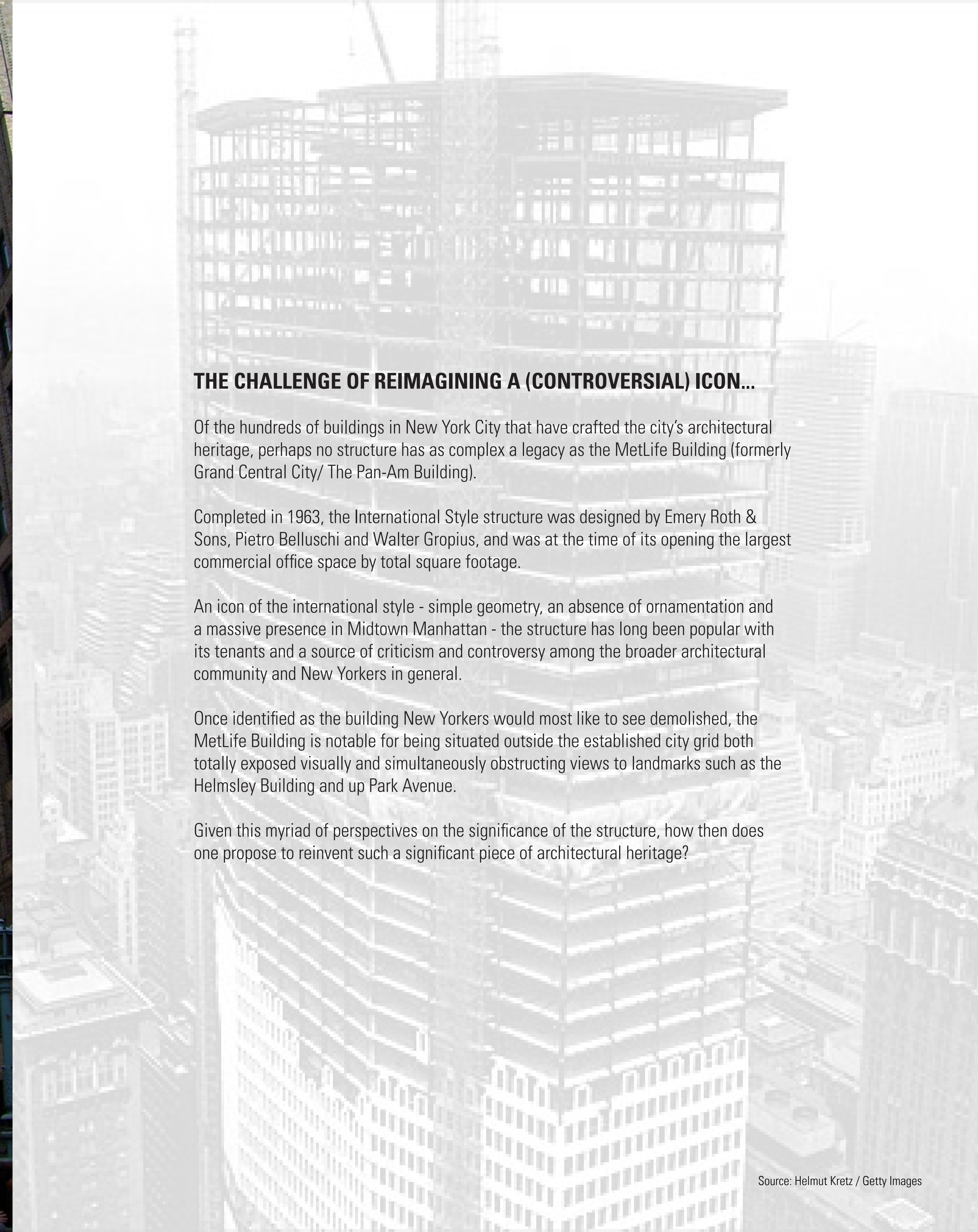
RE-IMAGINING A *(CONTROVERSIAL)* ICON

A VISION TO MODERNIZE 200 PARK AVENUE

Original Source: feelgrafix.com

Source: Beyond My Ken / Wikimedia Commons



THE CHALLENGE OF REIMAGINING A (CONTROVERSIAL) ICON...

Of the hundreds of buildings in New York City that have crafted the city's architectural heritage, perhaps no structure has as complex a legacy as the MetLife Building (formerly Grand Central City/ The Pan-Am Building).

Completed in 1963, the International Style structure was designed by Emery Roth & Sons, Pietro Belluschi and Walter Gropius, and was at the time of its opening the largest commercial office space by total square footage.

An icon of the international style - simple geometry, an absence of ornamentation and a massive presence in Midtown Manhattan - the structure has long been popular with its tenants and a source of criticism and controversy among the broader architectural community and New Yorkers in general.

Once identified as the building New Yorkers would most like to see demolished, the MetLife Building is notable for being situated outside the established city grid both totally exposed visually and simultaneously obstructing views to landmarks such as the Helmsley Building and up Park Avenue.

Given this myriad of perspectives on the significance of the structure, how then does one propose to reinvent such a significant piece of architectural heritage?

Source: Helmut Kretz / Getty Images

A VISION TO THE FUTURE

When tasked with establishing a vision for the future of this building, thought centered around the many subjective qualities that the "right" solution might entail:

- Do we embrace the iconic modernist expression?
- Do we attempt to please the detractors and "fix" the building?
- What is a truly "sustainable solution"?
- Is sustainability only about better performance metrics?
- Is there an inherent sustainability in reusing existing materials?

