NYC:DDC
A Market in Transformation

Department of
Design and Construction

Dr. Feniosky Peña-Mora
Commissioner

Margaret O'Donoghue Castillo, FAIA,
LEED AP, Chief Architect

660
Active infrastructure portfolio

641
active public buildings portfolio

$15 billion
current portfolio value

250+
awards won since inception

$17 billion
expected by 2020

4151
projects completed since 1996

1321
in-house workforce

1300
consultant workforce

$16 billion
completed since 1996

as of July 1, 2016

NYC Department for the Aging

Bklyn Public Library

NYC Office of Chief Medical Examiner

NYC Children's Services

NYC Citywide Administrative Services

Correction Department

NYC Housing Recovery

NYC Criminal Justice

Department of Cultural Affairs NYCulture City of New York

NYC Mayor's Office of Recovery & Resiliency

NYC Environmental Protection

New York City Department of Sanitation

NYC Health

NYC Department of Education

DHS

NYC Department of Housing Preservation & Development

NYC Human Resources Administration

NYC Information Technology & Telecommunications

New York City Department of Finance

New York Public Library

NYC Emergency Management

NYC Parks

Police Department City of New York

NYC Department of Probation

Queens Library

New York City Department of Education

New York City DOT

NYC Taxi and Limousine Commission

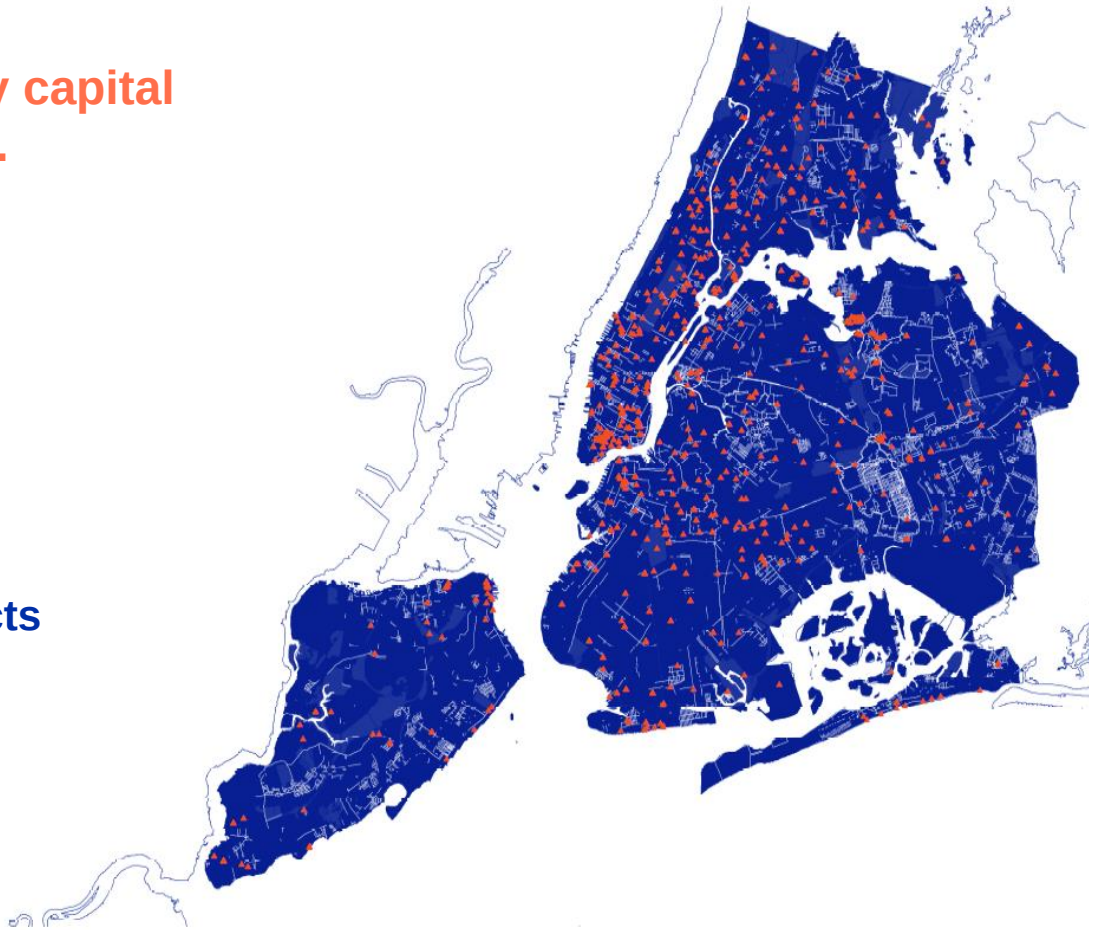
NYC DDC is the City's primary capital construction project manager.

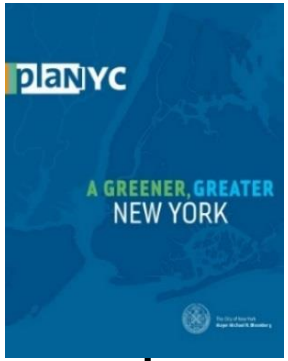
4,151 projects completed

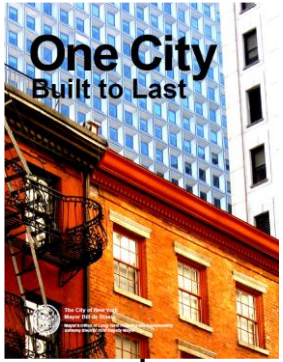
$15B active portfolio value

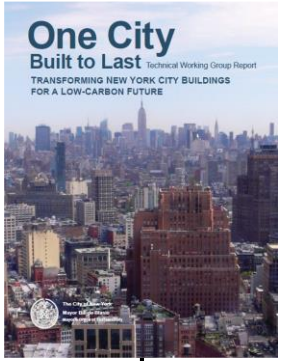
641 active public buildings projects

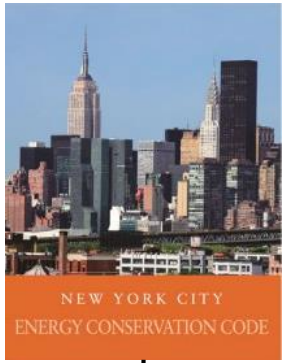
660 active infrastructure projects











2007

PlaNYC

sets citywide goal of 30x30

2009

Greener, Greater Buildings Plan

- **LL84** - Benchmarking*
- **LL85** - First NYC Energy Code, based on ASHRAE 90.1-2007
- **LL87** - Energy Auditing*
- **LL88** - Submetering/Lighting*

*For buildings over 50,000 gsf

2014

One City Built to Last

sets citywide goal of 80x50

NYC ECC

updated to ASHRAE 90.1-2010

2016

One City Technical Working Group

completes report on retrofitting existing NYC buildings

2016

NYC ECC

updated to ASHRAE 90.1-2013, adds airtightness testing

LL84/87/88

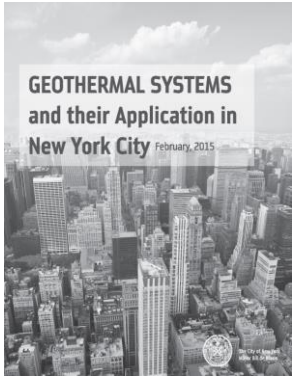
expanded to buildings over 25,000 gsf

Citywide Efforts to Date – Buildings

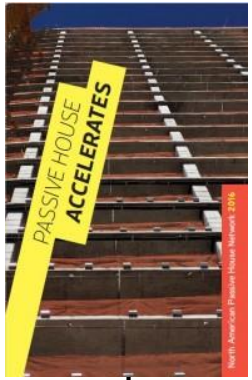
2005
LL86
requires LEED v2 Silver minimum

2009
LL86
updated to LEED v3 Silver

2016
LL24
requires solar feasibility study and implementation



2016
LL6
requires geothermal feasibility study and implementation (effective 2017)



2016
LL31
sets low-energy use intensity targets (effective 2017)

2016
LL32
updates LL86 to LEED v4 Gold (effective 2017)

Citywide Efforts to Date – Municipal Buildings

Local Law 31 of 2016 (LL31)

