

APRIL
11-13
2023



Better Buildings, Better Plants SUMMIT

Learn more: betterbuildingsolutioncenter.energy.gov/summit

U.S. DEPARTMENT OF
ENERGY



The Green Proving Ground Program: Innovative Technologies for the Net-Zero Carbon Transition

Wednesday, April 12, 2023

11:00 AM – 12:00 PM ET

Agenda

1

Welcome and Introductions

2

Green Proving Ground Overview

3

Introductions

4

Speaker Presentations

5

Closing and Q&A

Jeff Wanner

DOE

BTO–Commercial Buildings Integration Technology Validation

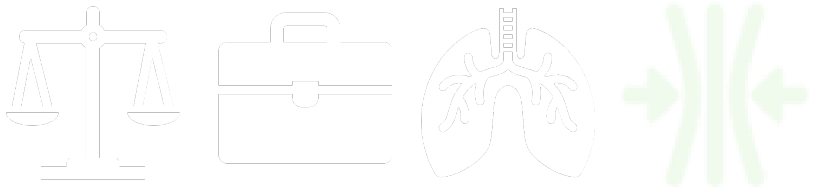
April 2023



Recognize buildings have a purpose while decarbonizing them

People-centered

Healthy, comfortable, and resilient buildings for living and working are foundational to communities that underpin the human experience



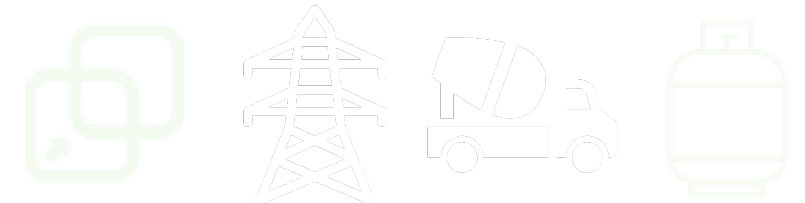
Efficient

Efficiency helps us reduce waste and save money in healthy buildings



Clean

Decarbonization makes healthy, efficient buildings better for the environment and enhances societal good



Buildings serve a function first. Focus on performing this function efficiently, and then aim for societal benefits such as decarbonization and grid enablement.



Technology Validation and Deployment

Green Proving Ground & High Impact Technologies (HIT)

Catalyst - competitively assess novel technologies annually for field validation and performance verification. Both programs partner with third-party evaluators to test the technologies in real-world applications within existing buildings. ([DOE Program Website](#))

Campaigns – accelerate adoption and demonstrate successes

recently launched Smarter Small Buildings Campaign

Key Partners

- Technical experts
- Building owners
- Local & regional stakeholders
- Trades Organizations
- Manufacturers



Green Proving Ground (GPG) & HIT Catalyst

General Service Administration (GPG Program) leverages our federal building portfolio to evaluate innovative building technologies.

GPG coordinates with **DoD**, **DOE**, and **utility programs** to assume first-use risk and accelerate market transformation by installing and objectively assessing innovative building technologies in real-world environments.

Provide Actionable Data

Evaluation results enable GSA to make sound investment decisions

GPG PUBLISHED RESULTS

The GPG program has 18 ongoing technology evaluations in buildings across the country. 51 results have been published to date:

Building Envelope

- [Chromogenic Windows](#)
- [Dual-Zone Indoor Shades](#)
- [EC Windows for Office Space*](#)
- [EC Windows for LPOE*](#)
- [High-R Value Windows*](#)

