



ERNST & YOUNG

LOWER FOOTPRINT, LEANER OPERATIONS

Introducing Compost and Maximizing HVAC Energy

3,109,221

lb Reduction in CO₂ Emissions

Over a 10 Year Period with a 2-Phase plan, EY Boston can reduce their carbon emissions by millions.



\$223,726

Cost Savings

Over a 10 Year Period, EY Boston can achieve significant savings which can be reinvested into further ESG initiatives.



4-Way Win

Four Key Impact Pillars

The project spans operational efficiency, workplace wellbeing, company ESG alignment, and local city sustainability.



2025 CARBON REDUCTION CHALLENGE

Not Affiliated with Ernst & Young LLP

INTRODUCTION

Ernst & Young (EY) is a global professional services firm providing assurance, tax, transaction, and consulting services. With more than 700 offices worldwide, EY has made ambitious strides in environmental responsibility, including achieving net-zero emissions globally. EY's FY24 Global Environment Strategy outlines a commitment to **halving absolute greenhouse gas emissions by FY30 and achieving a 90% reduction by FY50**¹, emphasizing yearly action and integration across the value chain.

Currently at EY, localized efforts to reduce carbon emissions vary by office and often depend on building infrastructure, tenant engagement, and the feasibility of retrofitting sustainable solutions. This presents an opportunity to align operational practices with the firm's global climate commitments through local offices.

While EY's global offices in cities like New York, Chicago, and London have made notable strides in sustainable infrastructure and office practices, **the Boston office presents a unique opportunity for progress**. Despite Boston's reputation as a top-five sustainable city and the nation's biotech capital, the historic John Hancock Tower, one of the city's most iconic but aging buildings, reflects the challenges of aligning older infrastructure with modern climate goals.

Jane Steinmetz, EY Boston's Office Managing Partner, has expressed her strong interest in sustainable office efforts and **plans of renovating with the upcoming expiration of the lease in 2028**. While large-scale sustainability investments are currently limited, she recently supported the formation of a green team focused on practical initiatives such as compostable utensils and basic sustainable office practices.

The **Carbon Reduction Challenge (CRC)**² at Georgia Tech empowers students to identify and strategize solutions with an organization tackling the climate change crisis. CRC encourages students to collaborate with their place of work to drive scalable, data-driven projects that reduce carbon greenhouse gas emissions while generating cost savings and operational improvements.

“Sustainability underpins our growth, transformation, collaboration and innovation, *all enabled by the contribution of our people.*”

HARSHA BASNAYAKE, EY GLOBAL MANAGING PARTNER

PROPOSAL

This project proposes a two-phase carbon reduction strategy starting with the EY Boston office, with a focus on **waste diversion and HVAC optimization**. Building on recent momentum from the green team, Phase 1 (2025-2028) introduces low-cost, high-impact actions including implementing a composting system and seasonally adjusting HVAC temperature setpoints. These strategies are expected to reduce landfill waste and lower energy usage. Phase 2 (2028-2035) includes higher investment options of integrating occupancy sensor add-ons to optimize HVAC systems daily. Together, these interventions not only reduce emissions and operational costs, but also push **EY Boston as a leader in localized, actionable sustainability**.

¹ <https://www.ey.com/content/dam/ey-unified-site/ey-com/en-uk/about-us/legal-and-privacy/ey-carbon-reduction-plan-2025.pdf>

² <https://www.carbonreductionchallenge.org>

ERNST & YOUNG BOSTON

EY Boston is located in the tallest building of Boston, 200 Clarendon St, formerly known as John Hancock Tower. Located in the heart of Back Bay, a high-traffic, high-profile area, It is a high-rise, commercial office spanning 62 floors.

5

Floors

EY Boston takes up 5 of the 62 floors featuring the 13th, 14th, 15th, 16th, and 23rd floors.