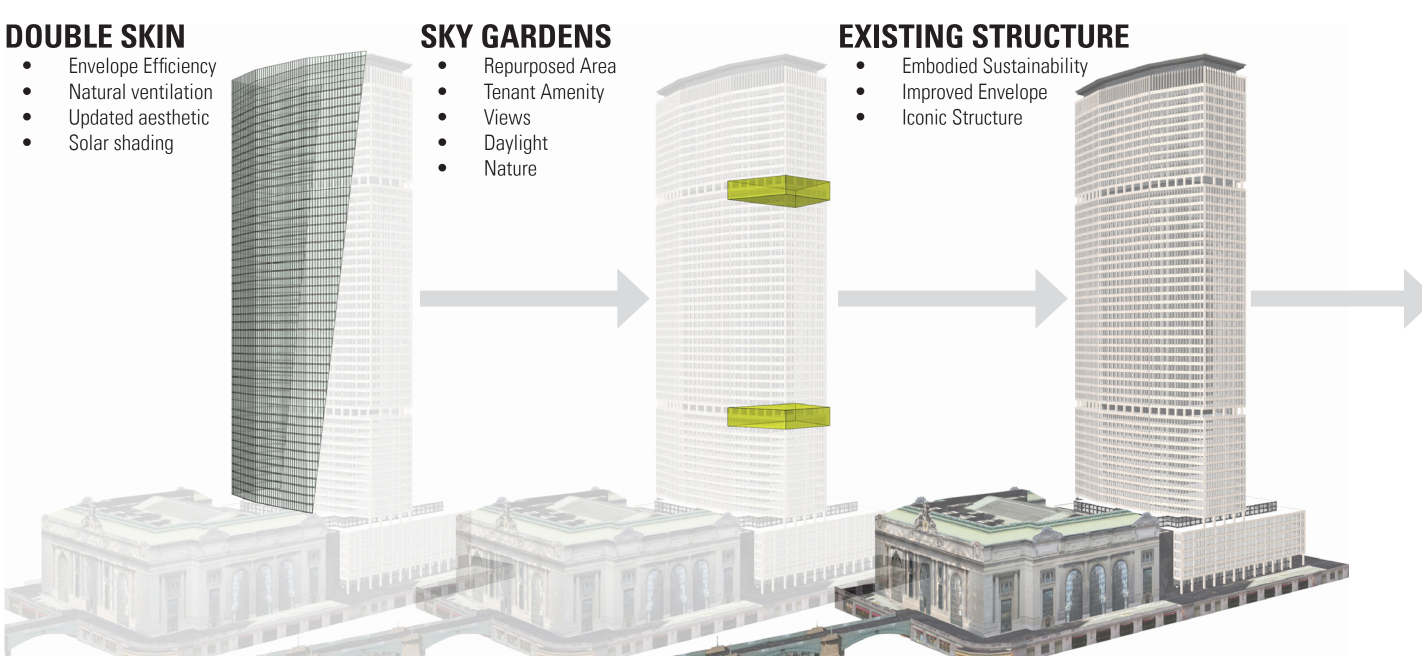
Given the overlapping and occasionally contradicting nature of these questions, the proposed solution seeks to balance preservation of the structure's architectural iconography with a bold new expression for the future.

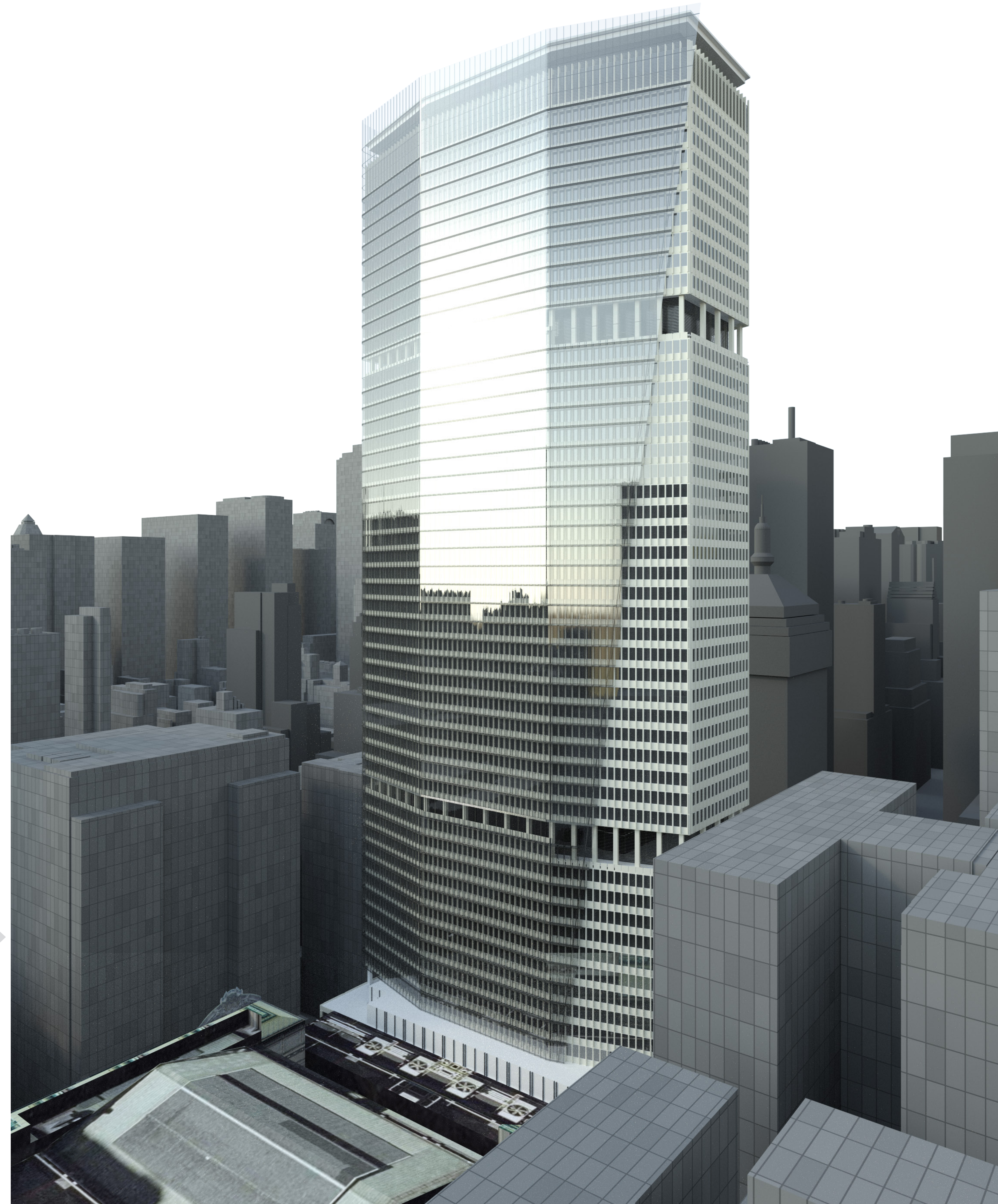
This proposal calls for selective intervention on the facade of the structure, specifically targeting areas most exposed and vulnerable to environmental conditions, while providing more modest solutions in areas of less urgency.

