THE GREEN BUILDINGS ACT

Rhode Island General Laws §37-24

http://webserver.rilegislature.gov//Statutes/TITLE37/37-24/INDEX.htm

February 21, 2024

Presented to:

EXECUTIVE CLIMATE CHANGE COORDINATING COUNCIL - EC4

Presented by:

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Strategic and Critical Importance of Green Buildings and Their Connectedness

- According to the most recent IPCC report (Intergovernmental Panel on Climate Change) a “rapid and far-reaching” sustainable transition in land, energy, buildings, transport and cities is needed to meet global carbon reduction goals. **Buildings account for almost 40 percent of global energy-related CO2 and will play a major role in a sustainable transformation.**

§ 37-24-2. Legislative findings.

It is hereby found and declared as follows:

(1) **Energy costs** for public buildings and public projects are skyrocketing and will likely continue to increase.

(2) **Energy use** by public buildings and public projects contributes substantially to the problems of pollution and global warming.

(3) **Public buildings, public structures, public real property and public projects** can be built, renovated, and located using high-performance methods that save and generate **energy**; reduce and conserve **water consumption**; improve indoor **air and environmental quality**; improve **water quality**; reduce transportation demand and emissions; preserve the **environment**; make **workers and students more productive**; and **improve the quality of our individual and shared human experience and environmental justice for all citizens** of the state.

(4) The green buildings act is a **strategic tool to achieve the greenhouse gas emission reduction targets and other objectives of chapter 6.2 of title 42 ("2021 act on climate") and the work of the executive climate change coordinating council established in § 42-6.2-1**.

(5) This law is necessary to **more efficiently spend public funds**.

Standards Incorporated into the Act

Addressing our **PUBLIC PROPERTY ~ PUBLIC STRUCTURES ~ PUBLIC REAL PROPERTY**

The Green Buildings Act RIGL 37-24 establishes the following high performance green building standards

LEED (2009)
LEED for Neighborhood Development (2017, 2022)
SITES - The Sustainable SITES Initiative (2017, 2022)
NE CHPS - Northeast Collaborative for High Performance Schools (2009)
GREEN GLOBES (2009)

for all public major facility projects of all State and municipal public agency projects larger than10,000 gross sf - new construction or renovation, and its public real-property site.

Administration of The Green Buildings Act

- **RI Department of Administration** - currently via the Office of Energy Resources

- **Green Buildings Advisory Committee** - 19 members, 11 public members, 8 public agency members

11 Public Members, appointed by the Governor, Speaker of the House, Senate President

9 Public Members - representing architecture, engineering, landscape architecture, energy, labor through the Rhode Island AFL-CIO, general construction contracting, building product and building materials industries

2 Public Members - one representing an urban municipality from Providence, Cranston, Warwick, Pawtucket, Woonsocket, or Newport, and one public member representing the other thirty-two (32) municipalities in the state in order to ensure geographic diversity

8 Public Agency Members - appointed by the directors of CEO of respective agencies representing personnel from affected public agencies, and cities and towns, that oversee public works projects and workforce development to include the:

Department of Administration; Department of Environmental Management; Department of Education; Department of Transportation; Department of Labor and Training; Office of the State Building Code Commissioner; the Rhode Island Infrastructure Bank, and the Rhode Island League of Cities and Towns.

The Green Buildings Act of 2009

The Act was historic…

Rhode Island was the first state in the Nation
to adopt

LEED

high performance green building standards into public law.

The Green Buildings Act was amended in 2017 and in 2022

The Act was again historic because Rhode Island was the first state in the Nation to adopt

LEED

LEED for Neighborhood Development

SITES - The Sustainable SITES Initiative

high performance green building standards into public law.

State Business Recognition

OPINION

R.I. can be green-building leader

KENNETH FILARSKI AND MIKE MCNALLY
GUEST COLUMN

Rhode Island may be the smallest state in the country, but it is creating big opportunities when it comes to developing sustainable infrastructure. Oftentimes the emphasis is placed on greening buildings, while landscapes and open spaces remain underutilized and overlooked. Yet sustainably designed and managed landscapes – from plazas and streetscapes to commercial and residential projects – create more resilient communities. The Environmental Protection Agency has estimated that capital cost savings associated with green infrastructure can range from 15-80 percent compared to traditional site infrastructure.