137,097

SqFt of EY Office Space

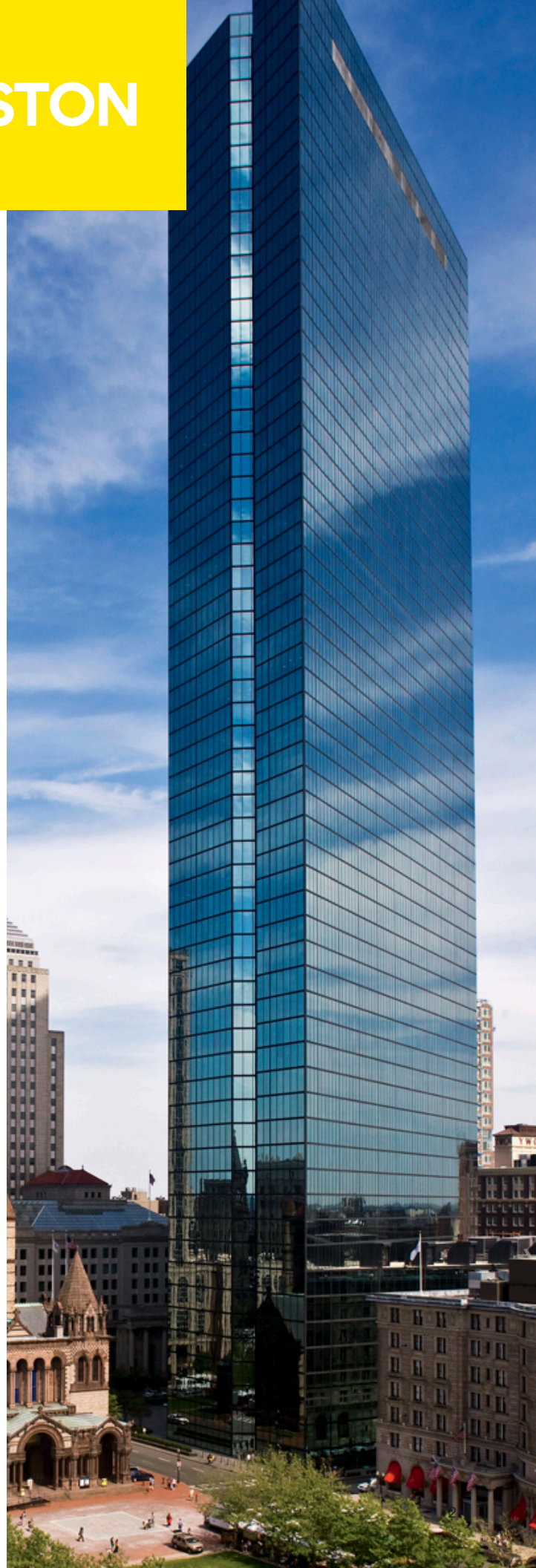
This project estimates the EY office space in Boston based on the buildings total space spanning 1,700,000 sqft.

~2375¹

Employee Occupancy Per Week

This project estimates the employee occupancy based off of three factors, day-to-day traffic, desk availability, and floor traffic. The 15th floor was allocated 25% more occupancy as a high-traffic floor. Tuesday's and Thursday's were allocated 30% more occupancy as high-traffic days. Friday's were allocated a reduction of 50% as a low-traffic day.

¹ See [Appendix A](#)



PHASE 1

HVAC SCHEDULING

PROPOSAL

Part 1 of this phase proposes seasonal HVAC setpoint adjustments on all five occupied floors at 200 Clarendon Street. Specifically, it suggests **raising cooling setpoints by 3°F during summer months and lowering heating setpoints by 3°F during winter months**. These small changes require no hardware upgrades, and can be implemented through existing HVAC controls and occupant education. Given that HVAC systems typically account for around 40% of energy use in commercial buildings, these adjustments present a cost-effective opportunity for immediate impact.

KEY DETAILS

ASSUMED HVAC SHARE OF ENERGY USE:

Approximately 33% of the building's total energy use is attributed to Heating and Cooling HVAC systems, based on typical commercial office benchmarks for older buildings in Boston.

EMPLOYEE IMPACT:

The proposed 3°F adjustment to HVAC temperature setpoints (from 72°F to 75°F in summer, and 70°F to 67°F in winter) remains within ASHRAE thermal comfort guidelines and is supported by behavioral energy studies. These changes are typically imperceptible to most occupants as these shifts align with seasonal expectations making **the risk of discomfort is minimal**.