965

vendor submissions

104

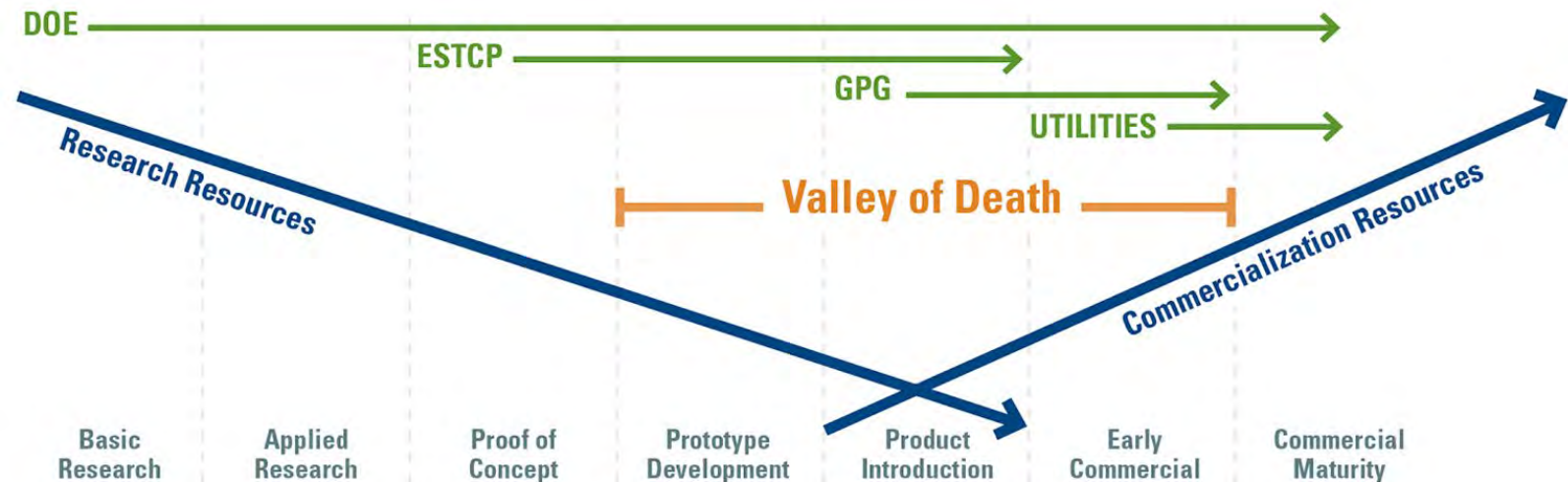
selected for evaluation

51

published reports

30

proven technologies



Green Proving Ground

Assess Innovative Building Technologies

Testbed deployments in real-world environments



Identify and select the most promising technologies at the edge of commercialization



Install selected technologies in representative locations within GSA's real estate portfolio



Partner with Department of Energy national laboratories to objectively evaluate real-world performance and payback



Identify technologies with broad deployment potential for GSA, share results with federal and commercial real estate communities

Transitioning Research into Practice

104

TECHNOLOGIES
EVALUATED

51

REPORTS
PUBLISHED

21

TECHNOLOGIES
DEPLOYED

116K

TONS ANNUAL CO2
REDUCTION

\$28M

ESTIMATED ANNUAL
SAVINGS

Green Proving Ground

2021 Technologies Being Evaluated:

Automated Air Sealing (Aeroseal) | Denver Federal Center & KCDC Multi-Fam Housing
HVAC Pretreatment Dehumidification (Altaire) | Burke USCH, Texas & NSA – Orlando
Window Insulation Panels (WexEnergy) | Eau Claire FB, Wisconsin

2022 Technologies Being Evaluated:

CO₂-Based Commercial Heat Pump | Dalrada
Solar PV Tracking | Rocking Solar
Non-Metalized Window Film | 3M
Hydronic Additive | Endo Enterprises/Pace49
Electrical Power Improvement | Legend Power
Carbon Capture | Clean02
Bi-Directional EV Charging | Fermata Energy
Managed EV Charging | WeaveGrid
Portable EV Charging | BEAM Global
Simple Building Controls Technology | Mesa by Sidewalk Labs

2023 Focus on technologies that:

Improve Operating Efficiency and Promote Healthy Workplaces
Enable Whole Building Electrification
Facilitate GHG and Carbon Reduction
Provide On-site Energy Generation and Storage Systems
Deliver Electric Fleet and Load Management Solutions

Key Dates:

Program Selection announcements: late April 2023
Test Bed Selection: September 2023
M&V Results: December 2024

Today's Presenters

- **Evan Petrack**
 - The Tower Companies
- **Doug Rheinheimer**
 - Paramount Pictures
- **Elizabeth Taveras**
 - NYC Department of Citywide Administrative Services

Evan Petrack
The Tower Companies

**The Green Proving
Ground Program:
*Innovative Technologies for
the Net-Zero Carbon
Transition***

The logo for TOWER, featuring the word "TOWER" in a bold, grey, sans-serif font. Above the letter "O" is a small red icon of a castle tower with three battlements.