An amendment to the state's Green Buildings Act, H-5427, proposed by Rep. Christopher Blazejewski, D-Providence, would work to elevate the value of Rhode Island's land by formally adopting The Sustainable SITES Initiative framework, a comprehensive program for designing, developing and maintaining sustainable landscapes. It would also make Rhode Island the first state in the nation to adopt the comprehensive green rating system.

The amendment proposes that all state-owned, operated and funded property, beyond the built infrastructure already covered in the Act, achieve certification under the SITES rating system, which is currently used by the U.S. General Services Administration. Reaching certification through LEED for Neighborhood Development, which was engineered to help create better, more sustainable, well-connected neighborhoods, would also be an acceptable standard under the amendment.

For Rhode Island, green construction is big business. Currently, the state has more than 7.5 million square feet of real estate that is LEED (Leadership in Energy & Environmental Design) certified and is home to more than 400 LEED professionals. LEED is an internationally recognized green-building standard created, maintained and improved upon by the U.S. Green Building Council. The SITES rating system serves as a complement to LEED, extending the principles of sustainability beyond the physical building to landscapes, including parks, streetscapes, residential projects and more.

According to the 2015 Green Building Economic Impact Study by U.S. Green Building Council and Booz Allen Hamilton, from 2015-2018, green construction in the state will account for $2.14 billion in state GDP and support approximately 25,000 jobs.

This amendment would continue the outstanding work of the General Assembly in both the House and the Senate, including the January 2016 Rhode Island Senate's "Grow Green Jobs – A Legislative Action Plan." It would also increase demand for employment services, increasing the workforce, and providing economic-development opportunities.

SITES was developed through a collaborative, interdisciplinary effort of the American Society of Landscape Architects Fund, the Lady Bird Johnson Wildflower Center at the University of Texas at Austin and the U.S. Botanic Garden. The rating system takes a systematic approach to defining, measuring and elevating the value of landscapes, waterways and other forms of green infrastructure through sustainable best practices that help create more resilient communities that are better able to withstand and recover from catastrophic events, such as floods and wildfires, which cost states money and resources.

The GSA adopted SITES in the 2016 version of Facilities Standards for the Public Buildings Service, and stated that it "allows land-based projects to better protect ecosystems and enhance the mosaic of benefits they continuously provide our communities, such as climate regulation, carbon storage and flood mitigation."

Businesses, governments, universities and more are embracing sustainable landscapes and helping to create regenerative systems that foster resiliency and enable communities to better withstand and recover from catastrophic events.

By adopting best practices, projects can find cost-effective ways to conserve resources and promote human health and well-being. ■