SYSTEM FEASIBILITY:

The temperature changes require no hardware upgrades and are compatible with the existing Building Management System, Cambridgeport Custom Air. This infrastructure can support these adjustments through preexisting HVAC scheduling enabled, making the intervention both **low-cost and easily implementable**.

CARBON CALCULATIONS

ANNUAL CARBON REDUCTION

$137,096 \times 52.9^1$	=	7,252,378.4	⇔	2,125,550.528	}	$145,399^4$
SqFt	kBtu/Year (EUI)	kBtu/Year Used	kWh/Year Used	lb Reduction in CO ₂ Emissions Per Year		
$2,125,550.528 \times 0.33^2$	=	701,431.67		$149,404.95 \times \$0.22^5 =$		
kWh/Year Used	Percentage of Heating/Cooling HVAC Systems	Heating/Cooling kWh/Year Used	Heating/Cooling kWh/Year Saved	Heating/Cooling kWh/Year Saved		
$701,431.67 \times 0.213^3$	=	149,404.95		$\$32,869.09$		Savings/Year
Heating/Cooling kWh/Year Used	Percentage of Setpoint Energy Savings	Heating/Cooling kWh/Year Saved				

¹ <https://portfoliomanager.energystar.gov/pdf/reference/US%20National%20Median%20Table.pdf>

² <https://www.cim.io/blog/understanding-energy-use-in-commercial-buildings>

³ <https://cbe.berkeley.edu/research/setpoint-energy-savings-calculator/>

⁴ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

⁵ <https://poweroutage.us/electricity-rates/ma/boston>



PHASE 1

COMPOST BINS

PROPOSAL

Part 2 of this phase proposes the installation of **5 centralized compost bins** across the 5 floors occupied by EY in the John Hancock Tower. The bins will be implemented into already existing spaces in floor kitchens. This is a high-traffic trash area where food waste, coffee grounds, and compostable materials are most commonly generated.

KEY DETAILS

BIN QUANTITY & PLACEMENT:

1 compost will be implemented in 1 trash drawer for each floor's kitchenette. Numerous trash drawers already exist allowing for **easy implementation**.

CUSTODIAL IMPACT:

Minimal custodial impact as **building already has compost services in place** for other floors. As a result, custodians will not need training on compost removal and rules. Additionally there is already a compost disposal system in place of the building.

COMPOST PICKUP:

Compost collection services may already be in place at the building given other floors compost. If not, partner with Boston Food Waste Collection, a local organization that offers free organic waste pickup. Their service **diverts food waste from landfills and converts it into clean energy for the city** through anaerobic digestion.

CARBON CALCULATIONS

ANNUAL COST

DROP-OFF: \$0
SIGNAGE: \$0
LINERS:
1300 BAGS × \$0.43³ = \$559.00
780 COMPOST BAGS × \$0.84⁴ = \$655.20
\$96.20 OFFSET COST/YEAR

ANNUAL CARBON REDUCTION

EMPLOYEES:			COFFEE MACHINES:					
475	×	0.64¹	×	260	+	6	×	1
Employees/Day		lb of Waste/Employee		Work Days		Machines		lb of Waste/Machine
79,046	×	0.62²	=	49,008.52				
lb of Waste/ Year		lb of CO₂ e/ Year/lb of Waste		lb Reduction in CO₂ Emissions Per Year				

SAVINGS

Although composting introduces a modest upfront cost of \$96.20, this expense is fully offset by the projected \$32,869 in annual savings from the concurrent HVAC scheduling initiative. Since both initiatives are being implemented in the same fiscal year, **the compost system incurs an inconsequential cost**, making it a cost-neutral intervention with high environmental return.

