453
High School	879	819	261	n/a
Hospital	3,283	3,059	289	n/a
Hotel	1,050	734	223	n/a
Large Office	1,984	2,021	284	n/a
Large Retail	2,049	1,983	648	n/a
University	1,161	1,077	667	n/a

	Pre-war uninsulated brick	Prior to 1979	1979 through 2006	2007 to present
Multi-Family Low-Rise	974	738	705	491
Multi-Family High-Rise	987	513	385	214

	Small Commercial
Assembly	588
Auto Repair	1,863
Big Box Retail	186
Fast Food Restaurant	793
Full Service Restaurant	801
Grocery	186
Light Industrial	696
Motel	604
Primary School	819
Religious Worship	704
Small Office	420
Small Retail	531
Warehouse	441
Other	664

**** Source:***
NYS DPS TRM v.11 issued on 10/6/2023, effective 1/1/2024

Gallons per Day (GPD)

- Taken from **TRM section on HPWHs**
- Defined in **Commercial Storage Water Heater section**

- Summary table (using 2024 values) listing GPDs and Peak Load factor (PLF) for various occupancies / building types is in the Article 320 Info Guide

Occupancy / Building Type	GPD Rate	Peak Load Factor	Occupancy Metric
Assembly	7.02	0.31	per 1,000 square feet
Auto Repair	4.89	0.216	per 1,000 sf
Big Box Retail	3.43	0.151	per 1,000 sf
Community College	1.9	0.084	per person
Dormitory	17.2	0.759	per resident
Elementary School	0.5	0.022	per student
Fast Food Restaurant	500	22.07	per restaurant
Full-Service Restaurant	2500	110.4	per restaurant
Grocery	3.43	0.151	per 1,000 sf
High School, Middle School	1.9	0.084	per person
Hospital	54.42	2.403	per 1,000 sf
Hotel / Motel	45.52	2.01	per 1,000 sf
Office, Large / Small	1.1	0.049	per person
Light Industrial	4.89	0.216	per 1,000 sf
Multifamily High-Rise, Low-Rise	46	2.031	per dwelling unit
Refrigerated Warehouse	0.93	0.041	per 1,000 sf
Religious	7.02	0.31	per 1,000 sf
Retail, Large / Small	3.43	0.151	per 1,000 sf
University	0.5	0.022	per student
Warehouse	0.93	0.041	per 1,000 sf
Other	4.89	0.216	per 1,000 sf

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5. **Example Calculations**
    1. **Metered approach – Typical Space Heating**
    2. **Deemed approach – Large Office, Space Heating**
    3. **Deemed approach – High-Rise Multifamily, Space Heating**
    4. **Deemed approach – Hotel, Service Water Heating**
6. FAQ

Example Metered Approach

- **Scenario: Office building installs water source heat pump as part of an incremental electrification of the building's space heating.**
- **Step 1 – determine metered annual electric consumption that displaces fossil fuel use**
  - Annual metered electric consumption = **10,000 kWh**
    - *Only the electricity that displaces fossil fuel use*

Monthly Heat Pump Energy Consumption (kWh)

Jan	1,417
Feb	1,358
Mar	1,181
Apr	944
May	413
Jun	-
Jul	-
Aug	-
Sep	708
Oct	1,110
Nov	1,358
Dec	1,511
Total	***10,000***

- **Step 2 – determine BE deduction based on installation year**
  - Deduction if installed and operational before 2027:

    tCO2e = -0.00130 tCO2e/kWh * 10,000 kWh

    tCO2e = **-13.0 tCO2e**
  - Deduction if installed and operational on or after 2027:

    tCO2e = -0.00065 tCO2e/kWh * 10,000 kWh

    tCO2e = **-6.5 tCO2e**

Example Metered Approach

- **Step 3 – apply BE deduction to current emissions - CY2024**
  - Total emissions limit for CY2024-2029 = 470 tCO2e
  - Total building actual emissions of CY2024 = 400 tCO2e
  - BE savings from WSHP systems from meters = -13.0 tCO2e (equipment in operation in 2024)
    - ❑ Total building actual emissions without using BE savings: 400 tCO2e < 470 tCO2e
  - This building complies with LL97 without using -13 tCO2e BE GHG savings, and thus this BE savings could be banked for a future year.