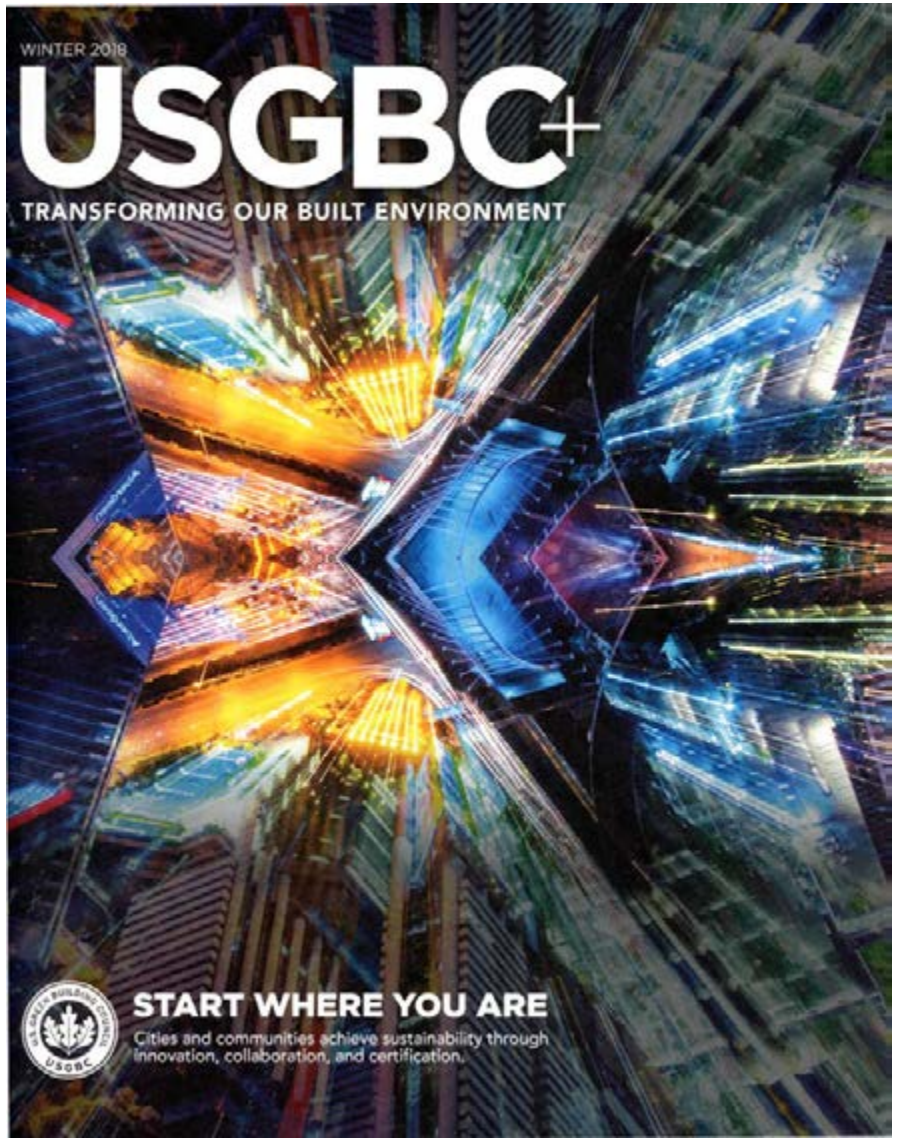
Kenneth Filarski is founder of Filarski Architecture+Planning+Research and chairman of the U.S. Green Building Council Rhode Island. Mike McNally is chairman of the U.S. Green Building Council and retired president and CEO of Skanska USA.

For Rhode Island, **green construction is big business.**

Global Impact

USGBC+

Winter Issue
2018



USGBC+

Winter Issue 2018

Smallest State, Biggest Strides

Rhode Island takes another huge step toward expanding its green infrastructure.

By Kiley Jacques

For a decade Rhode Island has pioneered sustainable design in the public sector. It was the first state in the nation to adopt the Leadership in Energy and Environmental Design (LEED) rating system, and the International Green Construction Code (IGCC). At their outset, however, those systems did not address real public property, which belongs to the state—that real public property became the domain of the 2006 Green Buildings Act, a policy requiring nonresidential public buildings to certify under the appropriate version of LEED.

The recent passage of bill S-0952A/H-5427A, which amends the Green Buildings Act, is in keeping with the state's long-standing commitment to sustainable building. The legislation has been in the works since 2014, when the Environmental Council of Rhode Island and the Green Infrastructure Coalition started talking more deeply about green infrastructure in the public sphere. (As the Ocean State, Rhode Island has a heightened appreciation for the need to protect its coastlines and waterways.) In late 2015, it was decided that there should be legislation in place to encourage the inclusion of green infrastructure in public projects. That idea resulted in an amendment to the Green Buildings Act that included the Sustainable SITES Initiative (SITES) and LEED for Neighborhood Development (LEED ND) as applicable standards for the construction of green infrastructure. After continual support from USGBC and USGBC Rhode Island Chapter, Governor Gina M. Raimondo signed the bill into law, making Rhode Island the first state to include SITES for the design and development of land that falls under the domain of public real property.

The updated legislation adheres to prior commitments while broadening sustainability and resilience measures to go beyond buildings. State and local governments taking on new public facilities projects that add public parks or landscapes that address the space between buildings will now apply SITES and/or LEED ND. "The Ocean State has taken a big step toward embracing sustainable development and landscapes," says Jeremy Sigmon, USGBC's Director of Technical Policy. "By using these rating systems for public projects, Rhode Island is creating healthier, more sustainable, and more resilient places for its residents."