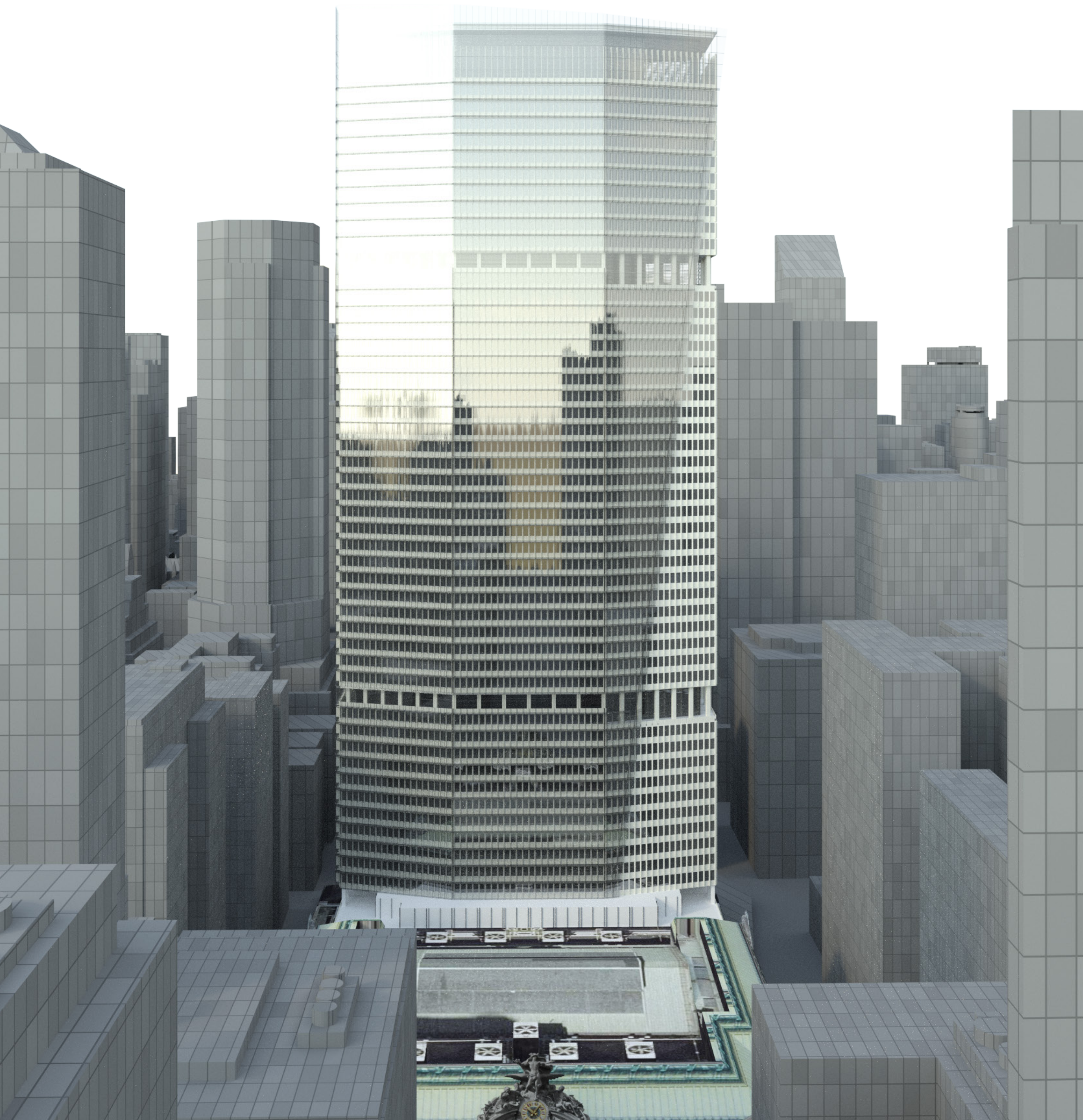
The north-eastern and eastern sides of the building are slated to improve the quality of facade performance through a conventional window replacement - substituting outdated single-pane glazing with state-of-the-art thermally broken windows with insulating glass units.

The southern, western, and northern sides of the structure, in addition to the window replacement, would in addition be retrofit with an outboard curtain wall system, creating a dual-skin scenario that not only provides significant environmental improvements, but creates a dramatic aesthetic contrast to the existing precast concrete curtain wall panels on the rest of the building and softens the imposing nature of the building's massing by reflecting views of the sky and the surrounding city.

Reclaimed mechanical space is selectively demolished and repurposed into sky gardens, introducing an open-air respite for the building's users to collaborate away from the office, eat lunch, or enjoy views of the city.