Large Office, Space Heating Example: Deemed Approach

- Scenario: Large office building installed 20 units of 60kBtu/h Air Source HP to displace fossil fuel heating. Determine the GHG emissions savings accrued from this equipment installation.

- **Step 1 – determine Equivalent Full Load Hours (EFLH)**

	Large Commercial			
	CAV econ	CAV noecon	VAV econ	Fan Coil
Community College	1,396	1,237	423	n/a
Dormitory	n/a	n/a	n/a	453
High School	879	819	261	n/a
Hospital	3,283	3,059	289	n/a
Hotel	1,050	734	223	n/a
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Light Industrial	696
Motel	604
Primary School	819
Religious Worship	704
Small Office	420
Small Retail	531
Warehouse	441
Other	664

Large Office, Space Heating Example: Deemed Approach

Step 2 – determine estimated annual kWh using deemed equation

$$AS_{de} = \left(\frac{HC}{3.412}\right) \times \left(\frac{1}{1.51} \times EFLH \times SF\right) \text{ (Equation 103-14.14)}$$

- Heating capacity @ 5F (HC): **60 kBtu/h**
- Equivalent full load hours (EFLH): **284**

ASde = (60 kBtu/h / 3.412) * (1/1.51) * (284 hours)

ASde = **3,307 kWh**

Step 3 – determine BE deduction based on installation year

- Deduction if installed and operational before 2027:

  tCO2e = -0.00130 tCO2e/kWh * 3,307 kWh

  tCO2e = **-4.3 tCO2e** (per equipment)
- Deduction if installed and operational on or after 2027:

  tCO2e = -0.00065 tCO2e/kWh * 3,307 kWh

  tCO2e = **-2.1 tCO2e** (per equipment)

	Totals	
Year	kWh	tCO2e
2024	*3,307*	*-4.3*
2025	*3,307*	*-4.3*
2026	*3,307*	*-4.3*
2027	*3,307*	*-2.1*
2028	*3,307*	*-2.1*
2029	*3,307*	*-2.1*

Large Office, Space Heating Example: Deemed Approach

Step 4 – apply BE deduction to CY2024 emissions

- Total building actual emissions of CY2024 = 400 tCO2e
- Total emissions limit for CY2024 = 379 tCO2e

- Deduction for equipment installed and operational in 2024

  Total BE deduction = **-4.3 tCO2e x 20 = -86 tCO2e**

	Totals	
Year	kWh	tCO2e
2024	*3,307*	*-4.3*
2025	*3,307*	*-4.3*
2026	*3,307*	*-4.3*
2027	*3,307*	*-2.1*
2028	*3,307*	*-2.1*
2029	*3,307*	*-2.1*

- Total building emissions of CY2024 with applying BE equipment deduction operational before 2027 = 400 tCO2e - **86 tCO2e = 314 tCO2e**

Total building emissions w. deduction 314 tCO2e < Emissions limit 379 tCO2e

>> With BE deduction, this Office building complies with LL97 for CY2024.

Large Office, Space Heating Example: Deemed Approach

Alternate Step 4 – apply "Banked" BE deduction to CY2030 emissions

- Total building actual emissions of CY2030 = 210 tCO2e
- Total emissions limit for CY2030 = 134 tCO2e

- Deduction for equipment installed and operational in 2024

  Total BE deduction = **-4.3 tCO2e x 20 = -86 tCO2e**

Year	Totals	
	kWh	tCO2e
2024	*3,307*	*-4.3*
2025	*3,307*	*-4.3*
2026	*3,307*	*-4.3*
2027	*3,307*	*-2.1*
2028	*3,307*	*-2.1*
2029	*3,307*	*-2.1*

- Total building emissions of CY2030 with applying the "Banked" BE deduction (operational in 2024) = **210 tCO2e - 86 tCO2e = 124 tCO2e**

Total building emissions w. deduction 124 tCO2e < Emissions limit 134 tCO2e

>> With use of "Banked" BE deduction, this Office building complies with LL97 for CY2030.

High-Rise Multifamily, Space Heating Example: Deemed Approach

- Scenario: A pre-war, multi-family high-rise, with uninsulated brick installed 24 units of 12 kBtu/h Air-Source HP. Determine the GHG emissions savings accrued from this equipment installation.