"I am enthusiastic not only for the legislation becoming law, but also for how the law can leverage and catapult a greater realm of sustainability," adds architect and USGBC Rhode Island Chapter chair and co-founder Kenneth J. Filarski, who drafted the bill.

Right: The Save The Bay Center provides classrooms for their Explore The Bay educational programs, Save The Bay's administrative offices, and community meeting space. The building itself represents Save The Bay's approach to brownfields redevelopment and environmentally friendly shoreline development. The 15,042-sq-ft building is located on a 6.07-acre site in Providence, Rhode Island, on Narragansett Bay.

Photos courtesy of Save The Bay

USGBC+

Winter Issue
2018

Meg Kerr, senior director of policy at Audubon Society of Rhode Island and a member of the Green Infrastructure Coalition, concurs: "We are excited for the opportunity to have state and public investment in . . . green infrastructure as a way to demonstrate its importance and the benefits it provides to the community."

The Law at Work in the Age of Climate Change

SITES and LEED ND are two more tools for building resilience into the state's fabric. SITES-certified projects create regenerative systems that not only help reduce water consumption, energy needs, and air pollution but also better bear catastrophic flooding events and sea level rise. The adoption of LEED ND will also play a role in addressing climate change. The state's small size coupled with the principles of New Urbanism make it well poised to significantly cut carbon emissions. "There are major areas including the Pastore Complex in Cranston, the Port of Galilee, and Quonset Business Park where LEED ND is applicable," Filarski explains. "It [can] be used as a guiding framework for sustainable hazard mitigation, communities' comprehensive plans, zoning works, subdivision works, and conservation development works."

Among the law's allies is the Rhode Island Builders Association, a 72-year-old nonprofit organization whose mission is to address the state's housing needs. Its unanimous support is something of which president Dave Caldwell is quite proud. He values the coming together of the building sector with the environmental community, and notes that it hasn't always been the case. Their capacity to do so, he feels, is something politicians respond well to, making the passing of advantageous bills like this one more likely. "This is [w]in piece of legislation. It saves [m]y and is good for the environment in terms of energy and water resources, [which is important] in an estuary like Narragansett Bay," says Caldwell, who advocates for expanding the realm of green infrastructure. "This legislation is a step toward increasing our awareness of our environment—it's another piece. It's not the end, and it's not a standalone element. But as we think about sea level rise and water quality, [it's vital] to build and adapt to a changing environment. . . . [This new law] is another brick in the foundation of how we learn to build better."

Governor Raimondo sees the big picture, too, noting Rhode Island's position on the front lines of the fight against climate change. As part of its commitment to environmental leadership, the state has introduced net metering to make it easier for residents to invest in clean energy resources; it has partnered with other states to cut greenhouse gas emissions; and it is the only state in the nation with an offshore wind farm. "Thanks to this new legislation, we can build on these accomplishments to extend our building sustainability efforts to public lands," says Governor Raimondo.

Broadening the Scope

According to Filarski, SITES has wider repercussions as well: "I think sustainable landscapes are more accessible and understandable than buildings are to the layperson. People have an intrinsic connection to any well-done landscape, but when it is a sustainable landscape, there is an affinity, a sort of sisterhood and brotherhood among people of all walks of life. SITES can bring in a whole new audience that will feel comfortable entering the notion of sustainability."

Filarski sees the two rating systems working in tandem, noting that even if a SITES project doesn't qualify for LEED ND, there is no reason some of its principles can't be applied. "Our job is to nudge [the state] to incorporate as many elements as possible," he says.

For Kerr, it's a matter of demonstrating that SITES metrics add value to projects—and that they are a positive for the state. "[We want to show] there are more benefits than costs, so that people managing these projects moving forward are excited, and we see more applications of SITES."

In addition to diversifying the audience supporting sustainable design and resiliency planning; building community structures, landscapes, and neighborhoods that improve environmental and human health; and addressing climate change, it also makes Rhode Island a fiscal steward of public funds while evidencing its commitment to sustainability in the built environment, which furthers its commendable reputation on the national stage.

Moving Forward

"Getting the bill passed is fabulous but the rubber hits the road with its implementation. I would like to see enthusiastic participation by state agencies," says Kerr, adding that state stakeholders have expressed concern that the law's implementation will require extra work for which they don't have resources. However, Green Infrastructure Coalition affiliates intend to make themselves available to help with technical expertise and support.