TOWER

The GPG, and the value of public-private partnerships

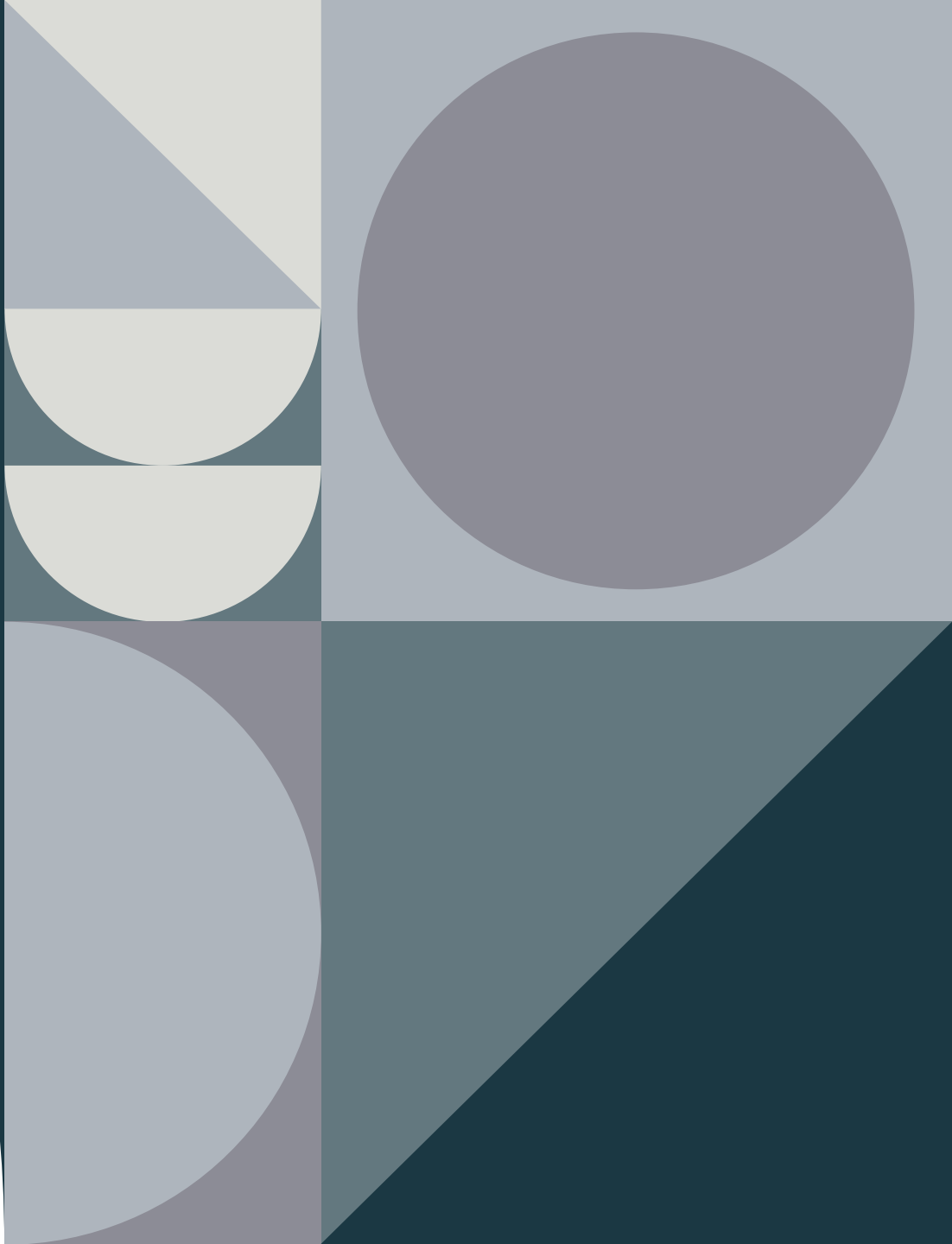


Why should the private sector participate?

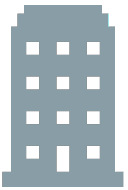


Access
Analysis
Experts

**What are we deploying
in 2023?**



The “new standards”



Rooftop,
carport
arrays



EV
chargers
Level 2





Advanced Controls

- Occupancy-based HVAC
- Retrofitting older, smaller, buildings with modern controls

No- and Low- Cost Data Acquisition



Software, increasingly offered for free by utilities



Self-deployable sensors



Programs

leverage tech + expertise



Virtual
Commissioning

ABC: always be
commissioning!



Demand and peak response
programs

Find those financial levers!

Solar and solar thermal RECs

Local “green” property tax credits

Sewer/evaporative tax credits

BEPS

Layer the dollars, layer the reasons



+
•
○ Thank you!

Evan Petrack
Sustainability Associate
The Tower Companies
sustainability@towercompanies.com

Doug Rheinheimer

Paramount Pictures

The Green Proving Ground Program (GPG):

Innovative Technologies for
the Net-Zero Carbon
Transition





GREEN PROVING GROUND: WHO?

- General Services Administration (GSA) driven collaboration with Dept. of Energy (DOE) with National Labs and new technology innovators to lead a market transformation in operational efficiencies in federal buildings +. . . We all need a plus in our life. .
- Who else? Everyone in this room and all interested in efficiencies and sustainability





HOW DOES GPG FIT INTO YOUR STRATEGY?