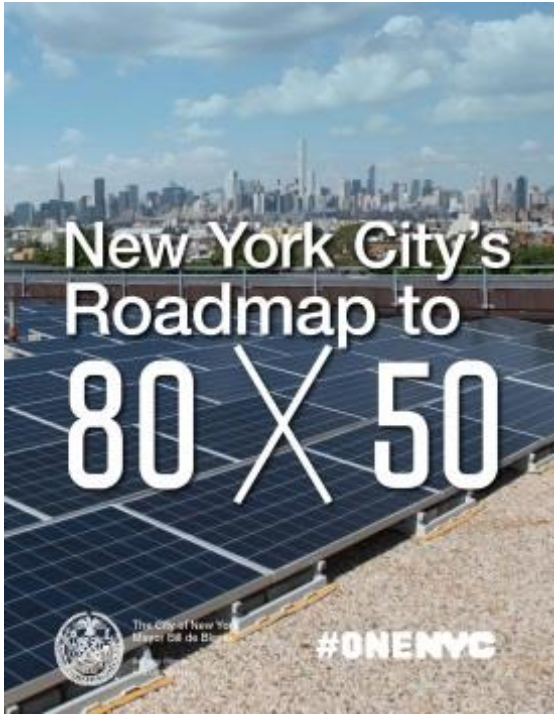
- **50% Median LL84: 50% of the median Source EUI for buildings of similar use, as determined by most recent Local Law 84 Benchmarking Data;**

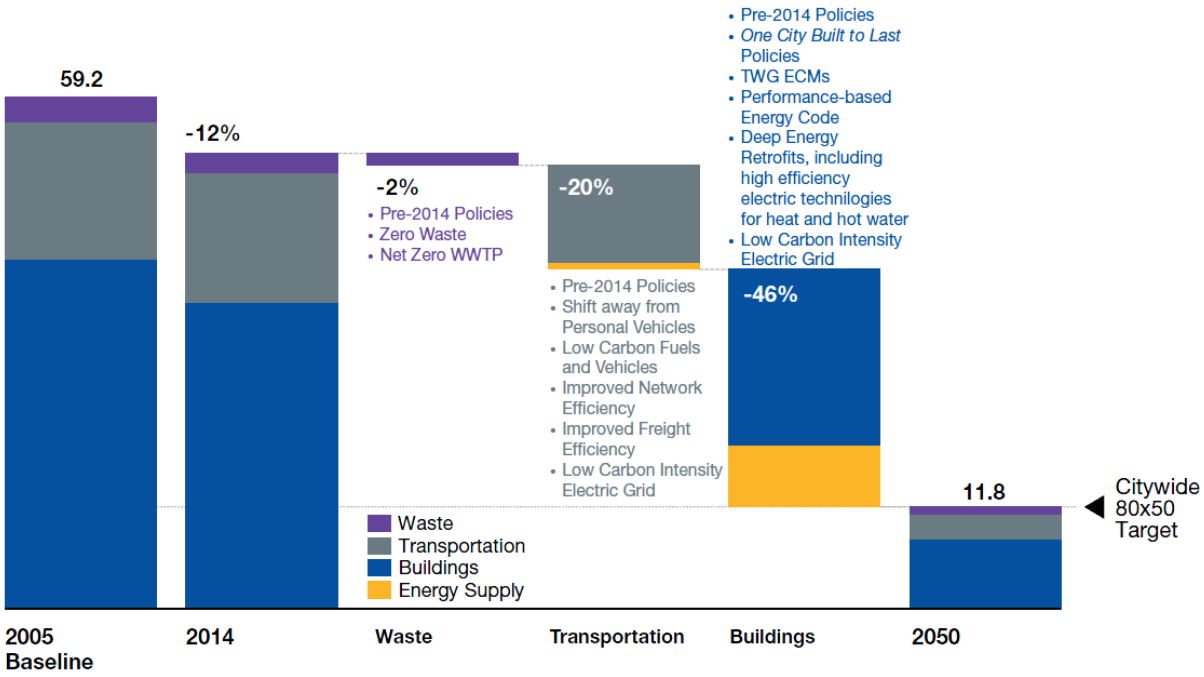
- **50% ASHRAE 90.1 2013: 50% of median Source EUI for buildings of similar use, as designed to meet the prescriptive and mandatory requirements of ASHRAE 90.1-2013 or**

- **Passive House: 38 kBtu/sf/yr Source EUI for new buildings and 42 kBtu/sf/yr for existing buildings. Local Law 31 does not require Passive House certification.**

80 x 50

Mayor de Blasio's goal to reduce New York City's carbon emissions by 80% of the 2005 baseline by 2050

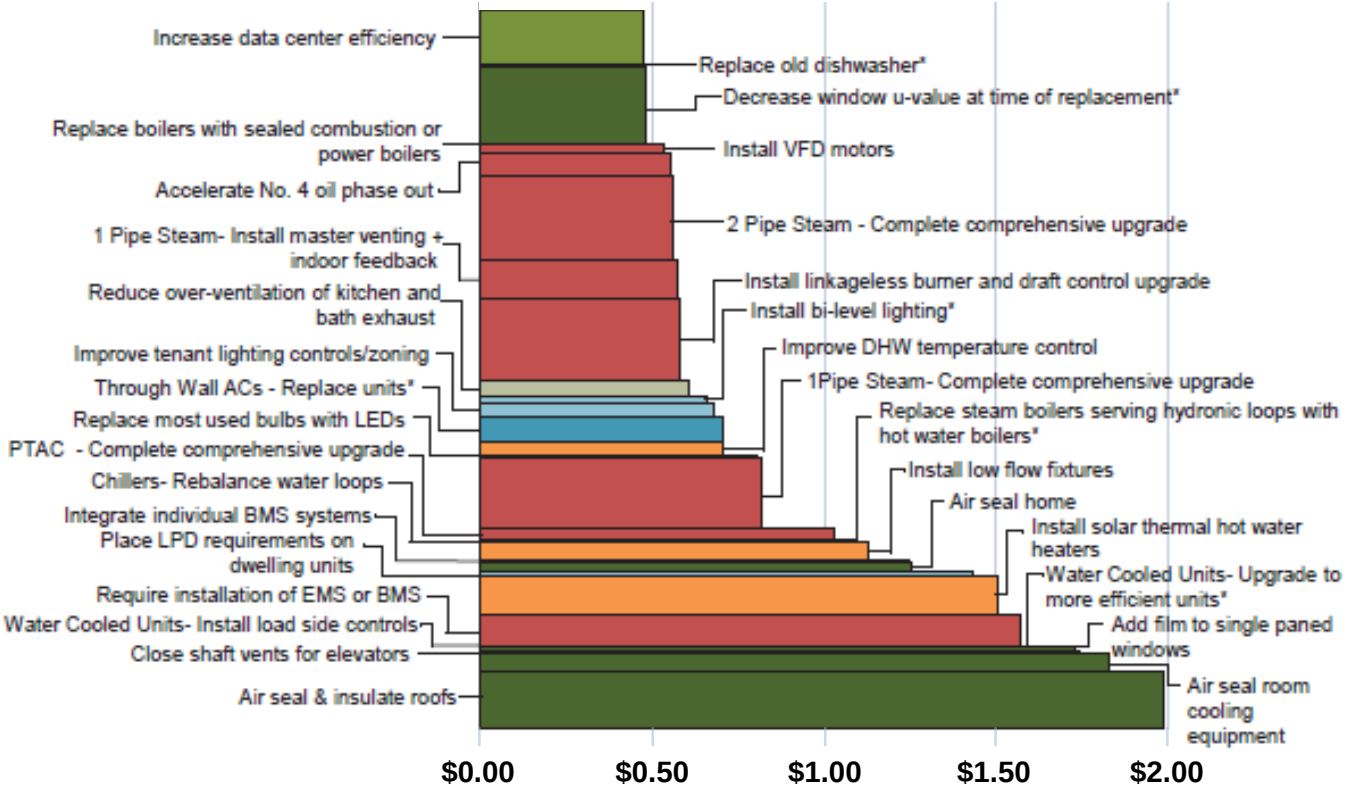




*All percent reductions are relative to the 2005 citywide baseline

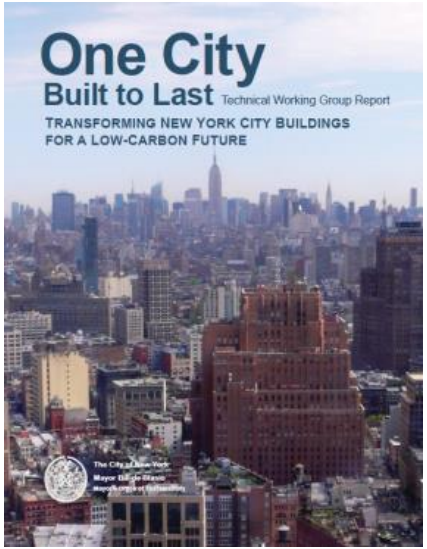
Roadmap to 80x50

Projected Citywide GHG Emissions Reductions (MtCO2e)