¹ <https://recyclingworksma.com/food-waste-estimation-guide/>

² <https://ww2.arb.ca.gov/sites/default/files/classic/cc/waste/cerffinal.pdf>

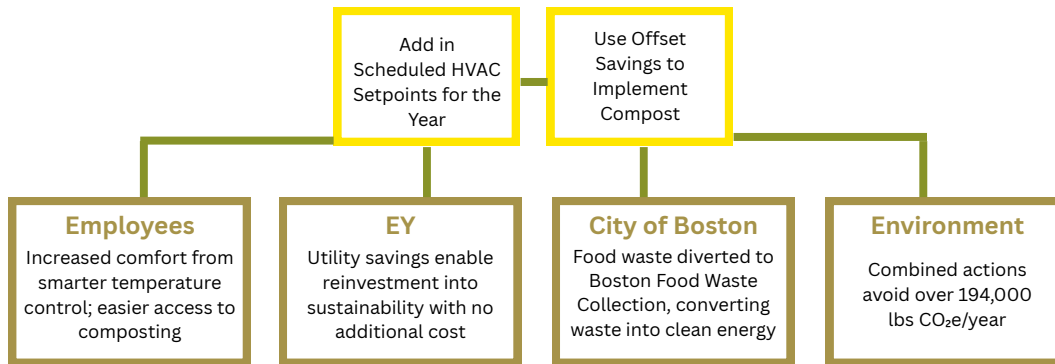
³ <https://www.dancopackagingproducts.com/product/182>

⁴ <https://www.goodstartpackaging.com/biobag-44-gallon-compostable-trash-bags-44G3448/>

PHASE 1

RESULTS

PROCESS FLOW



3-YEAR NET PRESENT VALUE¹

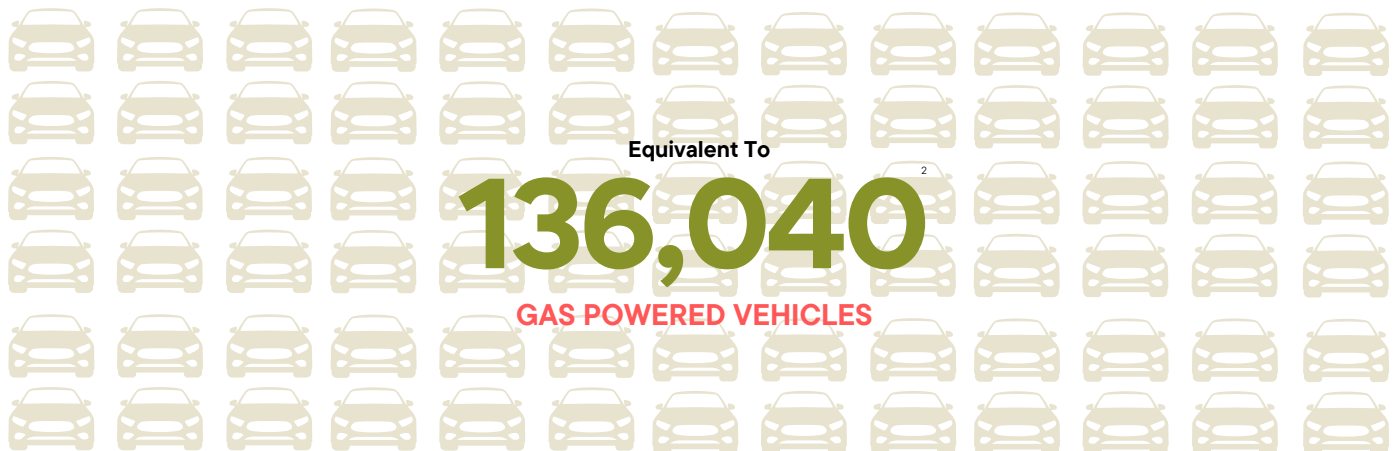
583,222

lb Reduction in CO₂ Emissions



\$158,251

Savings



¹ See Appendix B

² <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

PHASE 2

HVAC OCCUPANCY SENSORS

PROPOSAL

This phase proposes the integration of an elevated sensor system for full HVAC optimization. Unlike physical digital twins implemented at newer offices (New York), this solution uses live sensors to continuously adjust HVAC performance without full retrofitting of physical infrastructure. This is done through occupancy sensors which can be added to the motion sensors already existing in the office. By leveraging the momentum and cost savings from Phase 1, this phase offers **a scalable path toward building efficiency and reducing emissions** while improving comfort and equipment longevity.

KEY DETAILS

SYSTEM REQUIREMENTS:

Implementation would involve occupancy sensor add-ons integrated into the existing motion-sensing infrastructure in the 195 meeting rooms. The occupancy sensors detect human presence in real-time using infrared body heat or ultrasonic motion detection. As opposed to the preexisting motion sensors (which control the lighting), these are calibrated for HVAC zone control. Thus, the **HVAC usage in meeting rooms is optimized** for times when it is not in use.