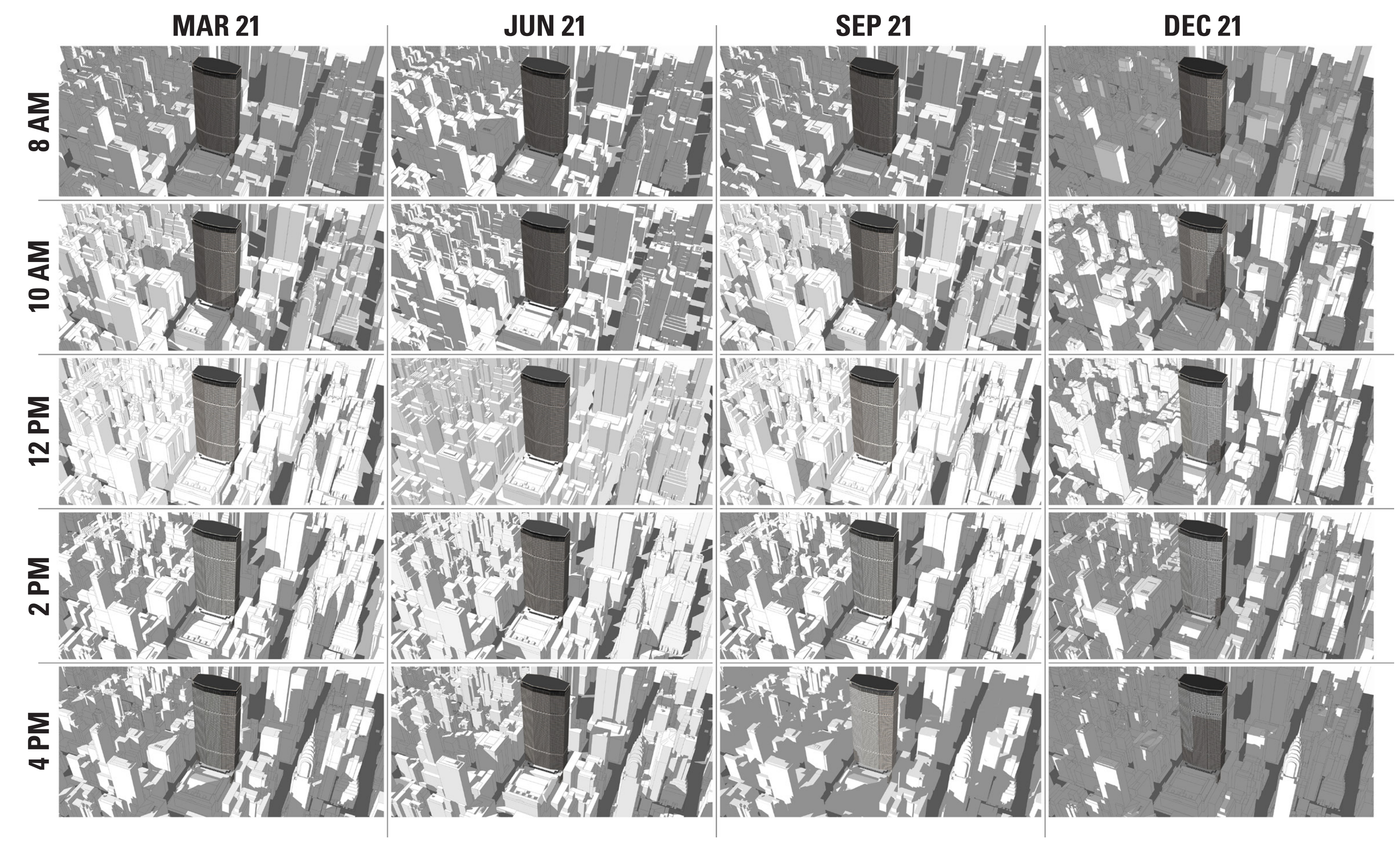


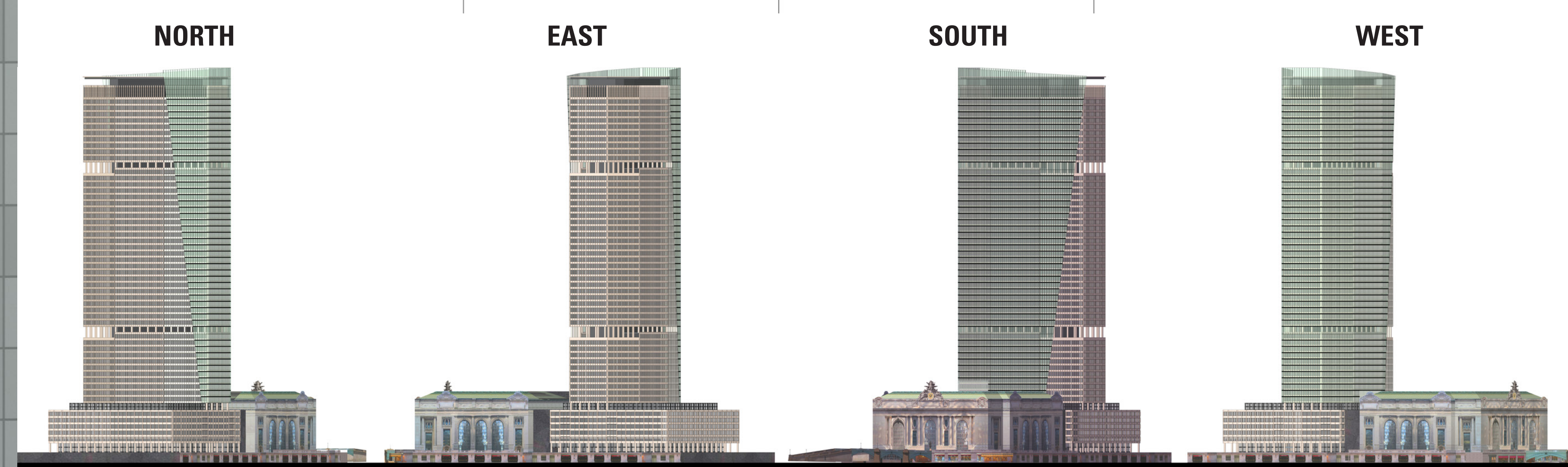
RESPONDING TO URBAN CONDITIONS

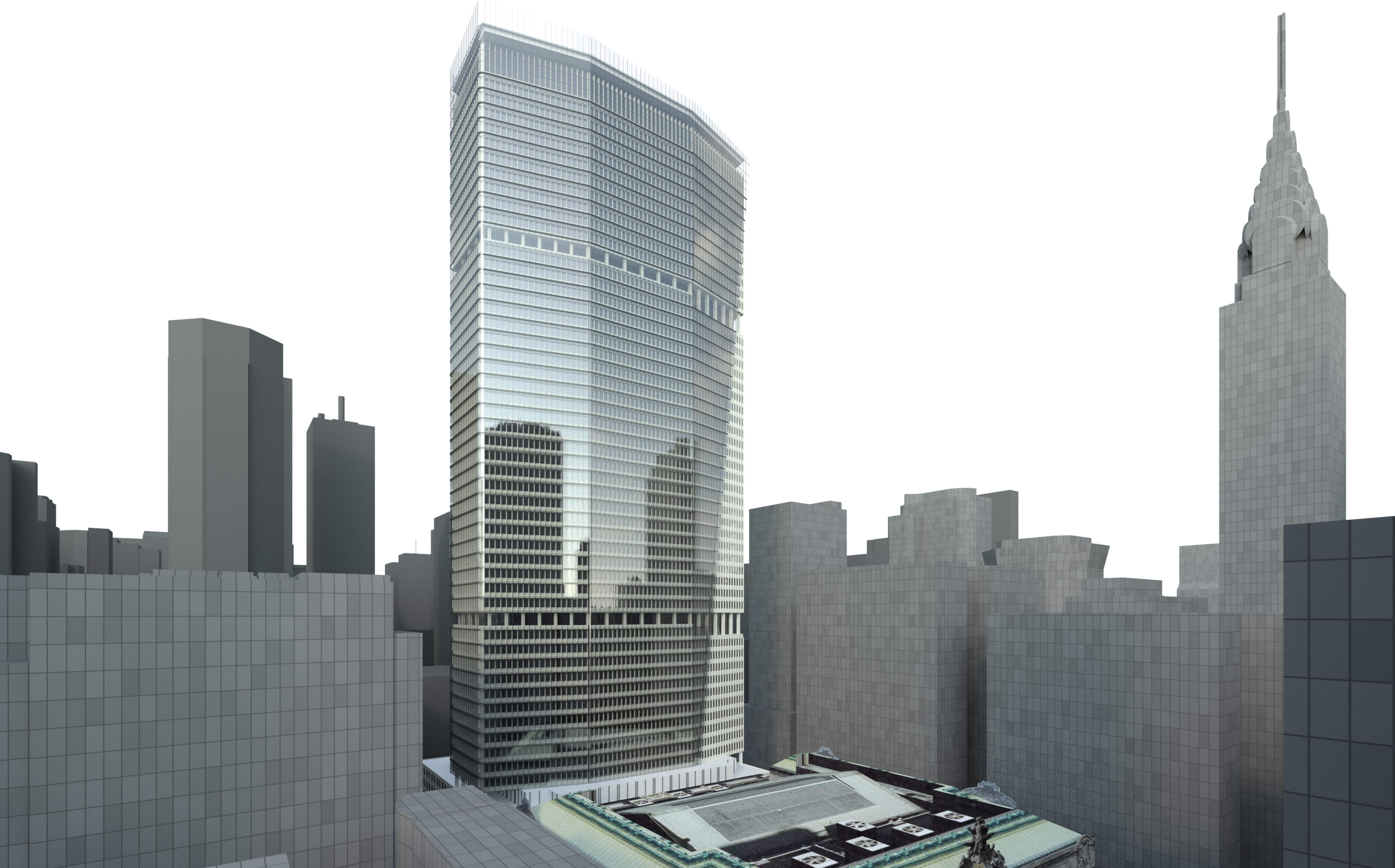
Situated in the heart of Midtown Manhattan, the MetLife Building must respond to a variety of unique environmental criteria. While the city features the traditional gridiron street layout with rectangular blocks, the grid is rotated 30 degrees east of north to better suit the island geography. As a result the primary facades of the structure face northeast and southwest.