GPG Opportunities impact all our programs

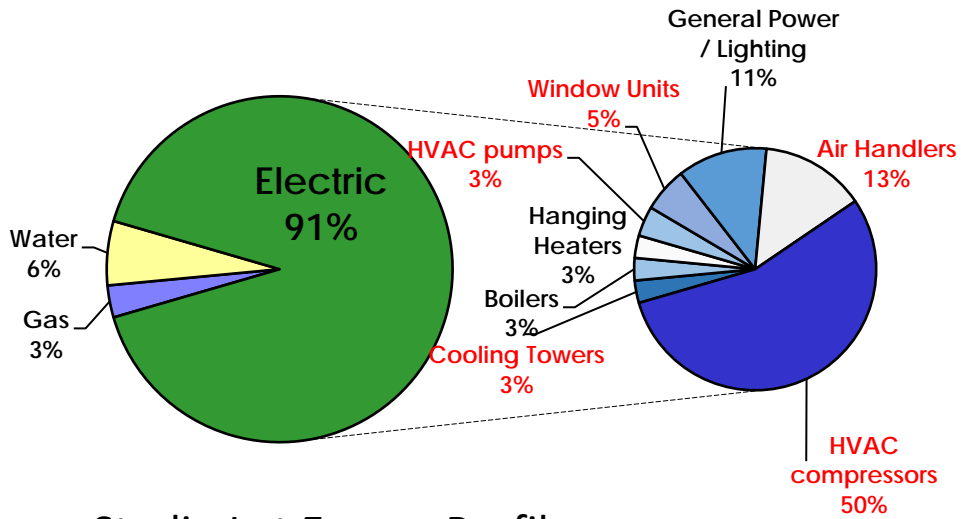
| Objectives | Energy Measurement & Management** | Reduce Energy Consumption / Carbon Footprint | Improve Facility Service & Quality | Diversify Risk & Invest in Alternative Energy Sources |
|------------|---|--|--|---|
| Programs | Smart Metering | HVAC Conversions | Power Distribution Upgrades | Install Micro-turbines |
| | Prioritize Opportunities | Lighting Retrofits | Microgrid / Transformer Upgrades | Install Solar |
| | Measure Improvement Made | Network Control & Automation | Underground Cable Upgrades | Install Fuel Cells / other options |
| Benefits | <ul style="list-style-type: none"> Establishes measurement system Tracks benefits of programs implemented | <ul style="list-style-type: none"> Reduced energy expense Reduced maintenance & operating cost | <ul style="list-style-type: none"> Faster response Less interruption Higher reliability Improved comfort | <ul style="list-style-type: none"> Reduces energy cost Redundant supply Eco responsible Improves ROIC |

** Should precede all other programs in order to track benefits achieved



OUR BIGGEST LOCALIZED OPPORTUNITY IS COOLING THE SPACE

NEW TECHNOLOGY EVALUATIONS



Studio Lot Energy Profile

- 1000 individual HVAC units
- 19,000 lighting fixtures
- 50 miles of underground utilities

- GPG organized, vetted and drove the process of introductions and feedback model in a manner that provided quick and educated decisions
 - Online time ~ 8 hours shared with dozens of vendors, offline time with data from vendors was varied based on technology, ie. window film, solar, AI applications
- Risks and Time reductions with GPG
 - HUGE time saver (10X-20X), as the technologies are already vetted by National Labs and industry experts
 - Serial #1 is not the number you would receive, since it has already been vetted, no “snake oils” need apply
- Challenges for new technologies
 - United Laboratories (UL) listing or other Authority Having Jurisdiction (AHJ) expectations
 - Correct application for technology AND applying/operating it as intended



ELECTRIFICATION AND EMISSION CONTROL ARE HAND IN HAND NEW TECHNOLOGY UNDER EVALUATION

CONSUMPTION

HFCs are a group of industrial chemicals primarily used for air conditioning and refrigeration.

LIFETIME IN ATMOSPHERE:

15 YEARS (AVERAGE WEIGHTED BY USE)

Many HFCs are short-lived climate pollutants. The most abundant of these, HFC-134a, is 3,790 times more damaging to the climate than carbon dioxide (CO₂) over a 20-year period.

RESIDENTIAL, COMMERCIAL AND INDUSTRIAL AIR CONDITIONING AND REFRIGERATION



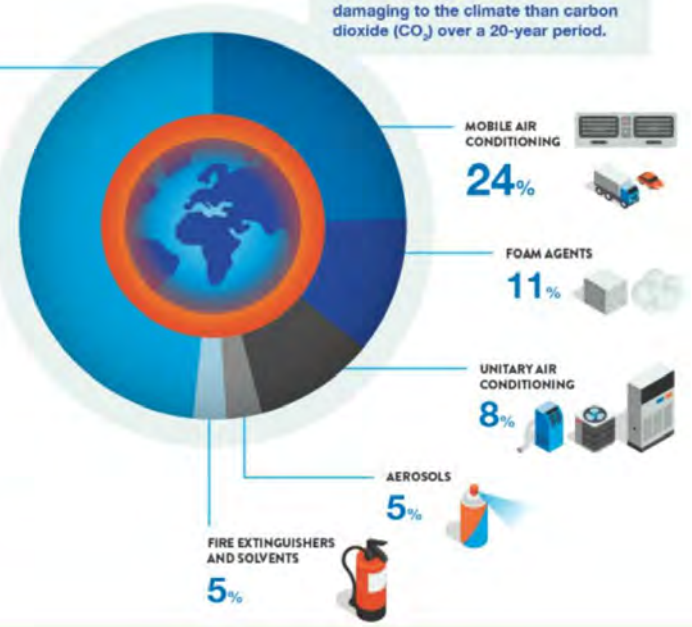
HFC consumption today...