SYSTEM FEASIBILITY:

There is no physical building modeling or infrastructure overhaul required. The existing Custom Knock Down Energy Recovery AHU and light sensors provide **a strong foundation**. The ERU is modular and recently upgraded, which gives flexibility for integrating advanced controls and sensor integration.

TIMED ROLLOUT:

This phase will begin with a **pilot on one high-occupancy floor** (15th floor) for 3–6 months. Afterwards, will begin full rollout pending performance validation.

CARBON CALCULATIONS

UPFRONT COST

HARDWARE + INSTALLATION

$$\text{\$0.50}^1 \times 39,300^2 = \text{\$19,650}$$

Sensor Cost/SqFt Meeting Rooms SqFt One-Time Cost

MAINTENANCE

$$\text{\$0.045}^1 \times 39,300 = \text{\$1768.50}$$

Cost/SqFt Meeting Rooms SqFt Cost/Year

ANNUAL CARBON REDUCTION

$$701,431.67^3 \times 0.12^4 = 84,171.8$$

Heating/Cooling kWh/Year Used Proportion of HVAC Savings Heating/Cooling kWh/ Year Saved

$$84,171.8 \times \$0.22^5 = \$18,517.80$$

Heating/Cooling kWh/ Year Saved Cost/kWh Savings/Year

$$84,171.8 \Leftrightarrow 360,857^6$$

Heating/Cooling kWh/ Year Saved lb Reduction in CO₂ Emissions Per Year

¹ <https://docs.nrel.gov/docs/fy14osti/61072.pdf>

² See [Appendix A](#)

³ See [Page 3](#)

⁴ <https://docs.nrel.gov/docs/fy13osti/57206.pdf>

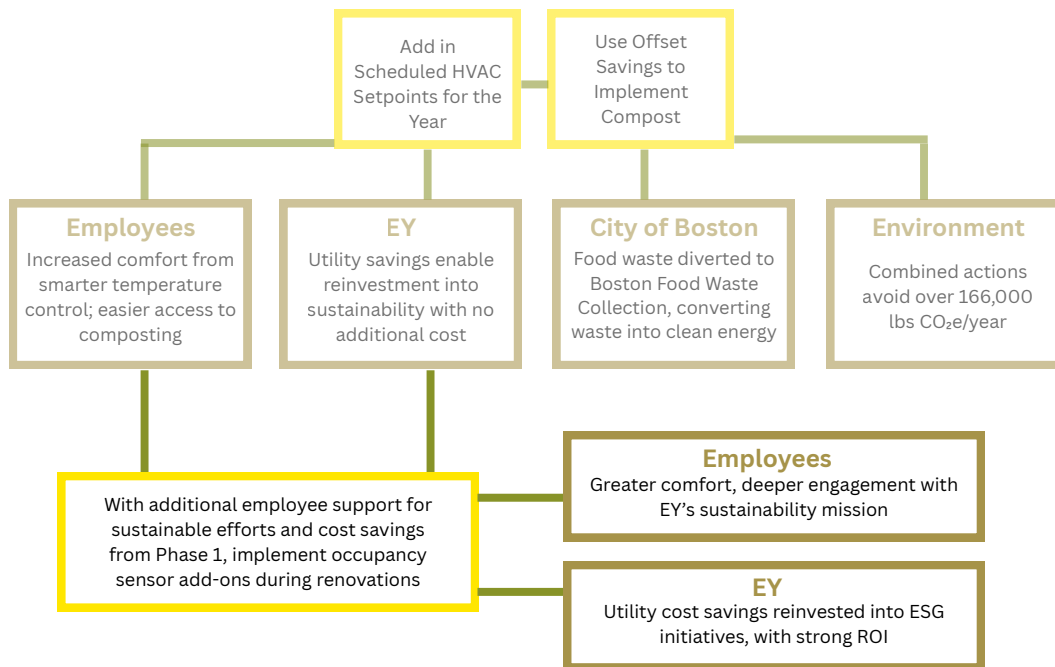
⁵ <https://poweroutage.us/electricity-rates/ma/boston>