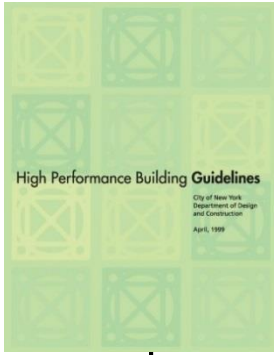


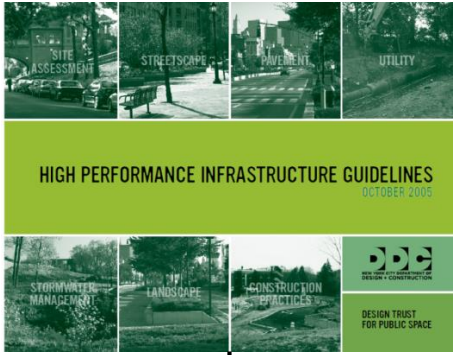
1 $MtCO_2e$

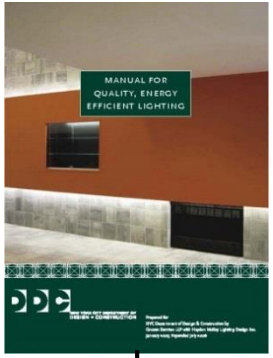
Relative Impact,
If Applied to All
Applicable Buildings

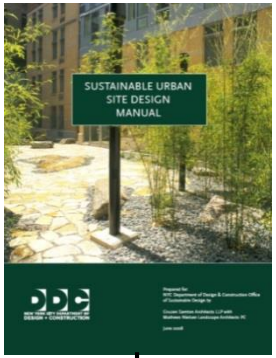


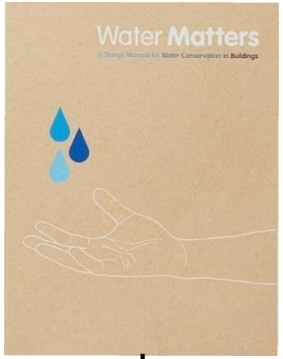
Existing Buildings - Technical Working Group ECMs

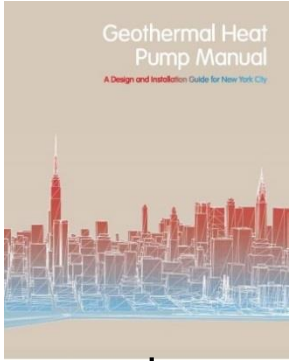












1999
High Performance Building Guidelines

2005
High Performance Infrastructure Guidelines

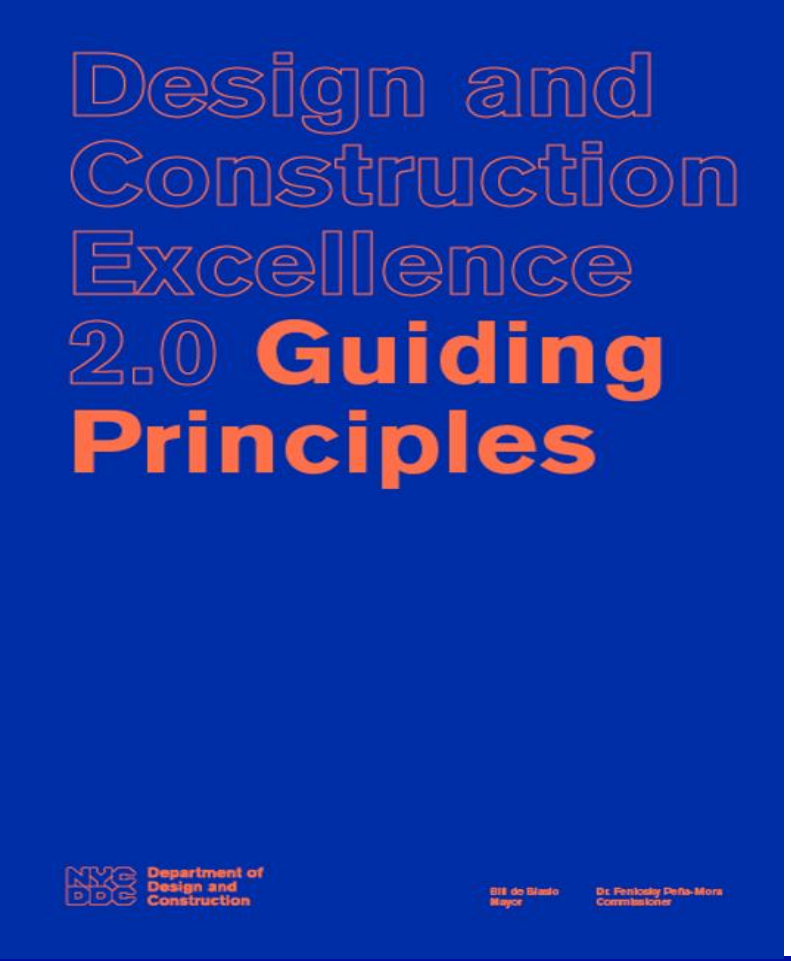
2006
Manual for Quality, Energy Efficient Lighting

2008
Sustainable Urban Site Design Manual

2012
Water Matters: Design Manual for Water Conservation in Buildings

2013
Geothermal Heat Pump Manual

80x50 at DDC Builds on A History of Sustainable Design Leadership



Equity

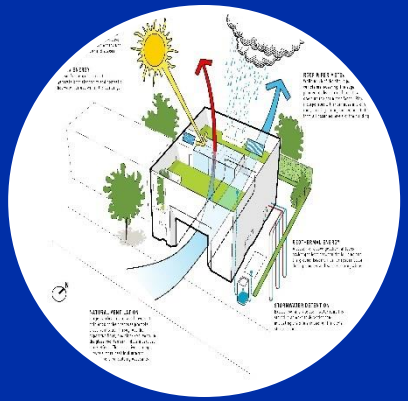
Sustainability

Resiliency

Healthy Living

Guiding Principles – Sustainability

Use natural resources responsibly



Design holistic, integrated systems

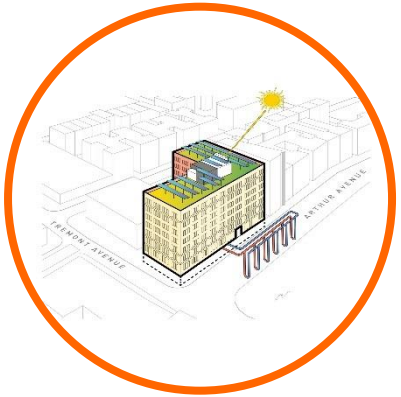
Encourage responsible water use

Promote sustainable urban ecology

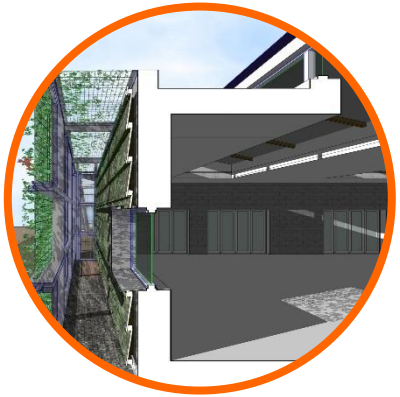
Minimize energy use and reduce greenhouse gas emissions