- filling new equipment
- topping up leaking equipment

Up to 10 air conditioners will be sold every second over the next 30 years

% = global emissions

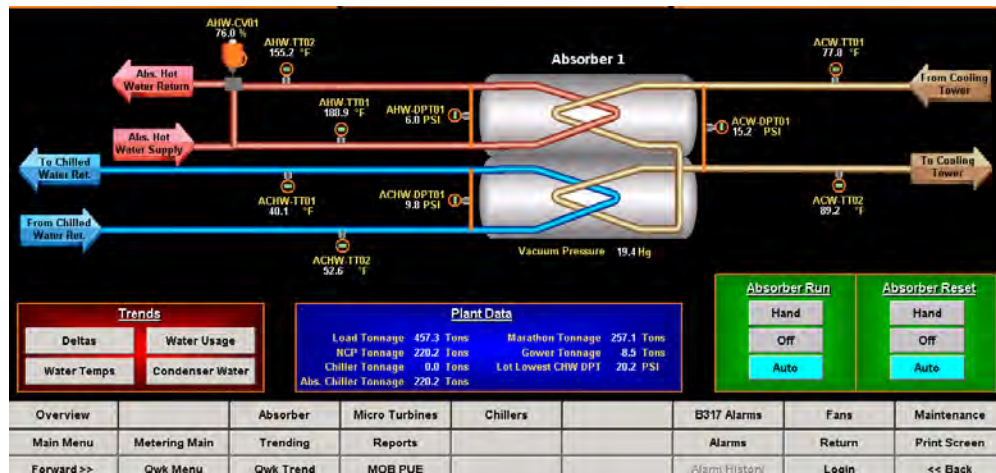


- Our focus was/is electric heat pumps with CO₂ as the refrigerant
 - Efficiency and carbon reduction
 - Electrification
 - Sunsetting of numerous refrigerants in CA / USA
 - Larger temperature range than previous heat pumps evaluated
- Hydrofluorocarbons (HFC's) are up to 3,790 times more damaging to the climate than CO₂
 - 50% in stationary residential, commercial and industrial air conditioning and refrigeration
 - By January 1, 2033, the maximum GWP of refrigerants entering the Californian market must not exceed 750, banning the sale of refrigerants like R448A, R449A and R134a

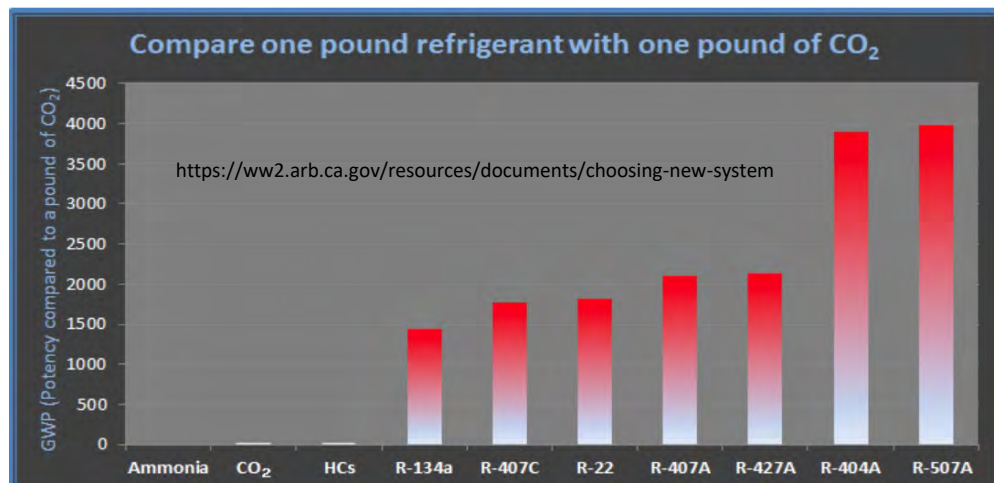




OPPORTUNITIES ON THE HORIZON



- MOVE THE ENERGY BEFORE YOU CONSUME or GENERATE MORE!!
- Refrigerants chemistry and properties offer advancements for efficiencies and CO₂e / GWP reductions
- Source integration like heat pumps with new building occupancies models and AI feed forward projections, ie. mass indexing, schedule enhancements and CO₂ level control improvements
- Modular Manufacturing with design intent of upgrades and recycling



- Real-Time Operations Center (THE ROC)



THANK YOU FOR YOUR TIME!

QUESTIONS?

Douglas Rheinheimer, PE

Senior Vice President, Studio Services, Energy and Engineering, Facility Operations

Paramount Pictures

Douglas_Rheinheimer@paramount.com



Elizabeth Taveras

NYC Department of Citywide Administrative Services

**D
C
A
S**

NYC
Citywide
Administrative
Services

Innovative Technologies for the Net-Zero Carbon Transition in **New York City**

Elizabeth Taveras, NYC DEM

etaveras@dcas.nyc.gov

April 12, 2023

Agenda

| | Topic |
|----|--|
| 1. | Who NYC DEM is |
| 2. | Why NYC demonstrates innovative technology |
| 3. | How NYC demonstrates innovative technology |
| 4. | IDEA at a glance |
| 5. | PropTech at a glance |
| 6. | Future of innovative technology |

NYC's buildings are mandated by LL97...