Next up is a meeting of all agencies to determine which of the state's upcoming projects would best be suited to pilot the newly amended Act. "We want to see this move from pilot to full implementation to standard practice," says Kerr, who anticipates Rhode Island ultimately serving as a model for other states and communities around the country.

"I don't want to do something that is easy just to make it look good," Filarski concludes. "I want to have high-profile, high-impact projects that really prove the point—particularly pertaining to climate change." ●

Left page, top: Kenneth J. Filarski is the USGBC Rhode Island Chapter chair and co-founder. Left page, bottom: Meg Kerr is senior director of policy at Audubon Society of Rhode Island.

Top: Governor Gina M. Raimondo of Rhode Island.

Left: The Rhode Island Department of Environmental Management (DEM) will use a federal grant administered by the U.S. Economic Development Administration (EDA), to continue rehabilitation of critical infrastructure in the Port of Galilee. The improvements will enhance the long-term viability of the regional commercial fishing industry and the local businesses they support.

Award Winning Legislation


LEADERSHIP IN ENERGY & ENVIRONMENTAL DESIGN
LEED


LEED is the most widely used green building rating system in the world. It works for all buildings at all phases of development, from new construction to existing buildings, and all building sectors, from homes to hospitals to corporate headquarters.

A concise framework for identifying & implementing **practical & measurable** green building design, construction, operations & maintenance strategies and solutions.

ALL BUILDINGS IN

LEED addresses homes, offices, hotels, hospitals, schools, retail spaces, banks, factories, stadiums, college campuses, neighborhoods... every building type at every lifecycle phase in any climate or region.

Some of the Benefits of LEED

- 22 LEED-certified buildings managed by the General Services Administration saw CO2 emissions were 34 percent lower, consumed 25 percent less energy and 11 percent less water, and diverted more than 80 million tons of waste from landfills.
- According to the EPA, heating and cooling accounts for about 43 percent of all energy use in the country, which contributes to air pollution and generates the largest amounts of greenhouse gases. By improving energy efficiency, green buildings also help reduce indoor air pollutants related to serious health issues.
- LEED projects are getting results across the board, scoring an average ENERGY STAR score of 89 points out of a possible 100. In a study of 7,100 certified construction projects, more than 90 percent were improving energy performance by at least 10 percent.
- LEED projects are responsible for diverting more than 80 million tons of waste from landfills, and by 2030 that number is expected to grow to 540 million tons.

"Our data proves that the cost of pursuing LEED adds **less than 1%** of the total project costs while accounting to significant water & energy savings & subsequent payback."

Heather Stewart, Populus

LOCAL GOVERNMENTS & LEED® FOR NEIGHBORHOOD DEVELOPMENT

Northwest Gardens, Fort Lauderdale, FL, Stage 2 Pre-Certified Plan (LEED Gold, 62 points)

LEED for Neighborhood Development (LEED ND) pushes both the public and private sectors to look beyond the individual building to a larger district, recognizing that the location and context of buildings in relation to the public realm plays a critical role in the sustainable performance of a community.

LEED ND also spells fiscally responsible development for local governments. Complete, walkable, amenity-rich and transit-served projects require lower up front infrastructure investment and result in lower costs associated with ongoing infrastructure maintenance and delivery of key services.

[LEED ND] is potentially the most transformative and powerful tool we have for influencing and establishing holistic and sustainable communities. But we have to use it. LEED ND's inherent power and its beauty begins by integrating its holistic framework into our comprehensive plans, zoning ordinances, and subdivision regulations so we can create and guide the sustainable future for the places we call home, neighborhood, community...and earth.

Kenneth J. Filkarski, FAIA, LEED AP®, BD+C, CFM, CEFPI, NCARB
FILARSKI/architecture+planning+research

LEED for Neighborhood Development

LEED for Neighborhood Development encourages and guides better planning and development in three areas:

- ***Smart Location and Linkage***

  Emphasizes locations with access to existing infrastructure and transit service leverage efficiencies in public contributions to infrastructure construction and maintenance. Protecting natural resources and sensitive lands ensures resilient ecological systems.