⁶ <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

PHASE 2

RESULTS

PROCESS FLOW | PHASE 1-2



7-YEAR NET PRESENT VALUE¹

2,525,999



1b Reduction in CO₂ Emissions

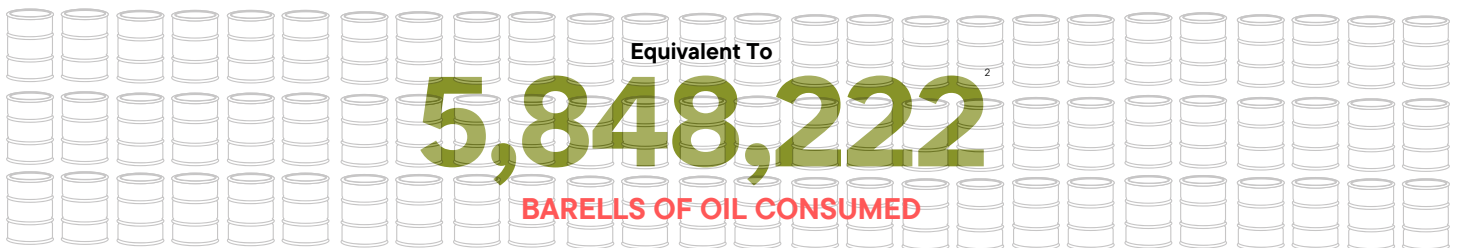
\$65,475



Savings

~2

Year Payback Period



¹ See Appendix C

² <https://www.epa.gov/energy/greenhouse-gas-equivalencies-calculator>

SUMMARY

This two-phase carbon reduction plan for EY Boston combines immediate, low-cost interventions with longer-term infrastructure optimization. Phase 1 introduces scheduled HVAC setpoint adjustments and centralized compost bins to **reduce energy usage and landfill waste** resulting in 583,000+ lbs in carbon savings and \$158K in savings over three years. Phase 2 builds on this by piloting occupancy HVAC optimization using sensor add-ons, allowing for **energy optimization**. Together, the plan delivers over 3.1 million lbs in carbon reductions and \$223K in projected savings over ten years, positioning EY Boston as a leader in local ESG action and scalable sustainability.



CO-BENEFITS

Operations - Operational Efficiency and Longevity¹

By implementing scheduled HVAC setpoints and sensed HVAC systems, the system workload is reduced significantly. This reduces energy consumption, mechanical wear, and maintenance needs. As a result, it lowers operating costs and extends the life of existing infrastructure, especially critical in an old building. This system also sets the stage for long-term energy planning.

Employees - Enhanced workplace experience and engagement²

Both initiatives improve daily experiences for employees with composting reducing order and improving cleanliness, while the HVAC adjustments improve temperature comfort. Often employees find the office to be too cold or too hot. Thus, with the adjustments, employees will benefit from more regulated temperatures. Additionally, supporting the new Green Team with visible initiatives also builds a culture and opens conversation of sustainability and environmental ownership.

EY - ESG Alignment and Influence³

This project reinforces EY Boston's alignment with the firm's global net-zero and ESG goals. Additionally, as a major tenant in the shared commercial building, EY's leadership in waste diversion and energy savings may inspire additional action from building management and other tenants.

Community - Boston Clean Energy Goals⁴

Composting directly supports Boston's Zero Waste goals by reducing the amount of organic waste in landfills. Through partnerships with local haulers such as Boston Food Waste Collection, composted materials can be sent to anaerobic digestion facilities, where they are converted into renewable biogasses to power local homes and businesses. This not only reduces GHG emissions, but also positions EY as a contributing corporate citizen in Boston.

¹ <https://www.energy.gov/eere/buildings/advanced-energy-retrofit-guides>

² <https://www.ashrae.org/technical-resources/bookstore/standard-55-thermal-environmental-conditions-for-human-occupancy>

³ <https://www.ey.com/content/dam/ey-unified-site/ey-com/en-uk/about-us/legal-and-privacy/ey-carbon-reduction-plan-2025.pdf>

⁴ https://www.boston.gov/sites/default/files/imce-uploads/2019-06/zero_waste_bos_recs_final.pdf

SUMMARY

ANTICIPATED OBSTACLES & NEXT STEPS

The largest anticipated obstacle in this project is building infrastructure, specifically for Phase 2. Given the building's long tenure and allocation to various companies, gaining access to building HVAC controls and coordinating with management can lead to logistical delays. These delays can be dependent on data access and approval across departments. In order to combat this, initiate early meetings with management and emphasize that no physical retrofitting is required for phase 1.