In addition, a number of mid-rise buildings surround the MetLife Tower, casting shadows on the tower's base during many times of the year. This scenario provides opportunity to tailor the design to the site in a way that balances aesthetic impact with performance. The double skin is cut back along the southeastern exposure, revealing more of the existing concrete at lower levels and relying on the surrounding structures to provide shelter from solar exposure.

This strategy is mimicked on the northwestern side, where the higher floors are increasingly exposed to cold winter winds. Here, the double facade is wrapped around the northwest corner of the building. Consolidated space in the mechanical levels is retrofit to serve as an active air circulator, bringing warm air from the wall cavity on the southern exposures to the north facade.







SYSTEM ASSEMBLY

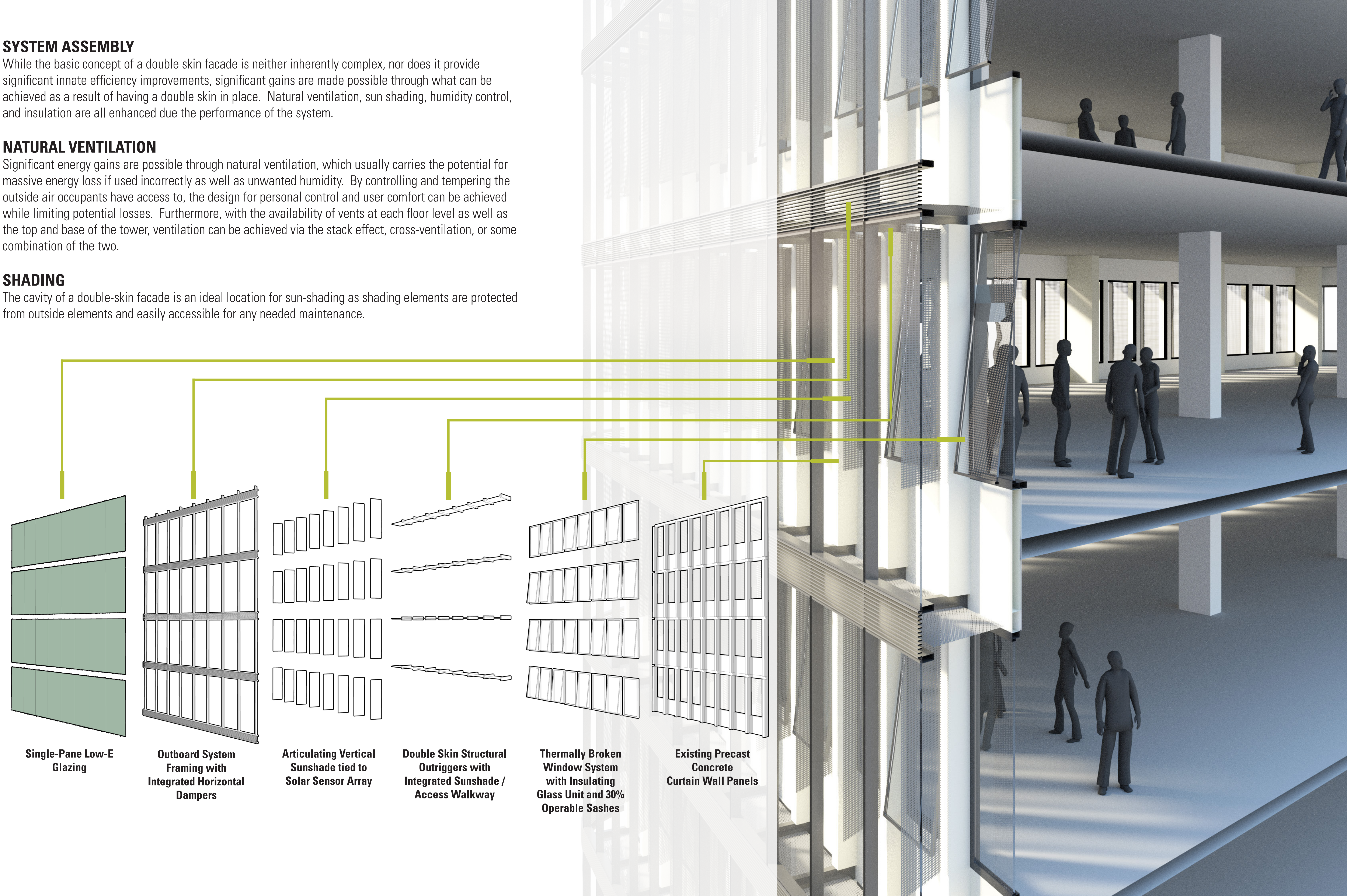
While the basic concept of a double skin facade is neither inherently complex, nor does it provide significant innate efficiency improvements, significant gains are made possible through what can be achieved as a result of having a double skin in place. Natural ventilation, sun shading, humidity control, and insulation are all enhanced due the performance of the system.