- ***Neighborhood Pattern and Design***

  Compact, walkable, vibrant, mixed use and mixed-income neighborhoods with good connections to nearby communities contribute to thriving local economies and create destinations where we can all live, work, play and learn.

- ***Green Infrastructure and Buildings***

  Building and infrastructure performance at the district scale reduces energy and water use, reuses materials, and minimizes waste.

LEED-ND was jointly developed by the U.S. Green Building Council (USGBC), the Congress for New Urbanism (CNU) and the Natural Resources Defense Council (NRDC).

Some benefits of LEED-ND

LEED-ND guides the efficient use of land and resources, reduces strain on public infrastructure, and contributes to a robust tax base.

A study from Smart Growth America shows that LEED-ND style development:

- **Saves an average of 38 percent on up front costs** for new infrastructure including roads, sewers and water lines.

- **Saves municipalities an average of 10 percent** on delivery of emergency services.

- **Generates 10 times more tax revenue** than conventional suburban development, on a per-acre basis.

- Only 35 percent of people who prefer to live in a walkable community actually do so. **Establishing LEED-ND development is a way to attract new renters, homeowners and local businesses.**

This is a strategic guiding framework for the Transit Oriented Development (TOD) being contemplated in RI.

Smart Location & Linkages -

Columbia Pike, Arlington, Virginia The Way It Is

Smart Location & Linkages -

Columbia Pike, Arlington, Virginia The Way It Could Be

Smart Location & Linkages -

Willets Point Redevelopment Queens, NY

Neighborhood Pattern & Design -

Bank of America Affordable Green Neighborhoods, New Grants Program

Neighborhood Pattern & Design -

Ronkonkoma, NY

Green Infrastructure & Buildings -

Clean Up Brownfield Contamination

Green Infrastructure & Buildings -

Daylighted Creek, City Creek Center, Salt Lake City, Utah


THE Sustainable
SITES
Initiative®

SITES https://www.sustainablesites.org/projects

Developed through a collaborative, interdisciplinary effort of the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at the University of Texas at Austin, and the U.S. Botanic Garden

SITES is the most comprehensive program for developing sustainable landscapes.

It offers a systematic, comprehensive rating system for designing sustainable sites, measuring their performance, and elevating the value of landscapes.

SITES is based on the understanding that

land is a crucial component of the built environment

and can be planned, designed, developed and maintained to protect and enhance the benefits we derive from healthy, functioning landscapes, better able to withstand and recover from episodic storms, floods, droughts, wildfires and other catastrophic events. Projects can range in size from 2,000 square feet to an unlimited amount of acreage.

SITES Guiding Principles

Do no harm.
Make no changes to the site that will degrade the surrounding environment. Promote sustainable design projects on sites where previous disturbance or development presents an opportunity to regenerate ecosystem services through sustainable design.

Apply the precautionary principle.
Be cautious in making decisions that could threaten human and environmental health. Some actions can cause irreversible damage. Examine a full range of alternatives (including no action), and be open to contributions from all potentially affected parties.

Design with nature and culture.
Create and implement designs that are responsive to economic, environmental, and cultural conditions and to the local, regional, and global context.

Use a decision-making hierarchy of preservation, conservation, and regeneration.
Maximize the benefit of ecosystem services by preserving existing environmental features, conserving resources in a sustainable manner, and regenerating lost or damaged ecosystem services.

Provide regenerative systems as intergenerational equity.
Provide future generations with a sustainable environment supported by regenerative systems and endowed with regenerative resources.

SITES Guiding Principles

Support a living process.
Continuously re-evaluate assumptions and values, and adapt to demographic and environmental change.

Use a systems thinking approach.
Understand and value the relationships in an ecosystem. Use an approach that reflects and sustains ecosystem services and re-establishes the integral and essential relationship between natural processes and human activity.

Use a collaborative and ethical approach.
Encourage direct and open communication among colleagues, clients, manufacturers, and users to link long-term sustainability with ethical responsibility.

Maintain integrity in leadership and research.
Implement transparent and participatory leadership; develop research with technical rigor; and communicate new findings in a clear, consistent, and timely manner.

Foster environmental stewardship.
In all aspects of land development and management, foster an ethic of environmental stewardship—an understanding that responsible management of healthy ecosystems improves the quality of life for present and future generations.