Another anticipated obstacle is the shared building infrastructure as a large commercial office building. Due to other tenants in the office, there can be delays in executing plans to verify other tenants are not impacted. In order to combat this, position EY Boston as a leader in sustainability within the building and encourage building wide collaboration.

NEXT STEPS

1. Gain Support

The first step would be to gain support by presenting the proposal to EY Boston leadership and the New England Green Team to secure formal endorsement and funding plans. In addition, reach out to other building tenants for joint implementation and support.

2. Coordinate With Building Management

Combatting the largest obstacle, the next step would be to coordinate with building management to gain access to all data points. After verifying data points, work with management to schedule HVAC setpoint changes and confirm compost bin logistics. For phase 2, start clarifying sensor integration early to align with HVAC capabilities.

FUTURE PATHS

1. Grow Initiatives to other building Tenants

By using data from Phase 1 and Phase 2 Pilot, demonstrate success and encourage other tenants in 200 Clarendon St to adopt similar interventions.

2. Expand Across EY America

Leverage EY Boston's leadership as a pilot site to scale sustainable office solutions in all types and ages of buildings to other EY offices across North America, aligning with the firm's global ESG goals.

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APPENDIX A

Building Details

Meeting Room SqFt							
Small Meeting Room	100						
Large Meeting Room	400						
Conference Room	1000						
	13th Floor	14th Floor	15th Floor	16th Floor	23th Floor	Total	SqFt
Small	13	37	30	37	26	143	14300
Large	9	9	10	9	8	45	18000
Conference	3	0	0	0	4	7	7000
						Total SqFt=	39300

Occupancy Rates						
	M	T	W	Th	F	Total
13	102	127.5	102	127.5	8.5	467.5
14	102.6	128.25	102.6	128.25	8.55	470.25
15	130.5	174	130.5	174	17.4	626.4
16	102.6	128.25	102.6	128.25	8.55	470.25
23	74.4	93	74.4	93	6.2	341
				Weekly Occupancy =		2375.4
				Daily Occupancy=		475.08
	13th Floor	14th Floor	15th Floor	16th Floor	23th Floor	Total
Total Desks	170	171	174	171	124	810
in %	M	T	W	Th	F	
Occupancy Rate Low	60	75	60	75	5	
Occupancy Rate High	75	100	75	100	10	

Given the limited access and short time frame to building details as an intern, building details were estimated using strategic calculations. Calculations considered factors of high occupancy floors, high occupancy days, variety of meeting sizes.

APPENDIX B

Phase 1 Net Present Value Calculations

Cost savings from Implementing Carbon Neutral Suggestions												
NPV and IRR Analysis												
Initial investment	\$	288.60	Summary of Analysis									
Life of project (years)		3	NPV (\$)	\$	158,250.50							
Cost savings (pre-tax)		32,869.09	IRR (%)		8286.74%							
Growth		0.00%	Payback (Years)		0.01							
Required return (WACC)		8.27%										
Tax rate		27.32%										
Year		0	1	2	3	4	5	6	7	8	9	10
Cost savings			32,869	32,869	32,869	32,869	32,869	32,869	32,869	32,869	32,869	32,869
(1) Cost savings x (1-T)			23,889	23,889	23,889	23,889	23,889	23,889	23,889	23,889	23,889	23,889
Depreciation expense			96	96	96	96	96	96	96	96	96	96
(2) Depreciation x T			26	26	26	26	26	26	26	26	26	26
(3) Initial Investment	\$	(289)										
Total Cash Flows (1)+(2)+(3)	\$	(289)	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916
NPV	\$	158,250.50	Accept?	Accept	=NPV(B7,C17:L17)+B17							
IRR		8286.74%	Accept?	Accept								
Effective Tax Rate (1-(1-Federal Tax Rate) *(1-State Tax Rate))												
in %												
Federal Tax Rate			21									
State Tax Rate			8									
			72.68									
Federal Tax Rate Proportion			0.21									
State Tax Rate Proportion			0.08			Tax Rate=	27.32					
Payback Analysis												
Year		0	1	2	3	4	5	6	7	8	9	10
Total Cash Flows	\$	(289)	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916	\$ 23,916
Cumulative Cash flows	\$	(289)	\$ 23,627	\$ 47,542	\$ 71,458	\$ 95,374	\$ 119,289	\$ 143,205	\$ 167,120	\$ 191,036	\$ 214,951	\$ 238,867
Payback period:		7.987932531	=4+ABS(F36)/G35		Accept?	Rule is arbitrary, so no clear-cut decision rule Based on executives' arbitrary "rules"						
			This formula ABOVE LIKELY Needs to change for each project									
If growth rate = 0:		0.012067469	=IF(B6=0,B3/C17,"Use Other Method Above")		Should always be used in conjunction with NPV							