NATURAL VENTILATION

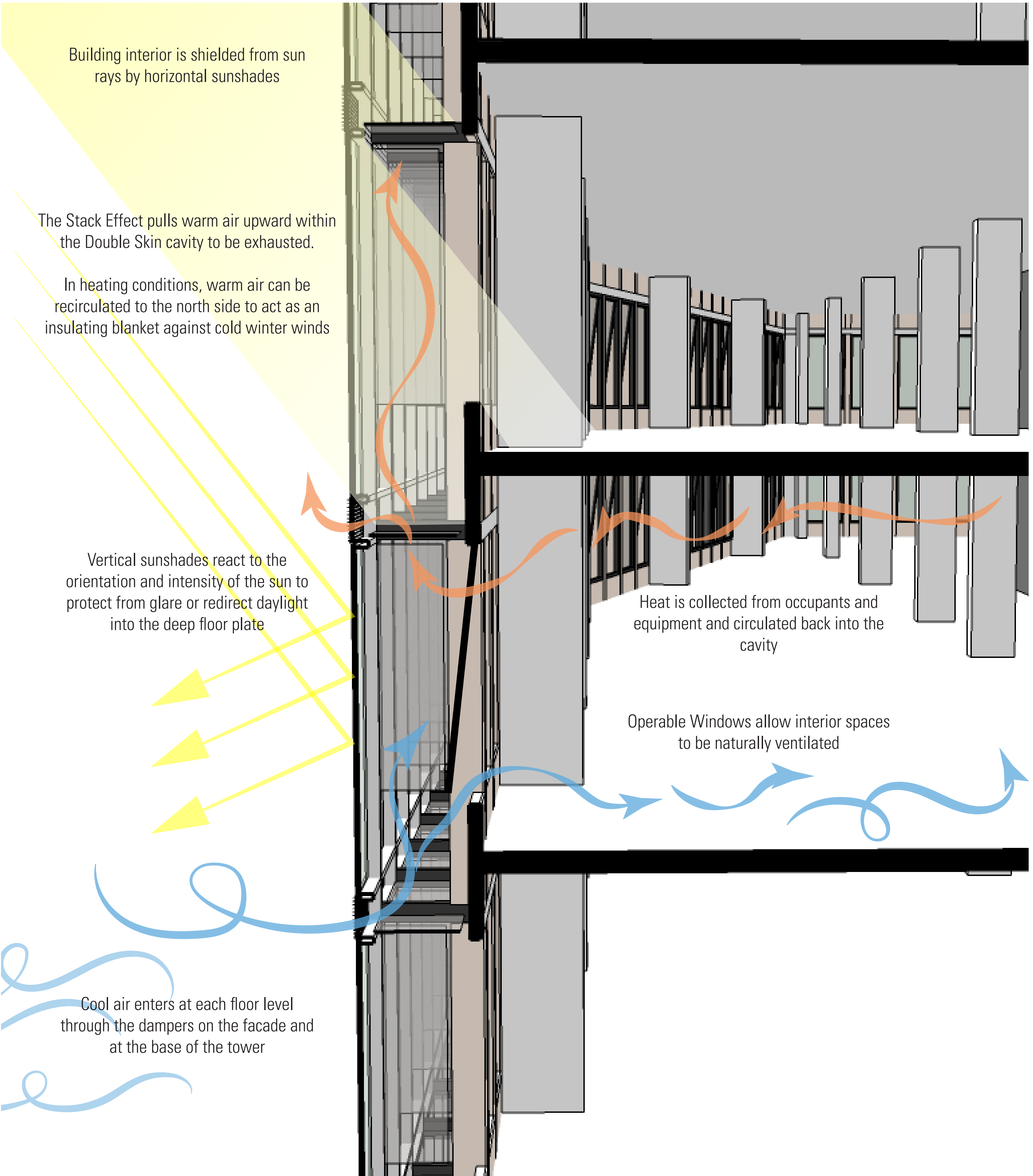
Significant energy gains are possible through natural ventilation, which usually carries the potential for massive energy loss if used incorrectly as well as unwanted humidity. By controlling and tempering the outside air occupants have access to, the design for personal control and user comfort can be achieved while limiting potential losses. Furthermore, with the availability of vents at each floor level as well as the top and base of the tower, ventilation can be achieved via the stack effect, cross-ventilation, or some combination of the two.

SHADING

The cavity of a double-skin facade is an ideal location for sun-shading as shading elements are protected from outside elements and easily accessible for any needed maintenance.



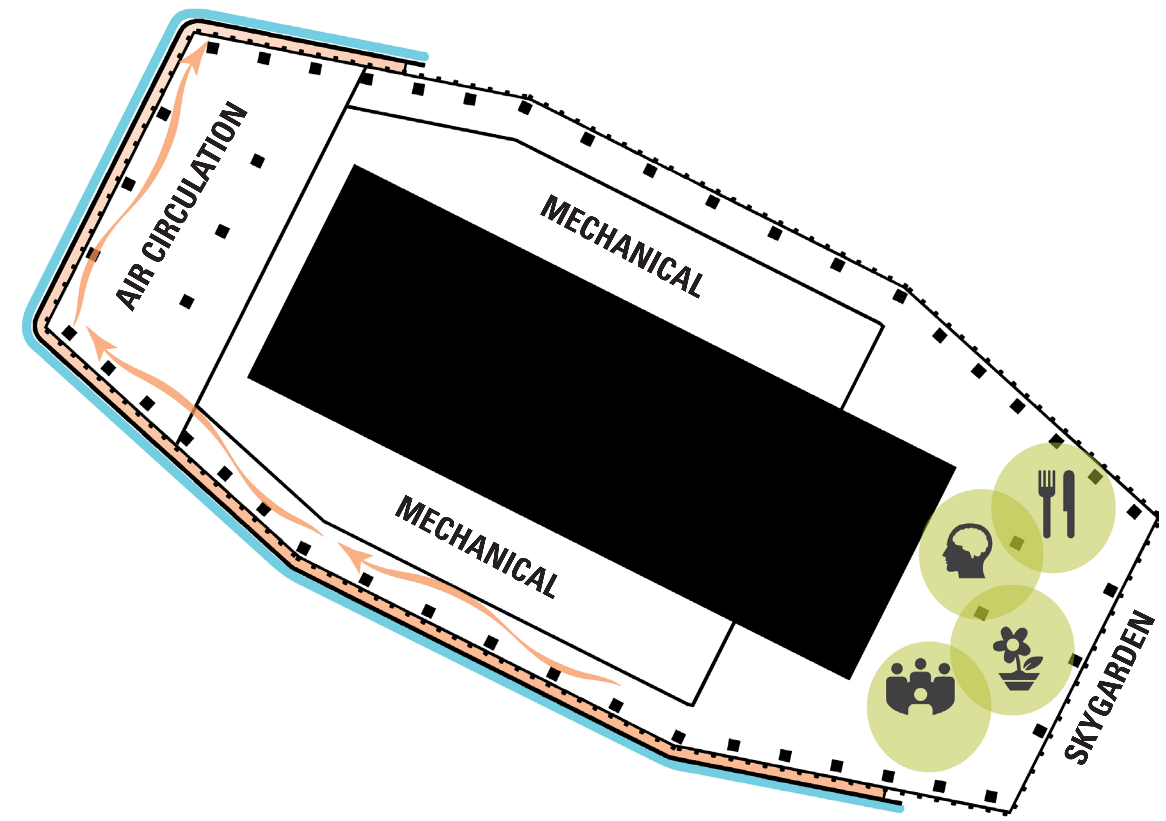
DOUBLE SKIN FACADE - OPERATIONAL ANALYSIS



CAPITALIZING ON MECHANICAL EFFICIENCY

Significant improvements to the building envelope suggest that the large mechanical levels in the tower could be consolidated and reconfigured to enhance the overall structure.