- **Step 1 – determine Equivalent Full Load Hours (EFLH)**

	Large Commercial			
	CAV econ	CAV noecon	VAV econ	Fan Coil
Community College	1,396	1,237	423	n/a
Dormitory	n/a	n/a	n/a	453
High School	879	819	261	n/a
Hospital	3,283	3,059	289	n/a
Hotel	1,050	734	223	n/a
Large Office	1,984	2,021	284	n/a
Large Retail	2,049	1,983	648	n/a
University	1,161	1,077	667	n/a

	Pre-war uninsulated brick	Prior to 1979	1979 through 2006	2007 to present
Multi-Family Low-Rise	974	738	705	491
Multi-Family High-Rise	987	513	385	214

	Small Commercial
Assembly	588
Auto Repair	1,863
Big Box Retail	186
Fast Food Restaurant	793
Full Service Restaurant	801
Grocery	186
Light Industrial	696
Motel	604
Primary School	819
Religious Worship	704
Small Office	420
Small Retail	531
Warehouse	441
Other	664

High-Rise Multifamily, Space Heating Example: Deemed Approach

Step 2 – determine estimated annual kWh using deemed equation

- Heating capacity (HC): **12 kBtu/h** (per unit)
- Equivalent full load hours: **987**

$$AS_{de} = \left(\frac{HC}{3.412}\right) \times \left(\frac{1}{1.51} \times EFLH \times SF\right) \text{ (Equation 103-14.14)}$$

ASde = (12 kBtu/h / 3.412) * (1/1.51) * (987 hours)

ASde = **2,299 kWh**

Step 3 – determine BE deduction based on installation year

- Deduction if installed and operational before 2027:

  tCO2e = -0.00130 tCO2e/kWh * 2,299 kWh

  tCO2e = **-3.0 tCO2e**

- Deduction if installed and operational on or after 2027:

  tCO2e = -0.00065 tCO2e/kWh * 2,299 kWh

  tCO2e = **-1.5 tCO2e**

	Totals	
Year	kWh	tCO2e
2024	2,299	-3.0
2025	2,299	-3.0
2026	2,299	-3.0
2027	2,299	-1.5
2028	2,299	-1.5
2029	2,299	-1.5

High-Rise Multifamily, Space Heating Example: Deemed Approach

Step 4 – apply BE deduction to CY2024 emissions

- Total building actual emissions of CY2024 = 400 tCO2e
- Total emissions limit for CY2024 = 338 tCO2e

Year	Totals	
	kWh	tCO2e
2024	2,299	-3.0
2025	2,299	-3.0
2026	2,299	-3.0
2027	2,299	-1.5
2028	2,299	-1.5
2029	2,299	-1.5

- Deduction for equipment installed and operational in 2024

  Total BE deduction = **-3.0 tCO2e x 24 = -72 tCO2e**

- Total building emissions of CY2024 with applying BE deduction for equipment operational in 2024

  = 400 tCO2e - **72 tCO2e = 328 tCO2e**

Total building emissions w. deduction 328 tCO2e < Emissions limit 338 tCO2e

>> With BE deduction, this Multifamily building complies with LL97 for CY2024.

High-Rise Multifamily, Space Heating Example: Deemed Approach

Alternate Step 4 – apply "Banked" BE deduction of CY2024 to CY2030 emissions

- Total building actual emissions of CY2030 = 235 tCO2e
- Total emissions limit for CY2030 = 167 tCO2e

	Totals	
Year	kWh	tCO2e
2024	2,299	-3.0
2025	2,299	-3.0
2026	2,299	-3.0
2027	2,299	-1.5
2028	2,299	-1.5
2029	2,299	-1.5

- Deduction for equipment installed and operational in 2024

  Total BE deduction = **-3.0 tCO2e x 24 = -72 tCO2e**

- Total building emissions of CY2030 with applying the "Banked" BE deduction (operational in 2024)

  = **235 tCO2e - 72 tCO2e = 163 tCO2e**

Total building emissions w. deduction 163 tCO2e < Emissions limit 167 tCO2e

>> With use of "Banked" BE deduction, this Multifamily building complies with LL97 for CY2030.