SITES - Ecosystem Services

Global climate regulation
- Maintaining balance of atmospheric gases at historic levels
- Maintaining healthy air quality
- Sequestering carbon

Local climate regulation
- Regulating local temperature, precipitation, and humidity through shading, evapotranspiration, and windbreaks

Air and water cleansing
- Removing and reducing pollutants in air and water

Water supply retention
- Storing and conserving water within watersheds and aquifers

Erosion and sediment control
- Retaining soil within an ecosystem
- Preventing damage from erosion and siltation

Hazard mitigation
- Reducing vulnerability to damage from flooding, storm surge, wildfire, and drought

Pollination
- Providing for the reproduction of crops and other plants

Habitat functions
- Providing refuge and reproduction habitat to plants and animals, contributing to the conservation of biological and genetic diversity and evolutionary processes

Waste decomposition and treatment
- Breaking down waste
- Cycling nutrients

Human health and well-being
- Enhancing physical, mental, and social well-being as a result of interaction with nature

Food and renewable non-food products
- Producing food, fuel, energy, medicine, or other products for human use

Cultural benefits
- Enhancing cultural, educational, aesthetic, and spiritual experiences as a result of interaction with nature

SITES - Goals

Create Regenerative Systems and Foster Resiliency

- Protect and restore natural resources such as soil, water, and vegetation.
- Encourage biodiversity.
- Enhance landscapes to provide multiple ecosystem services such as cleaning air and water, providing habitat, and storing carbon.
- Mitigate for evolving hazards and natural disasters.
- Plan for monitoring and adaptive management.

Ensure Future Resource Supply and Mitigate Climate Change

- Minimize energy consumption and encourage use of low carbon and renewable energy sources.
- Minimize or eliminate greenhouse gas emissions, heavy metals, chemicals, and other pollutants.
- Reduce, reuse, recycle, and upcycle materials and resources.
- Conserve water.
- Increase the capacity of carbon sinks through re-vegetation.

Transform the Market through Design, Development, and Maintenance Practices

- Foster leadership in industry and professional practice.
- Use a systems-thinking, integrative and collaborative design approach.
- Use lifecycle analyses to inform the design process.
- Support local economies and sustainability policies.

Enhance Human Well-Being and Strengthen Community

- Reconnect humans to nature.
- Improve human health (physical, mental, and spiritual).
- Foster stewardship by providing education that promotes the understanding of natural systems, and recognizes the value of landscapes.
- Encourage cultural integrity and promote regional identity.
- Provide opportunities for community involvement and advocacy.