Optimize site conditions

Use renewable sources



Optimize systems



Use passive tactics

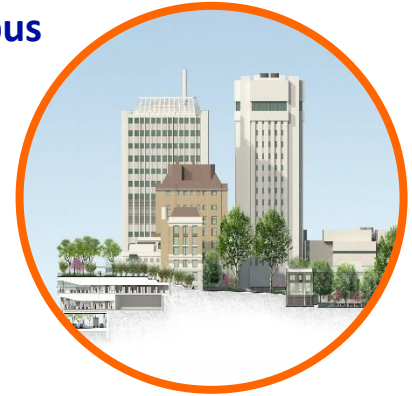
Minimize secondary electrical loads

Sustainability – Minimize Energy Use and Reduce Greenhouse Gas Emissions

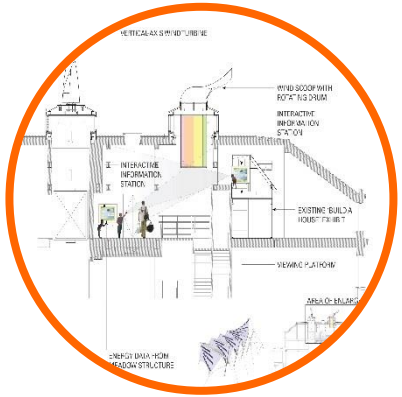
Bring sustainable urban ecology inside

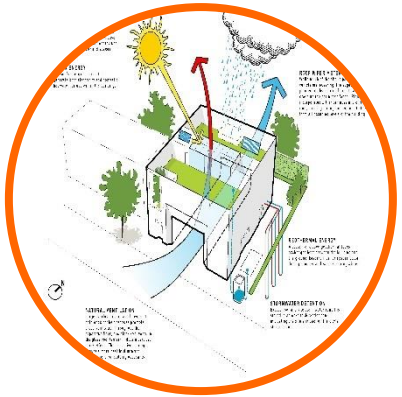
Improve commissioning

Optimize campus solutions



Design with Users in mind



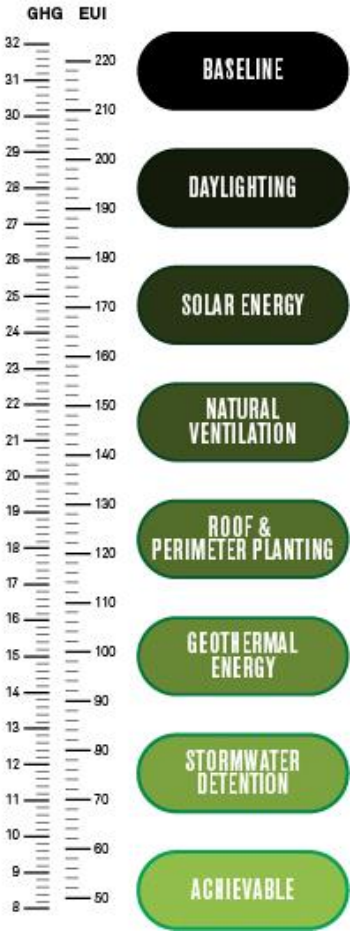


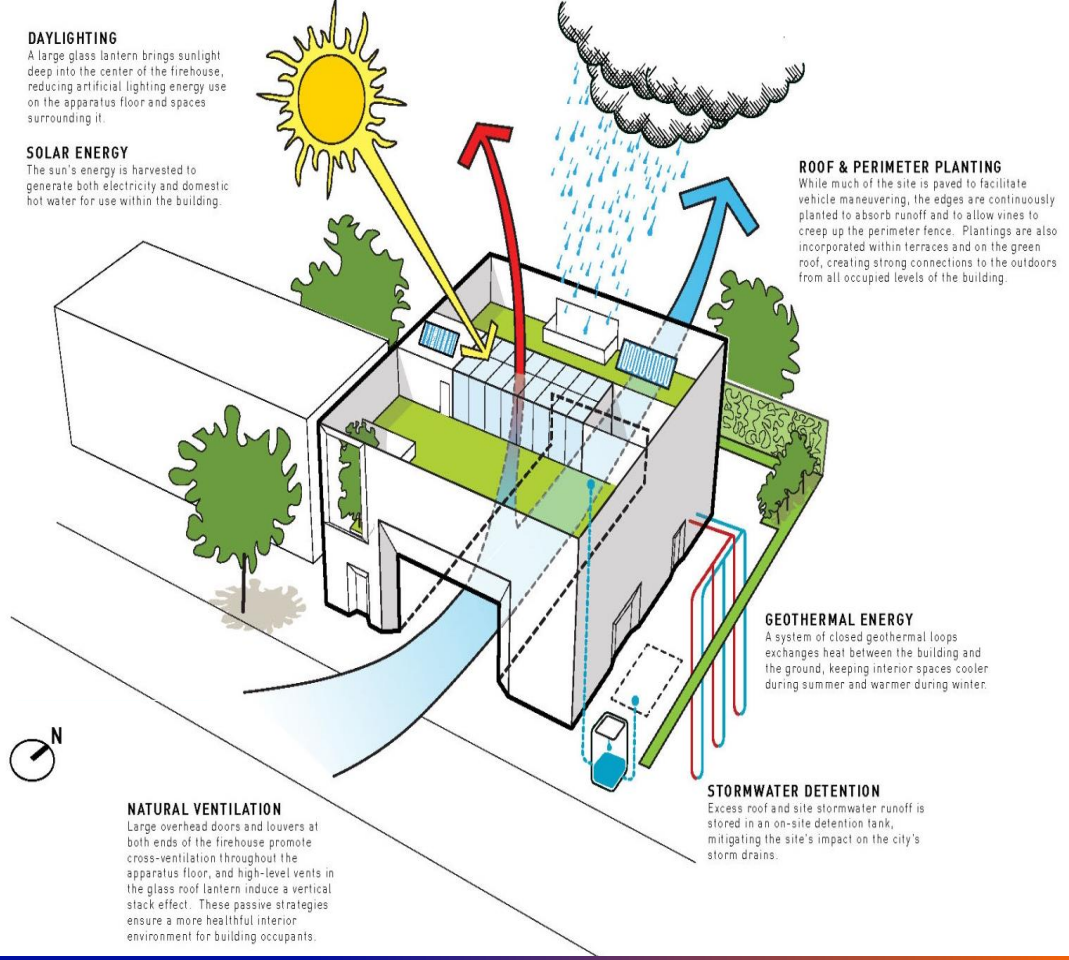
Leverage site and envelope response

Sustainability – Design Holistic, Integrated Systems

Rescue Company 2

Studio GANG





Simulated.
Not Actual.

Rescue Company 2

Studio GANG

Case Studies

Building Basics:

Constructed 1912-1916

7 stories + basement

140,739 gsf

Architecture:

Concrete-encased steel frame

Solid masonry exterior with limestone base

Historically significant street-facing façades

Systems:

Dual-fuel steam boilers and perimeter radiators

Window air conditioning units

Operable windows

Planned base scope (on hold):

Interior gut renovation with all-new systems

Extensive façade repair and restoration

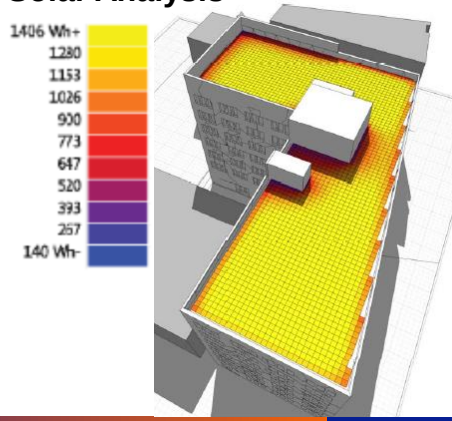
Window replacement and lintel repair

1918

2016

2020?