Hotel, Service Water Heater Example: Deemed Approach

- **Scenario: A 200kBtu/h heat pump water heater is installed in a 100,000 sf hotel to replace part of gas-fired water heating system**
- **Step 1 – determine gallons per day (GPD rate), Peak Load Factor (PLF) & Occupancy Metric**

Occupancy / Building Type	GPD Rate	Peak Load Factor	Occupancy Metric
Assembly	7.02	0.31	per 1,000 square feet
Auto Repair	4.89	0.216	per 1,000 sf
Big Box Retail	3.43	0.151	per 1,000 sf
Community College	1.9	0.084	per person
Dormitory	17.2	0.759	per resident
Elementary School	0.5	0.022	per student
Fast Food Restaurant	500	22.07	per restaurant
Full-Service Restaurant	2500	110.4	per restaurant
Grocery	3.43	0.151	per 1,000 sf
High School, Middle School	1.9	0.084	per person
Hospital	54.42	2.403	per 1,000 sf
Hotel / Motel	45.52	2.01	per 1,000 sf
Office, Large / Small	1.1	0.049	per person
Light Industrial	4.89	0.216	per 1,000 sf
Multifamily High-Rise, Low-Rise	46	2.031	per dwelling unit
Refrigerated Warehouse	0.93	0.041	per 1,000 sf
Religious	7.02	0.31	per 1,000 sf
Retail, Large / Small	3.43	0.151	per 1,000 sf
University	0.5	0.022	per student
Warehouse	0.93	0.041	per 1,000 sf
Other	4.89	0.216	per 1,000 sf

$$WH_{de} = (GPD) \times (14.2 \times CF) \qquad \text{(Equation 103-14.15)}$$

Where:

WH_{de} = Annual electric energy use associated with beneficial electrification for a heat pump water heater (HPWH) used for water heating in units of kWh.

GPD = Daily hot water usage in gallons per day (GPD) based on heat pump water heater usage rates pursuant to guidance issued by the Department.

CF = Heating capacity of HPWH as per Equation 103-14.16.

$$CF = (C/PL) \qquad \text{(Equation 103-14.16)}$$

Where:

CF = HPWH Capacity Factor. The ratio of installed HPWH capacity to peak service hot water load, limited to a maximum value of 1.0.

C = The aggregate capacity of HPWH equipment in units of kBtu/h.

PL = Peak load factor multiplied by the associated occupancy metric (i.e., 1,000 square feet, number of people, number of dwelling units, number of students, etc.) from Peak Service Hot Water Load Table

Hotel, Service Water Heater Example: Deemed Approach

- **Step 2 – calculate estimated annual kWh using deemed equation**

- GPD rate: **45.52 gpd per 1,000 SF**
- Peak Load Factor (PLF): **2.01 per 1,000 SF**
- Building metric: **100,000 SF**

GPD = gpd (from table) * building metric

GPD = 45.52/1,000 SF * 100,000 SF

GPD = **4,552**

$$WH_{de} = (GPD) \times (14.2 \times CF) \qquad \text{(Equation 103-14.15)}$$

PL = PLF (from table) * building metric

PL = 2.01/1,000 SF * 100,000 SF

PL = **201**

$$CF = (C/PL) \qquad \text{(Equation 103-14.16)}$$

Hotel, Service Water Heater Example: Deemed Approach

- **Step 2 (cont.) – calculate estimated annual kWh using deemed equation**

  - Aggregate capacity of HPWH: C = **200 kBtu/h**
  - Peak Load: **201**
  - GPD: **4,552 gpd**

CF = C / PL
CF = 200 kBtu/h / 201
CF = **0.995**

$$CF = (C/PL) \qquad \text{(Equation 103-14.16)}$$

WHde = GPD * 14.2 * CF
WHde = 4,452 * 14.2 * 0.995
WHde = **64,315 kWh**

$$WH_{de} = (GPD) \times (14.2 \times CF) \qquad \text{(Equation 103-14.15)}$$

Hotel, Service Water Heater Example: Deemed Approach

Step 3 – determine BE deduction based on installation year

- Deduction if installed and operational before 2027:

  tCO2e = -0.00130 tCO2e/kWh * 64,315 kWh

  tCO2e = **-83.6 tCO2e**

- Deduction if installed and operational on or after 2027:

  tCO2e = -0.00065 tCO2e/kWh * 64,315 kWh

  tCO2e = **-41.8 tCO2e**

Hotel, Service Water Heater Example: Deemed Approach

Step 4 – apply BE deduction to CY2024 emissions

- Total building actual emissions of CY2024 = 700 tCO2e
- Total emissions limit for CY2024 = 987 tCO2e