Net Present Value calculations were calculated through CRC official resources. Due to EY's role as a private company, tax rates and WACC were estimated according to A. Federal & Massachusetts Corporate Tax Rates, B. Average WACC for similar size business firms.

APPENDIX C

Phase 2 Net Present Value Calculations

NPV and IRR Analysis												
Initial investment	\$ 32,026.00		Summary of Analysis									
Life of project (years)	7		NPV (\$)	\$ 65,475.74								
Cost savings (pre-tax)	18,517.00		IRR (%)	44.79%								
Growth	0.00%		Payback (Years)	2.18								
Required return (WACC)	8.27%											
Tax rate	27.32%											
Year	0	1	2	3	4	5	6	7	8	9	10	
Cost savings		18,517	18,517	18,517	18,517	18,517	18,517	18,517	18,517	18,517	18,517	
(1) Cost savings x (1-T)		13,458	13,458	13,458	13,458	13,458	13,458	13,458	13,458	13,458	13,458	
Depreciation expense		4,575	4,575	4,575	4,575	4,575	4,575	4,575	4,575	4,575	4,575	
(2) Depreciation x T		1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	1,250	
(3) Initial Investment	\$ (32,026)											
Total Cash Flows (1)+(2)+(3)	\$ (32,026)	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	
NPV	\$ 65,475.74		Accept?	Accept		=NPV(B7,C17:I17)+B17						
IRR	44.79%		Accept?	Accept								
Effective Tax Rate (1-(1-Federal Tax Rate) *(1-State Tax Rate)												
in %												
Federal Tax Rate		21										
State Tax Rate		8										
		27.68										
Federal Tax Rate Proportion		0.21										
State Tax Rate Proportion		0.08			Tax Rate=	27.32						
Payback Analysis												
Year	0	1	2	3	4	5	6	7	8	9	10	
Total Cash Flows	\$ (32,026)	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	\$ 14,708	
Cumulative Cash flows	\$ (32,026)	\$ (17,318)	\$ (2,610)	\$ 12,098	\$ 26,806	\$ 41,514	\$ 56,223	\$ 70,931	\$ 85,639	\$ 100,347	\$ 115,055	
Payback period:	5.822558082	=4+ABS(F36)/G35	Accept?	Rule is arbitrary, so no clear-cut decision rule Based on executives' arbitrary "rules"								
	This formula ABOVE LIKELY Needs to change for each project											
If growth rate = 0:	2.177441918	=F(B6=0,B3/C17,"Use Other Method Above")	Should always be used in conjunction with NPV									

Net Present Value calculations were calculated through CRC official resources. Due to EY's role as a private company, tax rates and WACC were estimated according to A. Federal & Massachusetts Corporate Tax Rates, B. Average WACC for similar size business firms.

APPENDIX D

Phase 2 HVAC Estimation Justifications

Based on estimates from the National Renewable Energy Laboratory (NREL) and the Department of Energy (DOE), full occupancy sensor and controls retrofits typically cost between \$0.98–\$1.36/SqFt for installation, hardware, and commissioning. However, since this project is built on **pre-existing motion sensors and system infrastructure**, the cost of occupancy sensor add-ons is conservatively estimated at **\$0.50/ SqFt**. This reflects minimal hardware installation.

With next steps, it is important to verify costs and data points following coordination with building management.