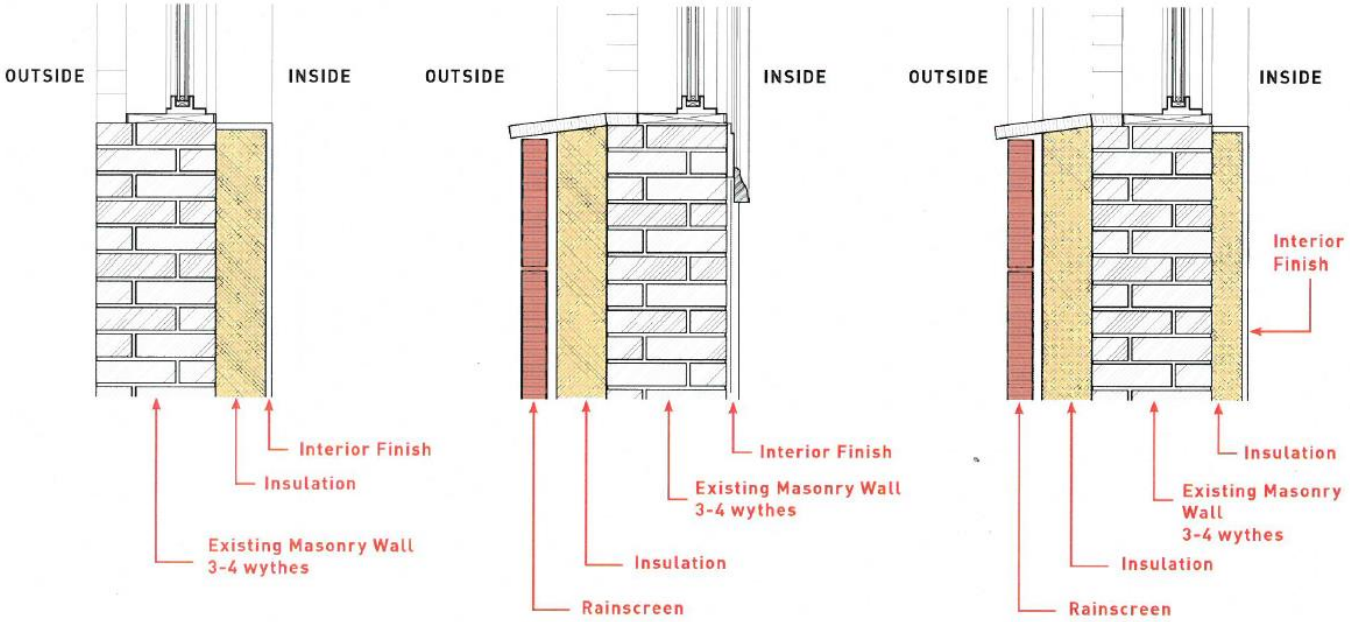
Solar Analysis



Case Studies

Bergen Building, Bronx - Renovation by Studio Gang Architects, Buro Happold Engineering, Thornton Tomasetti

WALL ASSEMBLY STUDIES
(Insulated)

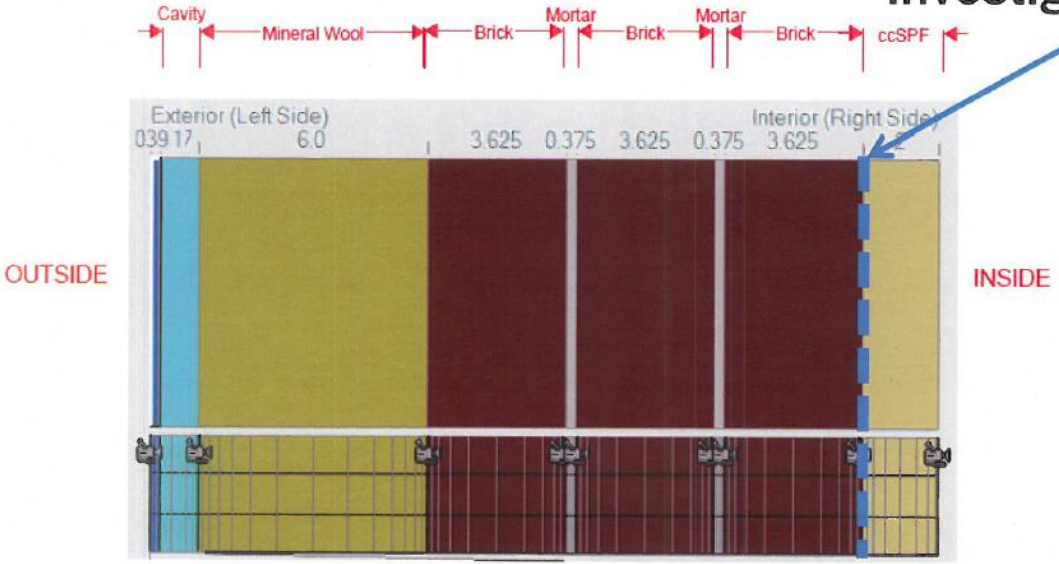


Typical wall section WT2- Option 2

The typical wall section built-up is: (from inside to outside)

- 2” Closed Cell Spray Foam Insulation
- ~12” Masonry Wall
- 6” Mineral Wool Insulation

Area under investigation

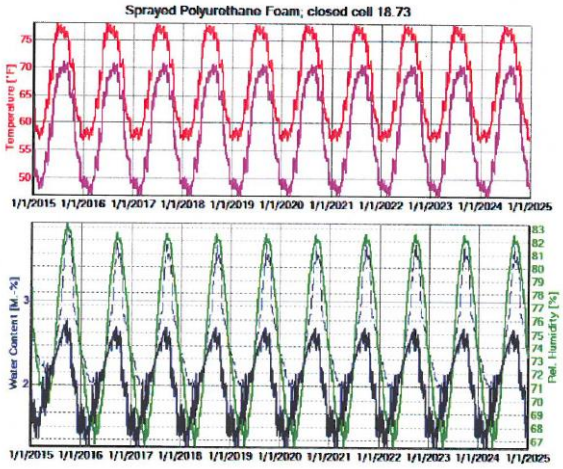


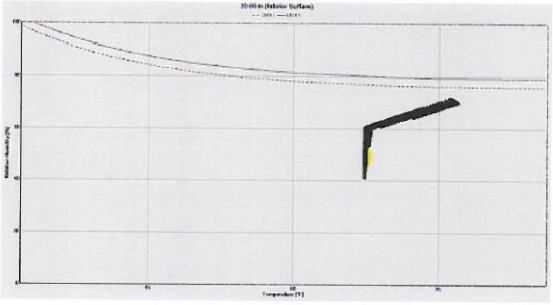
Temperature
& Dew Point curve
don't cross each
other

+

Relative
Humidity< 85%

No
Condensation





Case Study

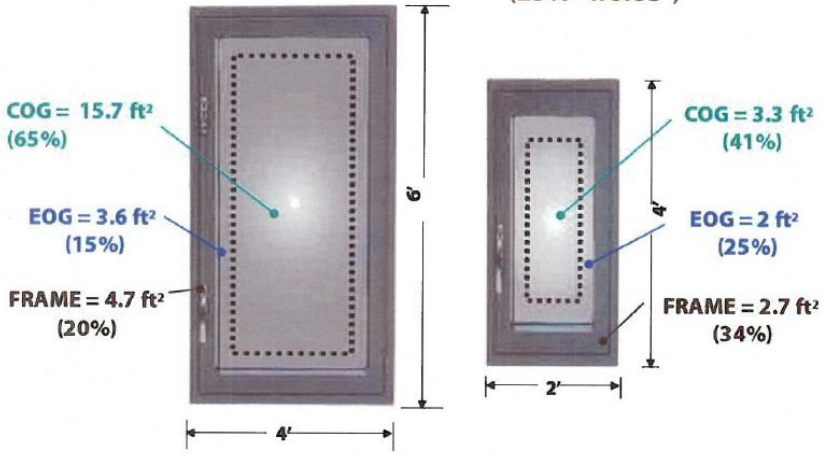
Bergen Building, Bronx - Studio Gang - BuroHappold Engineering

WINDOW ASSEMBLY - AREA AND U-FACTOR

The windows in this example have identical glass, spacer, and framing components.
The only difference is their **size**.

Area = 24.0 ft²
U-Factor = **0.4** BTU/ ft2-hr-°F

Area = 8.0 ft²
U-Factor = **0.5** BTU/ ft2-hr-°F
(25% "worse")



For the smaller window shown, the amount of higher-performing COG area decreased from 65% to 41%, and the lower performing frame increased from 20% to 34%.