40x25

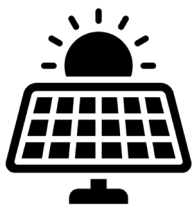
50x30

*On the path to
carbon neutrality
x 2050*

NYC's Division of Energy Management (DEM)



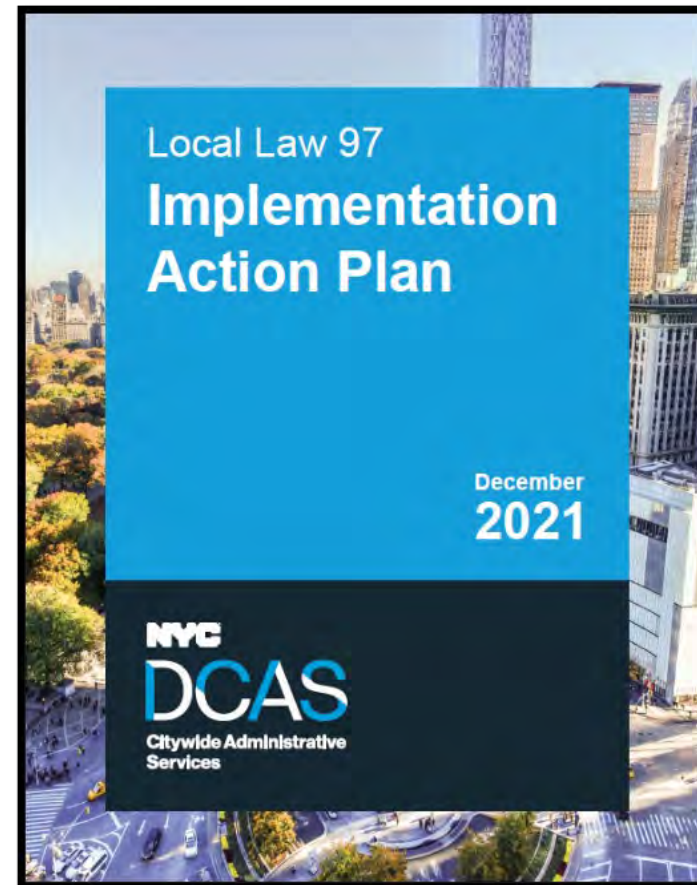
Improve energy efficiency of buildings and operations.



Invest in clean energy generation.



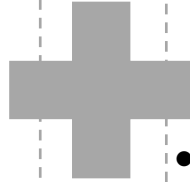
Electrify building systems.



Why NYC demonstrates innovative technology

Needs

- Have ambitious, progressive goals that require **progressive innovation**
- City investments require **performance validation/justification**



Benefits

- Have over **491 million square feet** of real estate
- Wide range of **building typology** from multifamily to commercial to institutional
- **Older and complex** building stock



Solutions

1. IDEA Program
2. PropTech Program

How NYC demonstrates innovative technology

SELECTION



NYC reviews technologies' feasibility.

PROCUREMENT



An evaluation of applicable procurement is performed.

PLANNING



An implementation plan is established that includes site selection.

INSTALLATION



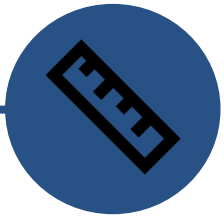
The technology is installed at the demonstration site.

TRAINING



The vendor provides relevant staff training on technology.

M&V



A third-party performs measurement & verification.

~2 years

How NYC demonstrates innovative technology

SELECTION



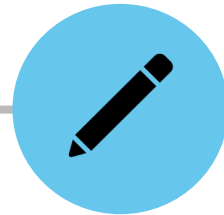
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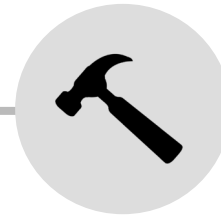
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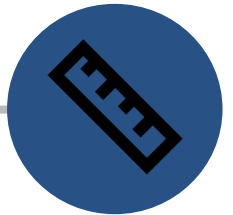
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~2 years