- Deduction for equipment installed and operational in 2024

  Total BE deduction = **-83.6 tCO2e**

- Total building emissions of CY2024 with applying BE deduction for equipment operational in 2024

  = 700 tCO2e - **83.6 tCO2e = 616.4 tCO2e**

Total building actual emissions	**700 tCO2e < Emissions limit 987 tCO2e**
Total building emissions w. deduction	**616.4 tCO2e < Emissions limit 987 tCO2e**

>> This Hotel complies with LL97 for CY2024 without using BE deduction, thus -83.6 tCO2e BE deduction would better be banked for future use.

Hotel, Service Water Heater Example: Deemed Approach

Alternate Step 4 – apply "Banked" BE deduction of CY2024 to CY2030 emissions

- Total building actual emissions of CY2030 = 460 tCO2e
- Total emissions limit for CY2030 = 385 tCO2e

- Deduction for equipment installed and operational in 2024

  Total BE deduction = **-83.6 tCO2e**

- Total building emissions of CY2030 with applying BE deduction for equipment operational in 2024

  = 460 tCO2e - **83.6 tCO2e = 376.4 tCO2e**

Total building actual emissions	**460 tCO2e > Emissions limit 385 tCO2e**
Total building emissions w. deduction	**376.4 tCO2e < Emissions limit 385 tCO2e**

>> This Hotel complies with LL97 for CY2030 -- ONLY with application of "Banked" BE deduction

1. Overview of Beneficial Electrification
2. Requirements
3. Banking of BE Savings
4. Deemed vs Metered Approach
5. Example Calculations
6. **FAQ**

Q: *An office building has been retrofitted with water-source heat pump systems with 6 modular condensing units -- the capacity of each is 80-tons. Can this individual condensing unit use 'Deemed electric use' approach to calculate beneficial electric use as each unit has less-than-100-ton capacity ?*

A: No, pursuant to (d)(4)(iii)b of 1 RCNY §103-14, the water-source heat pump equipment whose test procedure is not listed in the definition of BE must determine beneficial electric use based on the 'Metered electric use' method as described in (d)(4)(iii)a of the Rule.

Q: *A building newly constructed and received Certificate of Occupancy in 2023 has all-electric equipment for the building HVAC. Are these electric equipment qualifying BE equipment?*

A: No, for the equipment to be qualified, the new equipment must 'displace' the existing fossil-fuel-consuming equipment or inefficient electric-resistance heating system. The intent of BE is to recognize buildings with existing inefficient HVAC mechanical systems transitioning to those with high-efficiency, heat pump equipment.

Q: *A gas-fired absorption chiller is replaced by modular electric chillers. Are they qualified for Beneficial Electrification?*

A: No, for the equipment to be qualified for BE savings, the equipment must not only replace fossil-fuel-based equipment, but also must be a high-efficiency heat pump equipment.

Q: *A 240-unit co-op building has converted all in-unit natural-gas cooking ranges to electric cooking ranges. Are these electric equipment qualifying BE equipment?*

A: No, electric equipment installed for the building space heating, cooling and domestic hot water systems only are qualified for BE.

Q: *Instantaneous electric water heaters have replaced a gas-fired water heater in an Article 320 building. Are these water heaters qualified for BE savings?*

A: No, for water heating equipment to be qualified for BE savings, the equipment must not only replace fossil-fuel-based equipment, but also must be a high-efficiency heat pump equipment.

Q: *Fin tube hydronic radiators heated by gas boilers have been replaced by electric base board heating systems. Are these electric heating systems qualified for BE savings?*

A: No, for space heating equipment to be qualified for BE savings, the equipment must not only replace fossil-fuel-based equipment, but also must be a high-efficiency heat pump equipment.

QUESTIONS???

• PDH QUESTIONS

1. What are the requirements for meeting the beneficial electrification equipment criteria specified in 1RCNY 103-14?

2. What is the difference between “deemed” and “metered” approaches to quantifying annual electricity consumption of qualifying equipment?

3. How are the beneficial electrification savings “banked” for future years?

This concludes the
American Institute of Architects
Continuing Education Systems Course.

Department Contact for AIA:
Melanie Guzman
Melaguzman@buildings.nyc.gov, 212-393-2163

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