WINDOW ASSEMBLY - Glass Coatings

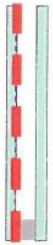
Glass Coatings and U-Factor

Low-e coatings improve both COG and EOG U-Factors.
(All Winter U-Factors in BTU/hr-ft^2-°F)

1" Insulating Uncoated

COG 0.47
EOG 0.49
Frame 0.86

1" Insulating Low-e Coated



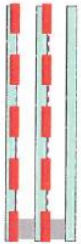
COG 0.29
EOG 0.37
Frame 0.85

38% better

1-3/4" Triple Insulating Uncoated

COG 0.30
EOG 0.39
Frame 0.71

1-3/4" Triple Insulating Double Low-e Coated



COG 0.16
EOG 0.27
Frame 0.69

47% better

At left: Illustrates the difference between a 1" uncoated IG unit, and a 1" IG unit with a Low-e coating on the #2 surface, improving the COG U-Factor by 38%

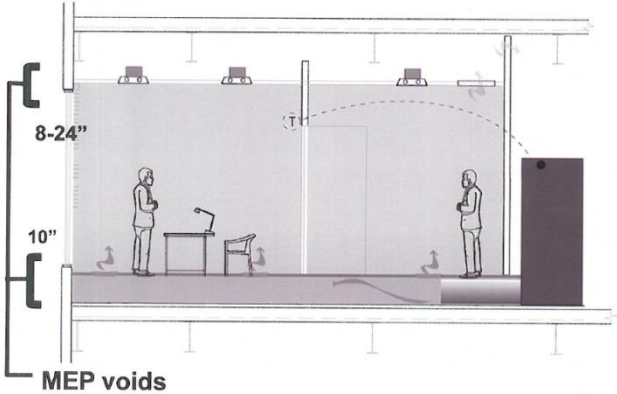
At right: Illustrates the difference between an uncoated triple IG unit, and a triple IG unit with two Low-E coatings on the #2 and #4 surfaces, improving the COG U-Factor by 47%

ENVELOPE ENERGY SENSITIVITY STUDY

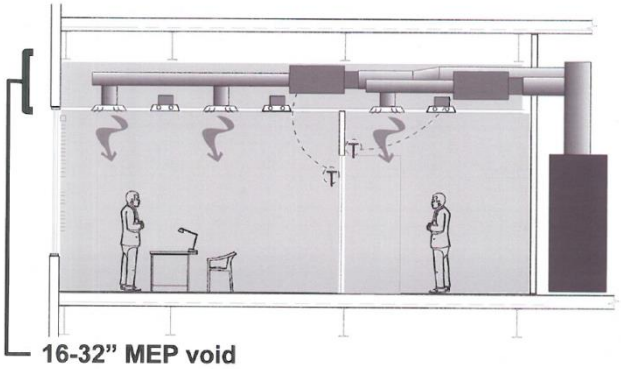
Case Study

Bergen Building, Bronx - Studio Gang - BuroHappold Engineering

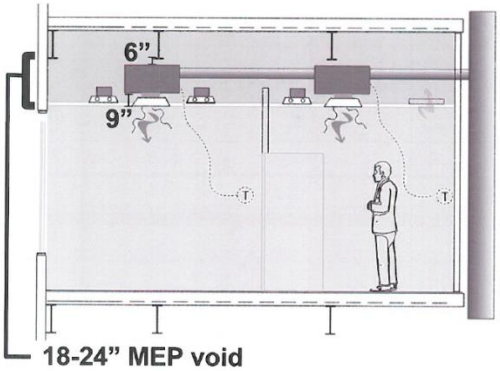
1 – UFAD - FLOOR-X-FLOOR AHU TO UFAD



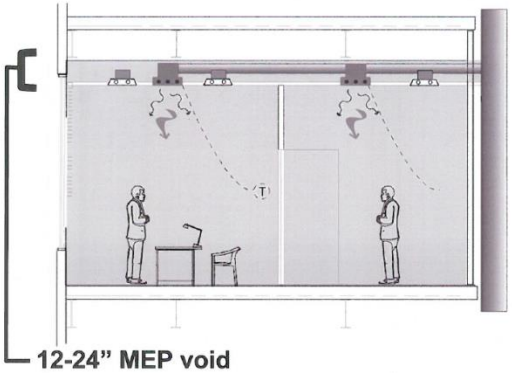
2 – VAV - OVERHEAD VAV



3A/B – FCU - DEDICATED OA WITH FCUS FOR COOLING/HEATING



4 – ACB - DEDICATED OA TO ACTIVE CHILLED BEAMS, OPTIONAL PERIMETER RADIANT



Case Study

Bergen Building, Bronx - Studio Gang - BuroHappold Engineering

BASELINE EUI:
217 KBTU/YR/SQFT

MODIFIED SITE EUI:
212 KBTU/YR/SQFT

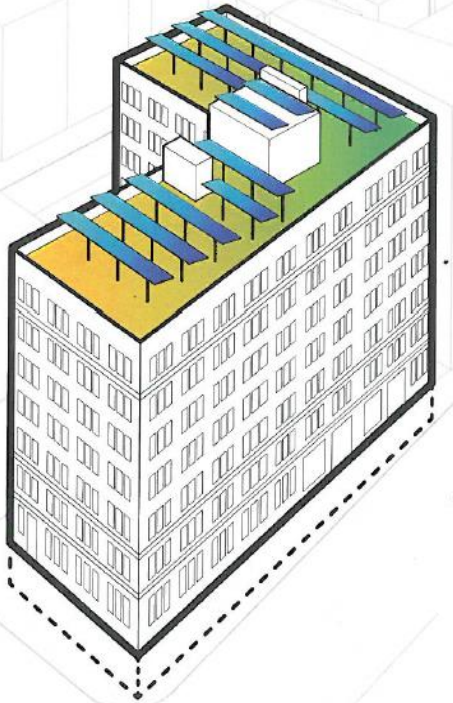
(-5)

MODIFIED SITE EUI:
194 KBTU/YR/SQFT

(-18)