DEM's efforts to date

IDEA at a glance

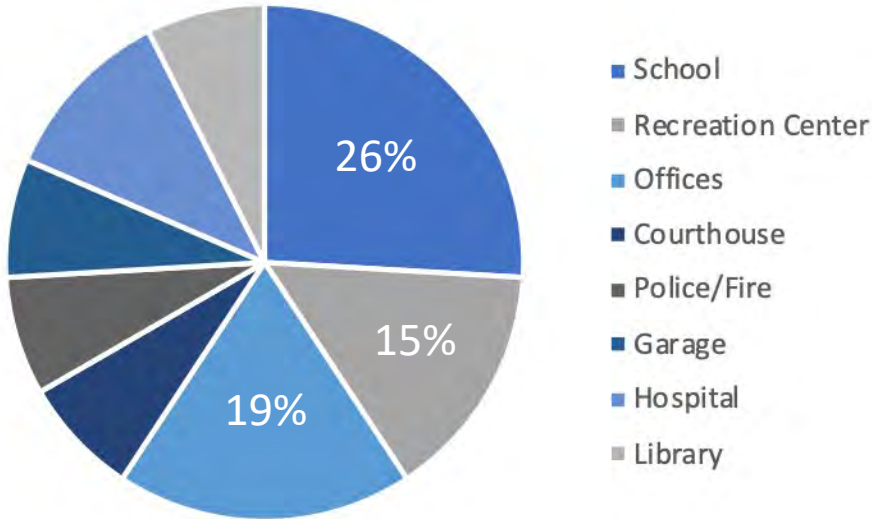
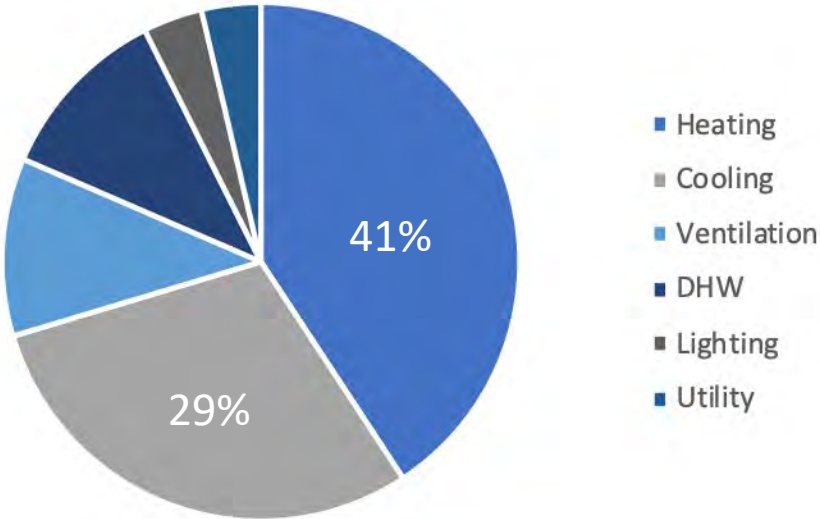
The Innovative Demonstrations for Energy Adaptability (IDEA) Program tests new or underutilized energy technologies in NYC-owned buildings via demonstration projects.

30+
IDEA demos

56%
Hardware demos

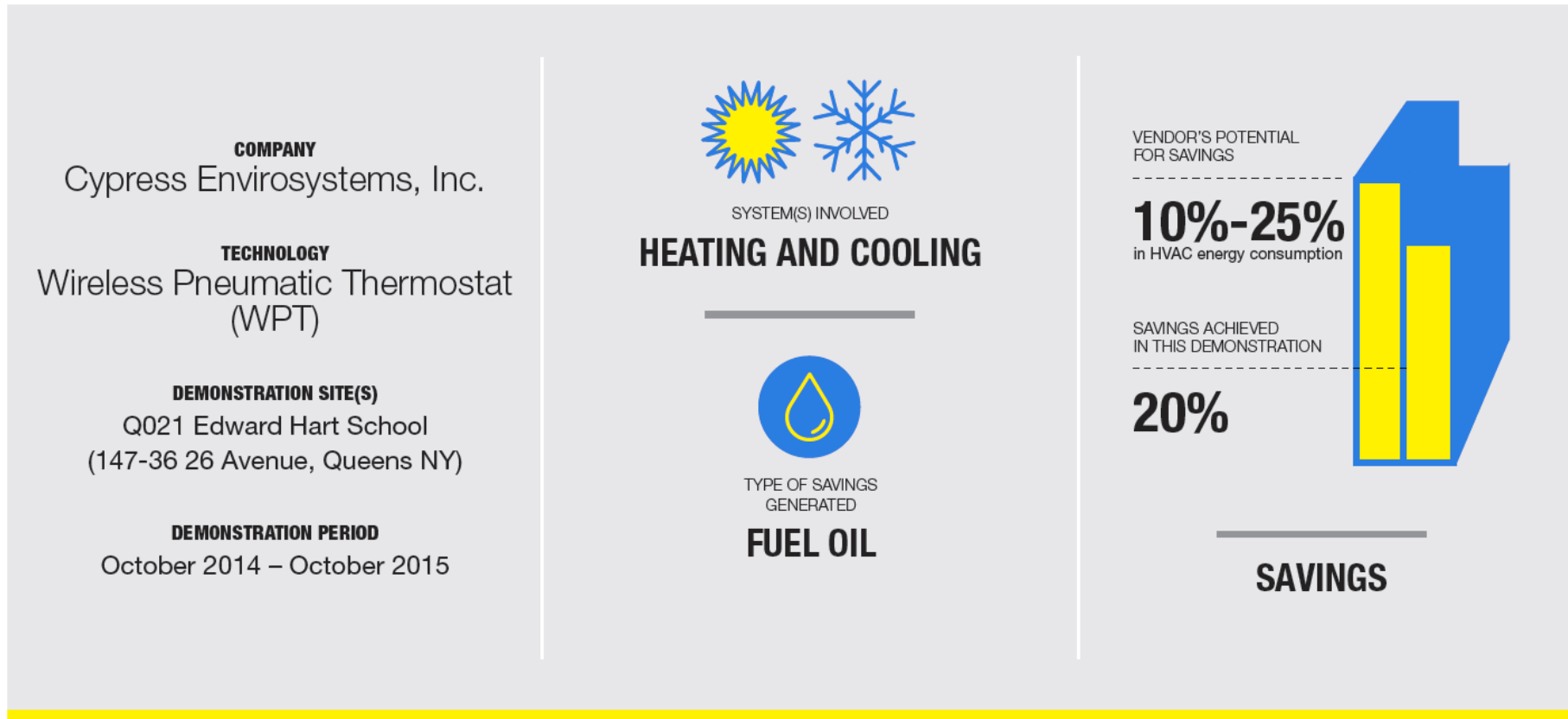
78%
Success rate

15%
Average energy savings



IDEA at a glance | Example #1

The Innovative Demonstrations for Energy Adaptability (IDEA) Program tests new or underutilized energy technologies in NYC-owned buildings via demonstration projects.