- The southeastern end of the mechanical level is converted to an open-air sky garden, giving building tenants access to a unique amenity on-par with the highest-quality commercial spaces in the world. A place for socialization, out-of-the-office collaboration, or just eating lunch while enjoying sweeping views of the skyline.
- The northwestern end of the floor is extended out to the double skin facade and circulates air from one side of the cavity to the other. During heating conditions, warm air can be circulated from the south-facing sides of the building to the north to provide an additional layer of protection from cold winter winds out of the northwest



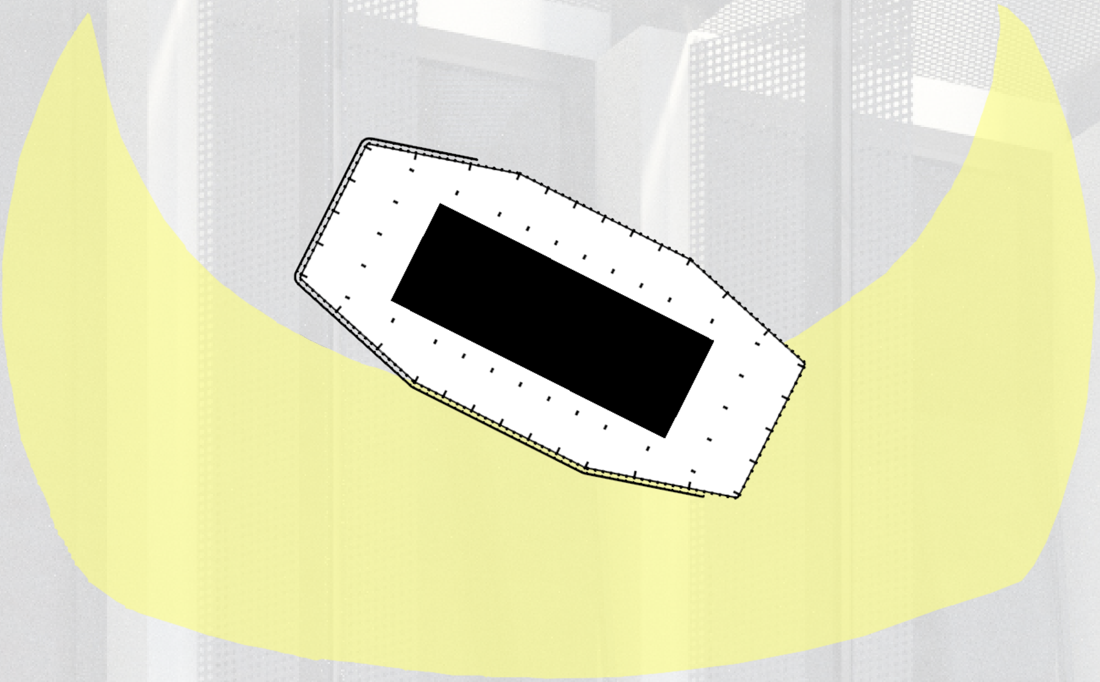
ACTIVE SOLAR SHADING

The cavity of a double-skin facade is an ideal location for sun-shading as shading devices are protected from outside elements and easily accessible for any needed maintenance.

Given the orientation of the structure, there is not a one-size-fits-all solution to provide adequate solar shading. Therefore, this system utilizes a dual-shading approach:

- Horizontal shades are located above the window openings to provide shading appropriate to more southerly exposures as well as provide a walkway within the cavity to allow for maintenance access.
- Enhancing the articulation of the original precast concrete facade, vertical shades are incorporated at these concrete pilasters to provide shading appropriate to east/west exposures. Active articulation of these shades to respond to solar angles in a critical component to both protect from unnecessary glare and heat gain, as well as to bounce daylight into the floor plate, which is particularly deep at the east and west ends of the building.

SOLAR ORIENTATION

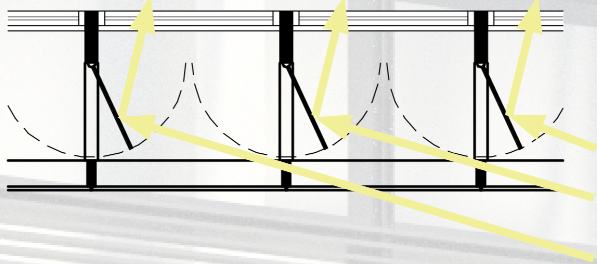


SHADING SCENARIOS

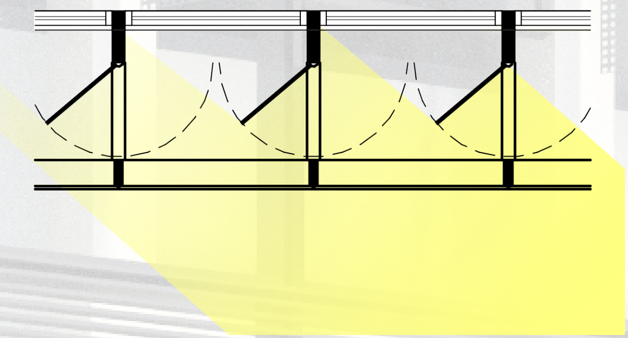
Light and heat sensors integrated into the facade provide dating to the Building Automation System to assist in controlling the shades for two scenarios

- Scenario 1: Shades are used to bounce daylight into deep floor plate to provide additional daylighting
- Scenario 2: Shades are used to block daylight and limit glare and solar heat gain

Scenario 1: Bounce Condition



Scenario 2: Shading Condition

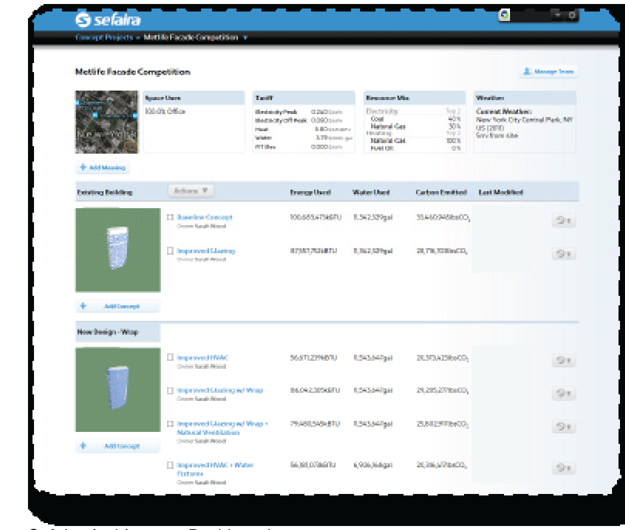


ENERGY ANALYSIS

The team utilized Sefaira Architecture to run conceptual energy performance analysis. The existing building / baseline model was compared against a multitude of different strategies to determine which single and combined variables helped us to reduce energy consumption.
Once imported into Sefaira, the first round of analysis revealed that the Metlife Building is susceptible to high solar gains and that it loses heat through the ventilation system and conduction through the building facade.