POTENTIAL ROOF POWER GENERATION:
180,000 kWh/yr

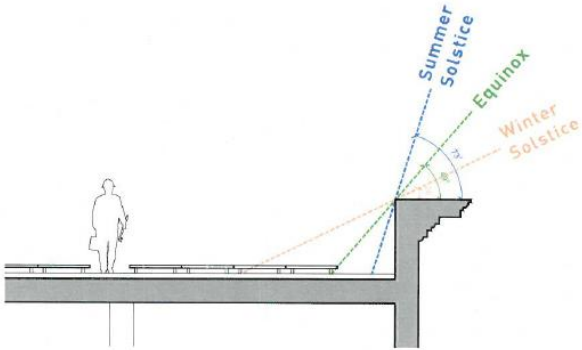
POTENTIAL ROOF INSULATION
18 KBTU/YR/SQFT



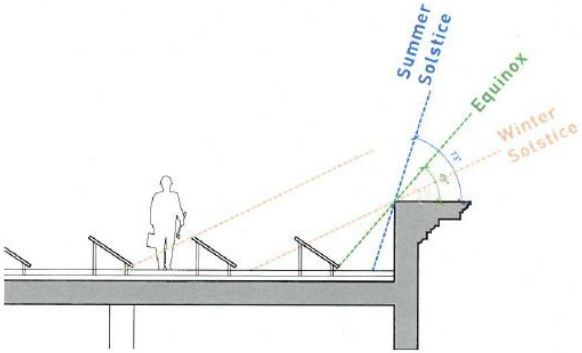
Case Study

Bergen Building, Bronx - Studio Gang - BuroHappold Engineering

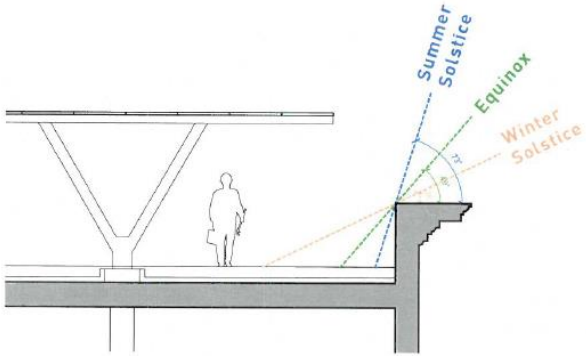
SOLAR PANEL MOUNTING OPTIONS



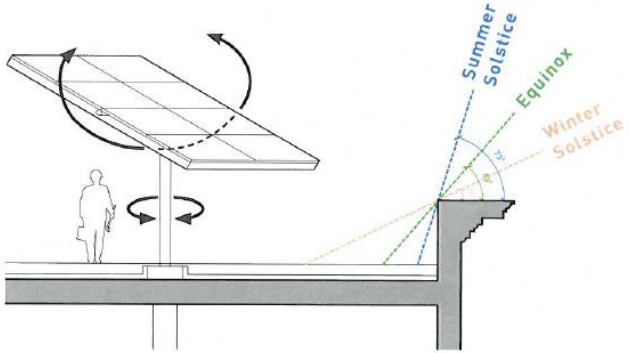
OPTION 1 - ON ROOF, FLAT



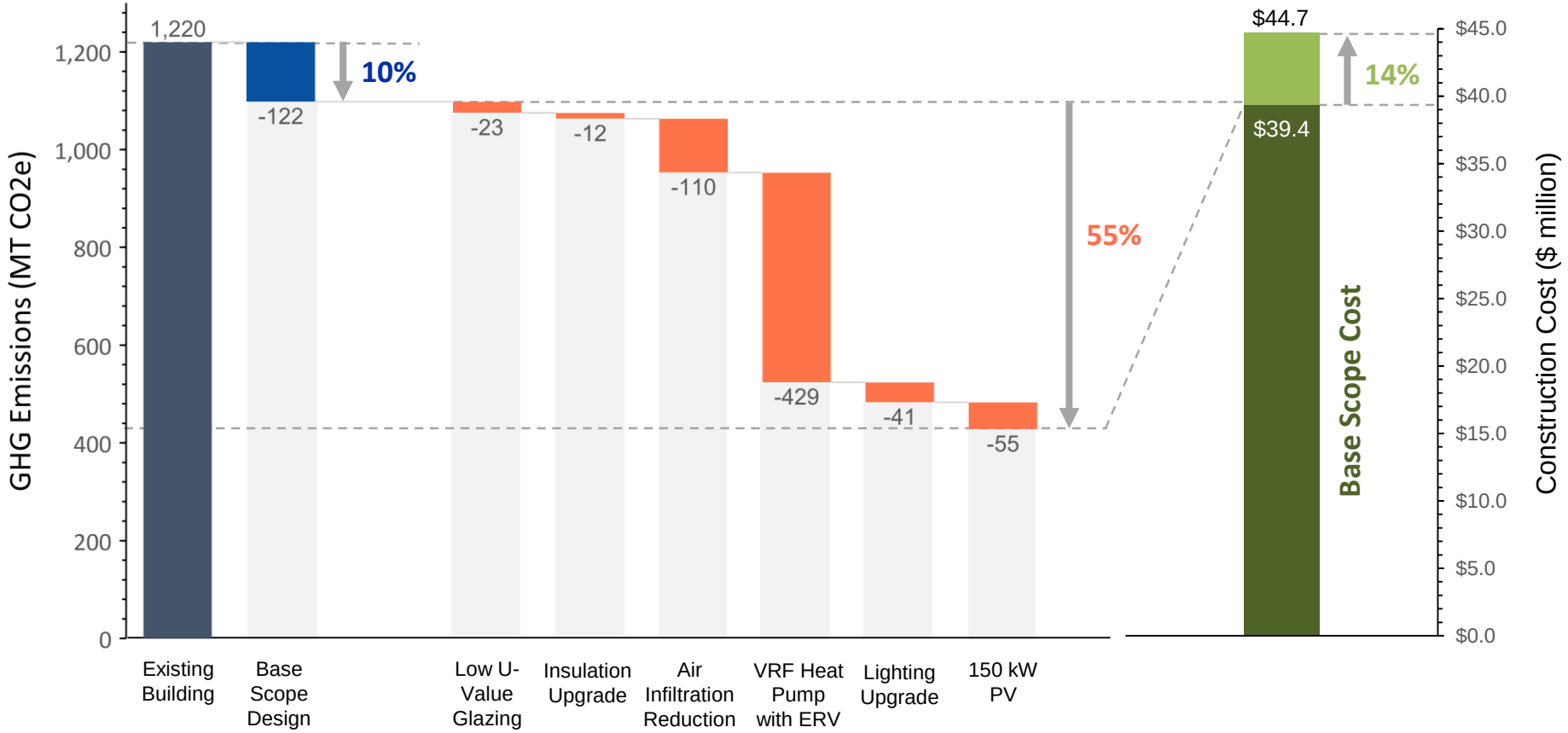
OPTION 2 - TILTED



OPTION 3 - OVER ROOF, FLAT

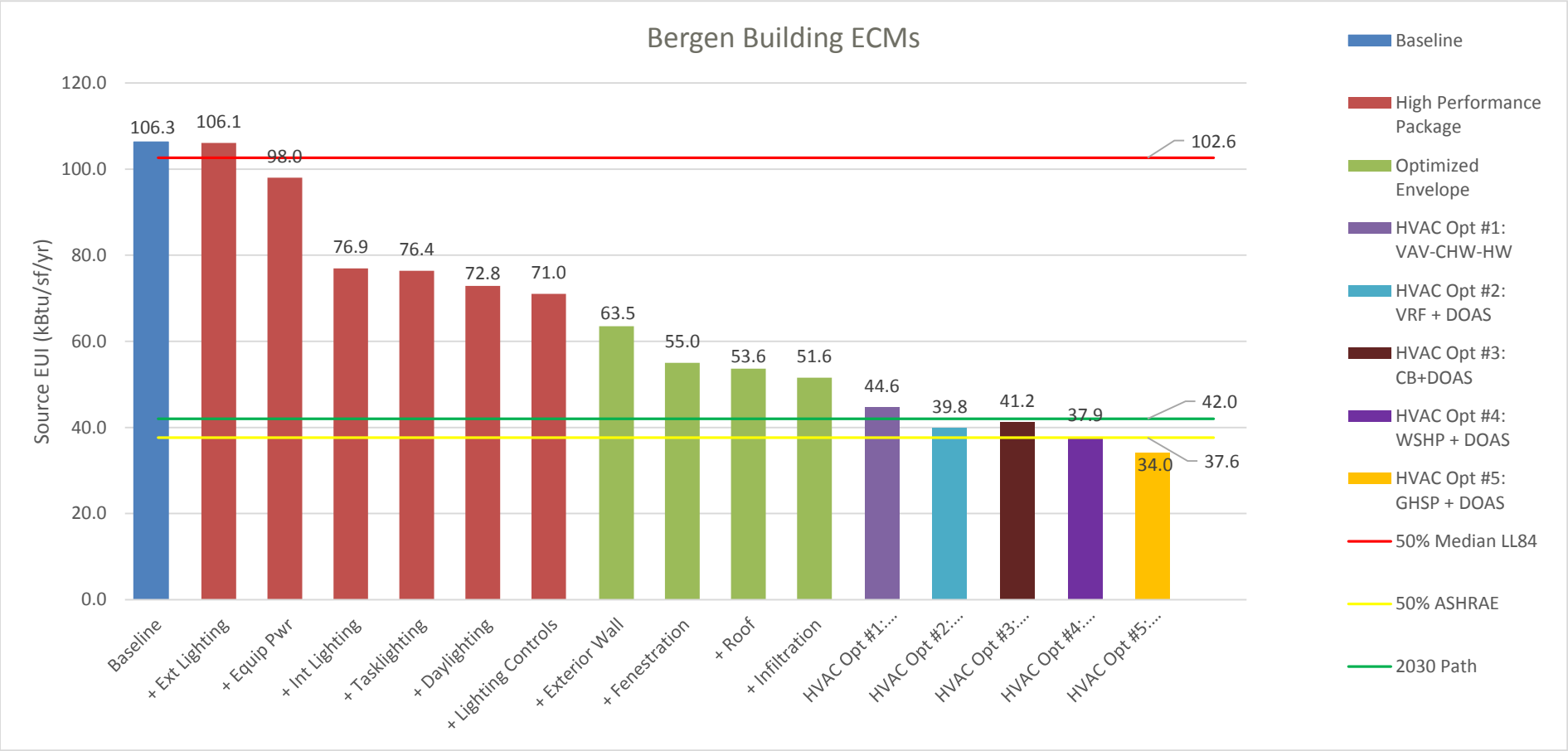


OPTION 4 - TRACKING



Case Studies

Bergen Building, Bronx - Renovation by Studio Gang Architects, Buro Happold Engineering, Thornton Tomasetti



Case Studies

Bergen Building, Bronx - Renovation by Studio Gang Architects, Buro Happold Engineering, Thornton Tomasetti

Building Basics:

2 stories

11,621 gsf

Targeting LEED Gold certification

Base Scope Architecture:

Steel frame with diagonal columns

Curtain wall with ceramic frit

Precast concrete panels

Base Scope Systems:

