Urban Energy Analytics
Data-driven design for the built environment.

Shreshth Nagpal
Principal | Design Analytics

INTEGRAL | ELEMENTA
Climate Action

TAKE URGENT ACTION TO MITIGATE CLIMATE CHANGE AND PROACTIVELY ADAPT TO ITS IMPACTS

OBJECTIVE 4.1
ACHIEVE CARBON NEUTRALITY FOR YALE UNIVERSITY BY OR BEFORE 2050

Goal: GHG Emissions Reduction Commitment
By 2050, meet or exceed the 2005 commitment to reduce greenhouse gas emissions by 43% below 2005 levels.

Goal: Carbon Neutrality Strategy
By 2050, develop a strategy to achieve carbon neutrality by or before 2050.

OBJECTIVE 4.2
DEVELOP, TEST, AND SHARE CLIMATE CHANGE MITIGATION AND ADAPTATION STRATEGIES IN SUPPORT OF OVERALL REGIONAL RESILIENCE

Goal: Campus Resilience Plan
By 2019, create a campus resilience plan that aligns with local and regional adaptation approaches for resiliency.
The 2016 GHG emissions inventory represents the third year of comprehensive inventory assessment for the Institute and was audited by the MIT Office of Treasury. The total change in emissions is a reduction of 15.360 MTCO2e from 2014 to 2016. The reduction in GHG emissions was primarily achieved through:

- Implementation of energy efficiency measures in existing buildings, including investments in new construction and renovation, lighting, building retro- and monitoring based-commissioning, mechanical system upgrades, and utility system insulation.
- Use of less carbon-intensive fuels in the central utility plant.
- Reduced demand from buildings partially or fully offline for renovation.
- Modest reductions attributed to weather variation.
- Improvements in carbon-intensity of grid-purchased electricity.
THE PROBLEM

How can we quickly evaluate building specific strategies, with limited data, to help us develop early-stage prioritization plans?

THE PROBLEM

Data Collection

Detailed Audits

Building Energy Models

Test Upgrades

NEEDED SOLUTION

Data Collection

Planning Models

Test Upgrades

Saved Time and Cost

Targeted and strategic site inspections
to validate key modeling assumptions

Time and Cost

Existing Condition

Upgrade Scenario 1

Upgrade Scenario 2

Upgrade Scenario 3

Upgrade Scenario 4

Upgrade Scenario 5

x200
WINTERTIME DEMAND INCREASE
Campus electricity profile after electrification
With solar (estimate)
With solar and battery storage

PEAK DEMAND REDUCTION
Campus electricity profile after electrification
Current electricity profile
How can we quickly evaluate building specific strategies, with limited data, to help us develop early-stage prioritization plans?
Urban Energy Analytics
Data-driven design for the built environment.

Shreshth Nagpal
snagpal@elementaengineering.com

† INTEGRAL | ELEMENTA