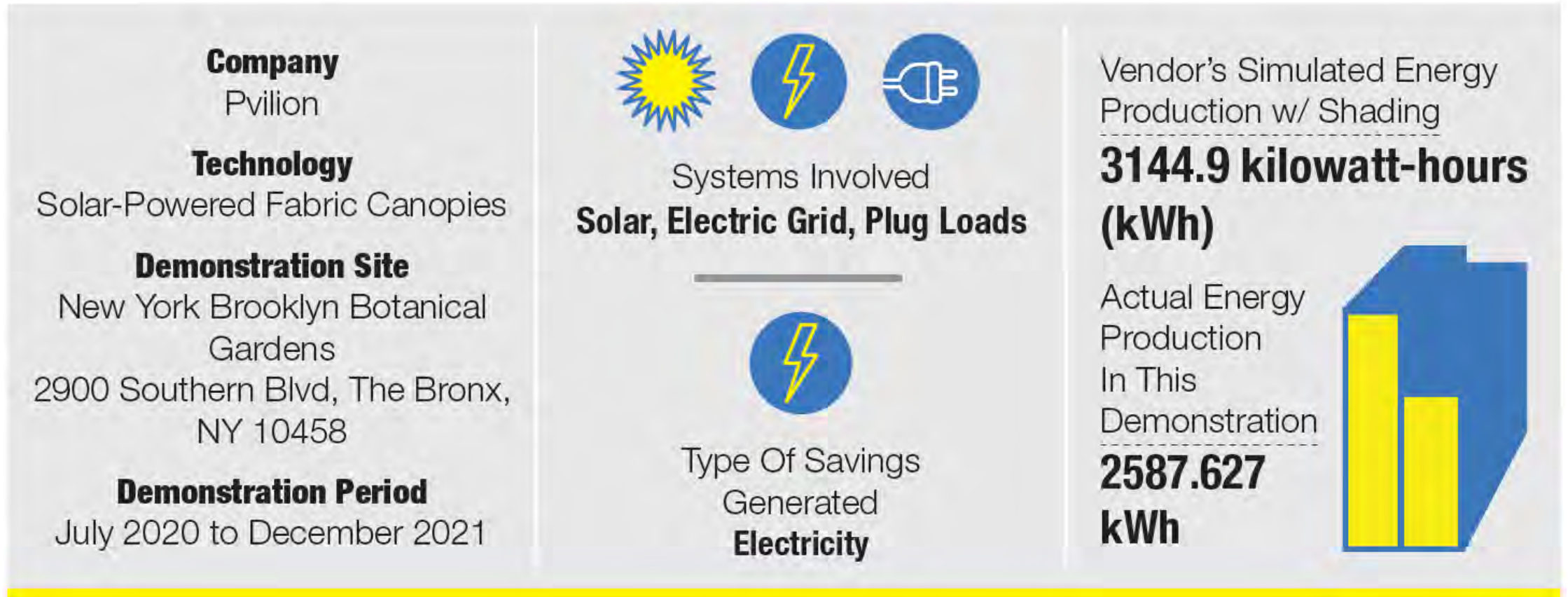
IDEA at a glance | Example #2

The Innovative Demonstrations for Energy Adaptability (IDEA) Program tests new or underutilized energy technologies in NYC-owned buildings via demonstration projects.



IDEA at a glance | Example #2

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Path forward

Addressing our Challenges – PropTech Pilot Program

The **Property Technology** (PropTech) Pilot Program is aimed at finding solutions around: (1) transitioning from demo to implementation, (2) broadening reach of NYC-owned assets, and (3) streamlining demo process.

270+

PropTech applicants

491M

Gross square feet

8

Areas of interest

15

Demos per year

Areas of focus

1. Partnering with experts in innovative technology to bolster reach.
2. Exploring contracting mechanisms to allow for implementation beyond demonstration.
3. Developing a structured site selection criteria to properly fit technologies to sites.
4. Facilitating a more rigorous due diligence process to select technologies.

Future of innovative technology for net-zero



AI/Machine Learning

- Automating fault detection and diagnosis
- **TIP:** Set clear expectations to facilitate validation



IoT Devices

- Advancing the interconnection of disparate devices
- **TIP:** Prioritize addressing native communication protocols



Portfolio Management

- Centralizing all data across energy, assets, projects to drive decision making
- **TIP:** Understand the data that feeds a portfolio management tool.



THANK
YOU

D
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A
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NYC
Citywide
Administrative
Services

Q & A

Thank You!

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Download the Webex Events app to your mobile device or use the QR code to access the web version.