Air-source heat pumps with variable refrigerant flow

Dedicated outdoor air system with energy recovery

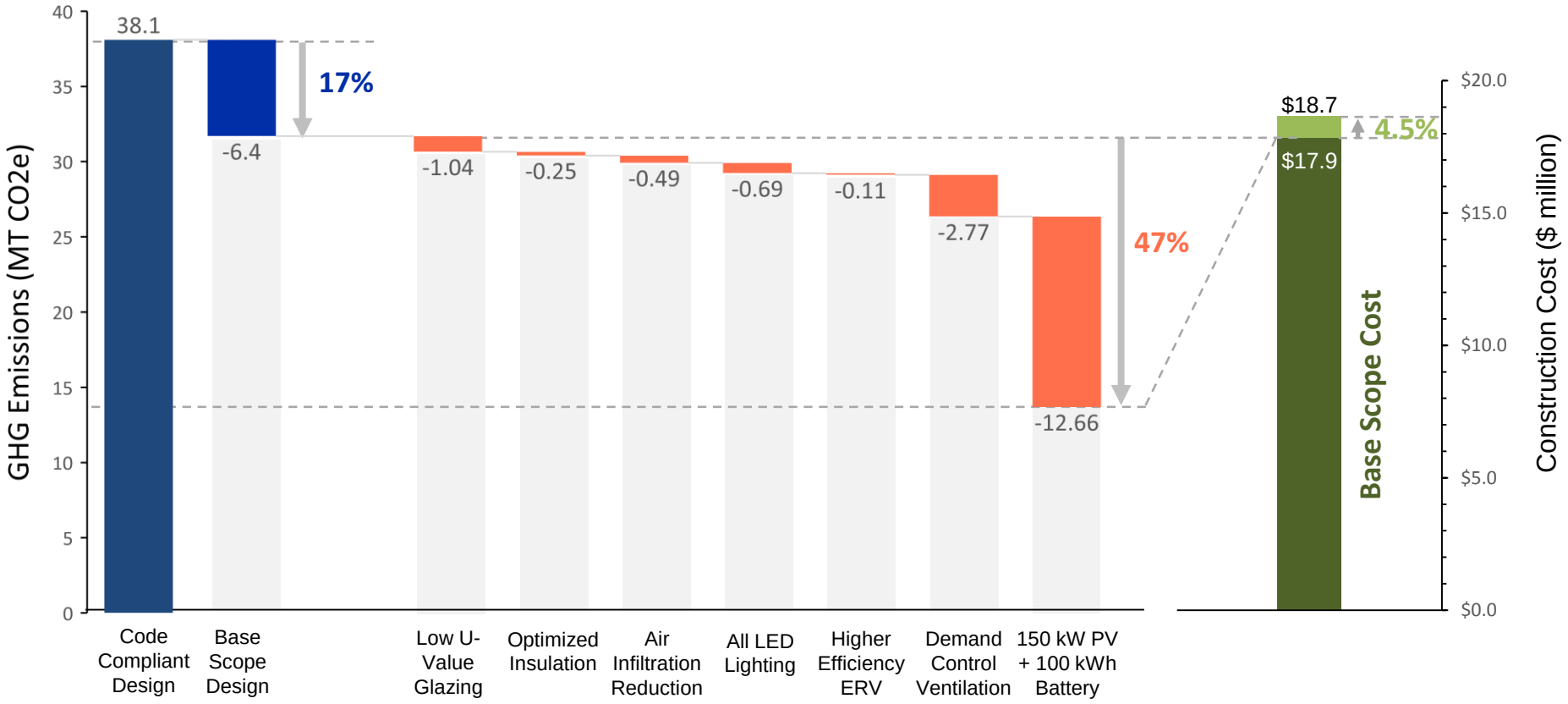
Hydronic radiant flooring

Constraints:

Adjacent elevated subway requires high STC (sound transmission class) rating for curtain wall

Case Studies

Westchester Square Library, Bronx - Snøhetta, Altieri Sebor Wieber Consulting Engineers, Atelier Ten



Case Studies

Westchester Square Library, Bronx - Snøhetta, Altieri Sebor Wieber Consulting Engineers, Atelier Ten

Building Basics:

2 stories

10,640 gsf

Replaces facility damaged by Sandy

Base Scope Architecture:

Steel frame

Insulated metal panel walls

Glazing located behind perforated metal screens

Base Scope Systems:

#2 fuel oil boiler (no natural gas service to site)

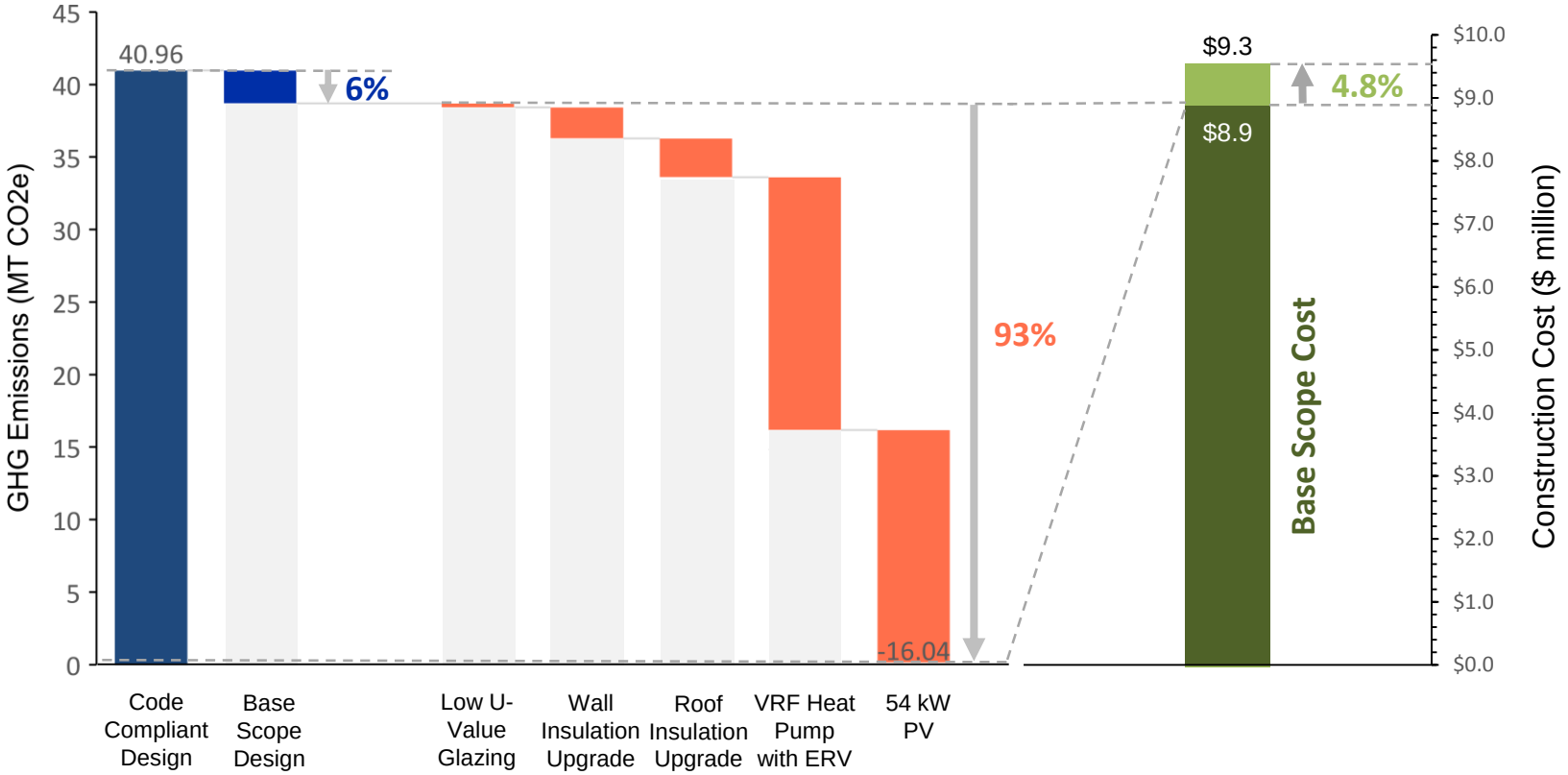
Conventional rooftop HVAC

Constraints:

Located in floodplain - first floor designed to allow floodwaters to pass through, second floor elevated

Case Studies

NYPD Bomb Squad Facility, Bronx - Rice+Lipka Architects, Plus Group Consulting Engineering



Case Studies

NYPD Bomb Squad Facility, Bronx - Rice+Lipka Architects, Plus Group Consulting Engineering


NYC
BIKES
Beautiful
The Carole King Musical
AMERICAN EAGLE
OUTFITTERS