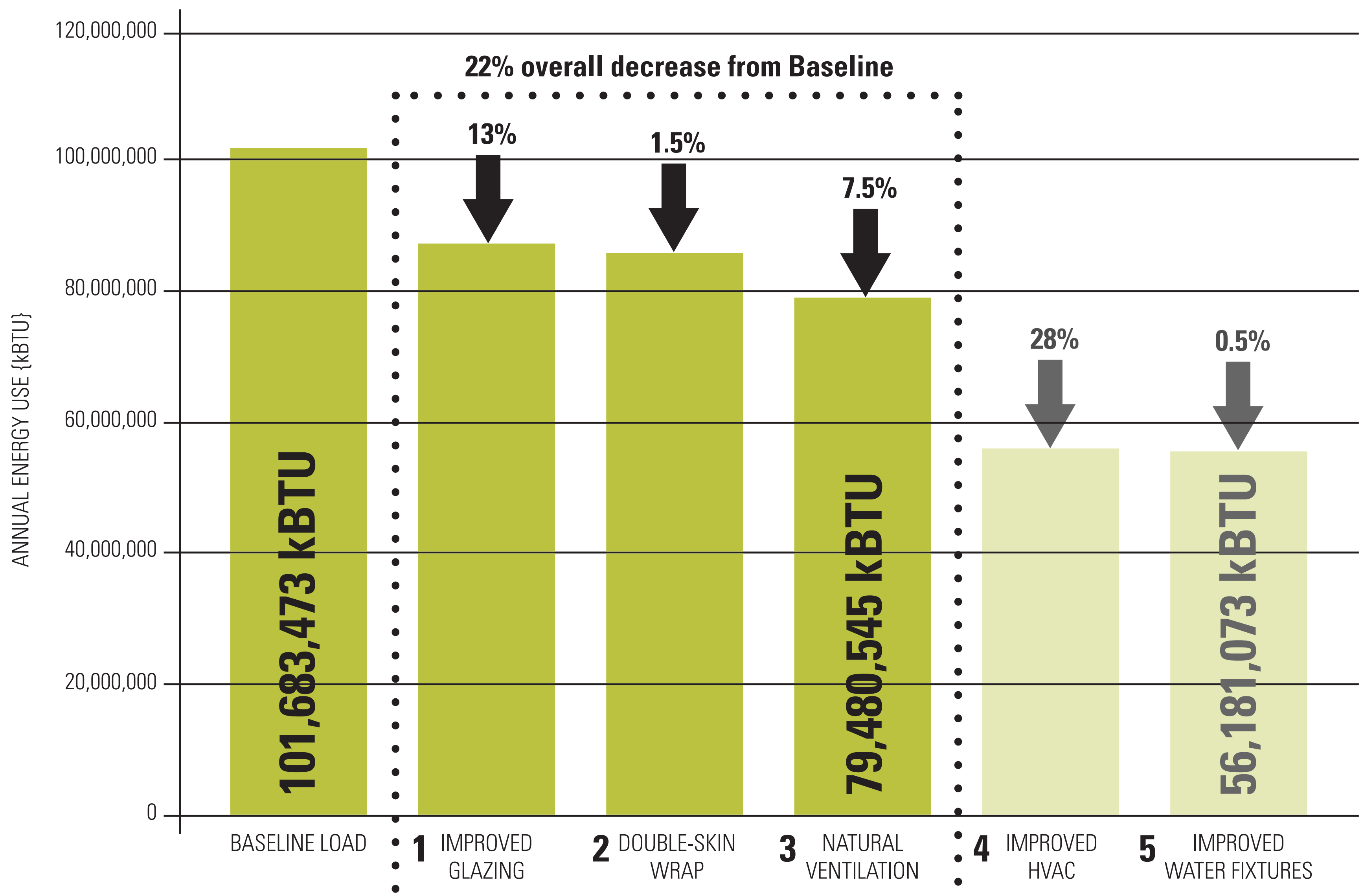
- **Strategy 1:** Improve the glazing by replacing the existing clear single glazing with high performance low-e double glazing. This Strategy alone reduce energy consumption by 13%.
- **Strategy 2:** Wrap a portion of the building in a Double-Skin System. Daylight analysis revealed which facades receive the most amount of solar gains, which determined where this system would be most effective. This system alone, however, only reduced energy use by 1.5%.
- **Strategy 3:** By introducing natural ventilation, this brought the energy use down another 7.5%. This final facade-based strategy proved an overall decrease from the baseline by 22%.

- Although not in the specific scope of the competition, the team chose to investigate MEP improvements to realize overall building potential maximum energy reduction. **Strategy 4 + 5** resulted in an additional 28% energy reduction, primarily by replacing the existing / inefficient HVAC system with an improved highly efficient system. The overall result, based on all 5 Strategies, indicates an approximate 45% energy use reduction.



Sefaira Architecture Dashboard.

ENERGY IMPROVEMENTS BASED ON INDIVIDUAL STRATEGIES



BUILDING COMPONENT IMPROVEMENTS

GLAZING U-FACTOR {BTU/h-ft²-°F}

Single Glazing {0.65} ❯❯❯ **High Performance Double Glazing with low-e {0.37}**

GLAZING SOLAR HEAT GAIN COEFFICIENT {SHGC}

Clear Single Glazing {0.7} ❯❯❯ **Clear Double Glazing & North Facade {0.4} + Reflective Coated Glazing on South, East + West Facades {0.2}**

WALL THERMAL RESISTANCE R-VALUE {ft²-h-°F/BTU}

Poorly Insulated Concrete Panels + Single Glazing {4.0} ❯❯❯ **Well Insulated Concrete Panels + Double Glazing + Double-Skin Wrap {21-38}**

LEAKAGE {cfm/ft²}

Leaky Building {0.55} ❯❯❯ **Best Practice Thermally "Tight" Building {0.2}**

NATURAL VENTILATION {%}

Hermetically Sealed, aside from the leakiness {0} ❯❯❯ **"Naturally Ventilated" Glazing {30}**

SOLAR SHADING {horizontal length + vertical length / ft}

Vertical Fins {1.2} ❯❯❯ **Horizontal + Vertical Shades {3}**

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