TRADITIONAL LANDSCAPE

City of Santa Monica

- 67,000 gallons of water
- 670 pounds of yard waste
- 80 maintenance hours

SUSTAINABLE LANDSCAPE

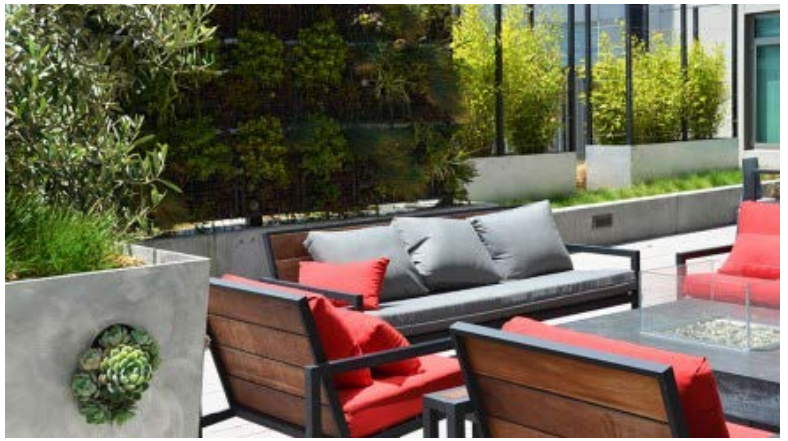
City of Santa Monica

$2,200 per year in cost savings

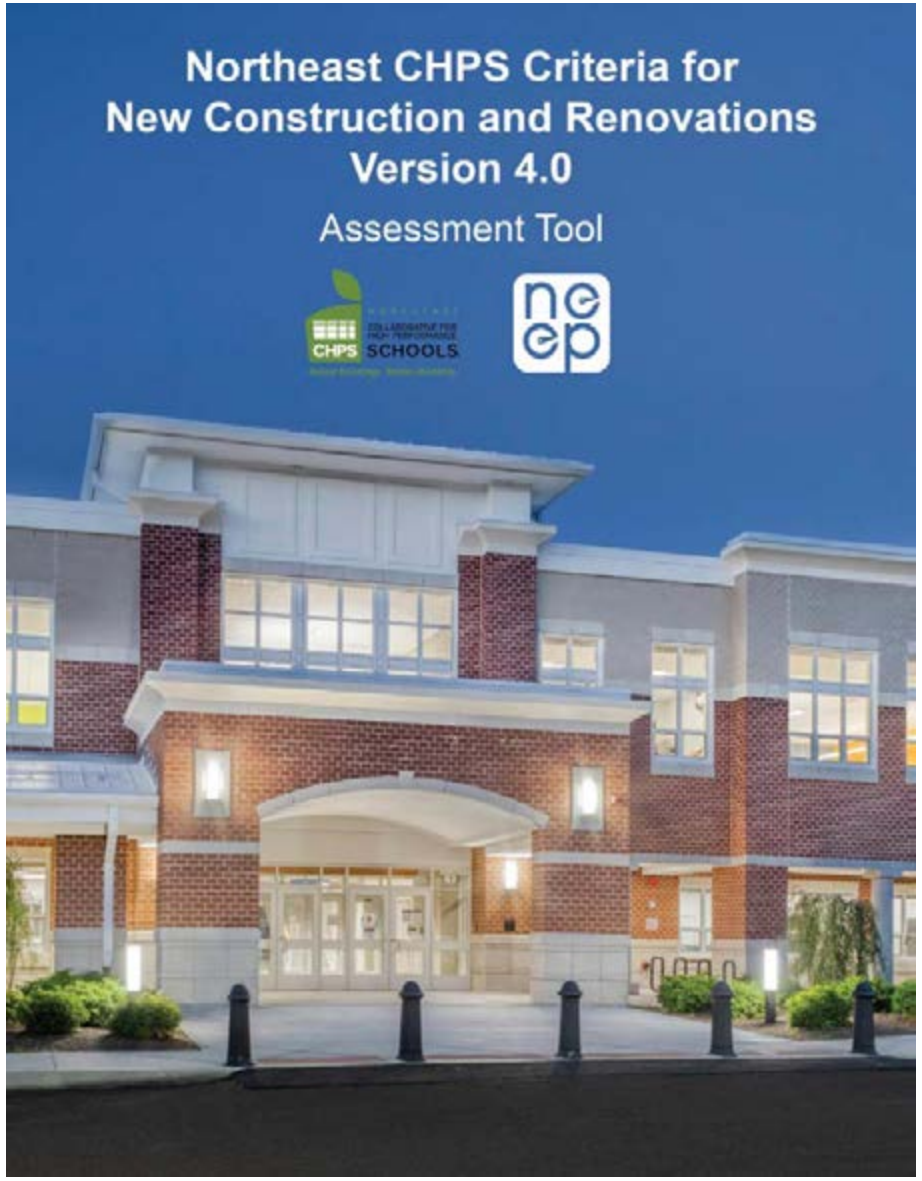
- 6,000 gallons of water
- 250 pounds of yard waste
- 15 maintenance hours






Northeast Collaborative for High Performance Schools



The Northeast Collaborative for High Performance Schools Criteria (NE-CHPS) was developed to promote operational energy savings and sustainable design features in school construction and major renovations throughout the region. NEEP's vision is that the work done today on High Performance Schools will pave the way for the development of zero net energy schools, schools that consume no more energy than they produce, on a broader scale throughout the region. NE-CHPS is based on the pioneering Collaborative for High Performance Schools' Guidelines, but has been tailored by NEEP to the climate, building codes, and educational priorities of the Northeastern United States.

The Collaborative for High Performance Schools believes **kids learn better in schools with good lighting, clean air, and comfortable classrooms.**

Ai3architects.com

Green Globes

GREEN BUILDING INITIATIVE®

GREEN GLOBES®
BUILDING CERTIFICATION

NEW CONSTRUCTION

EXISTING BUILDINGS

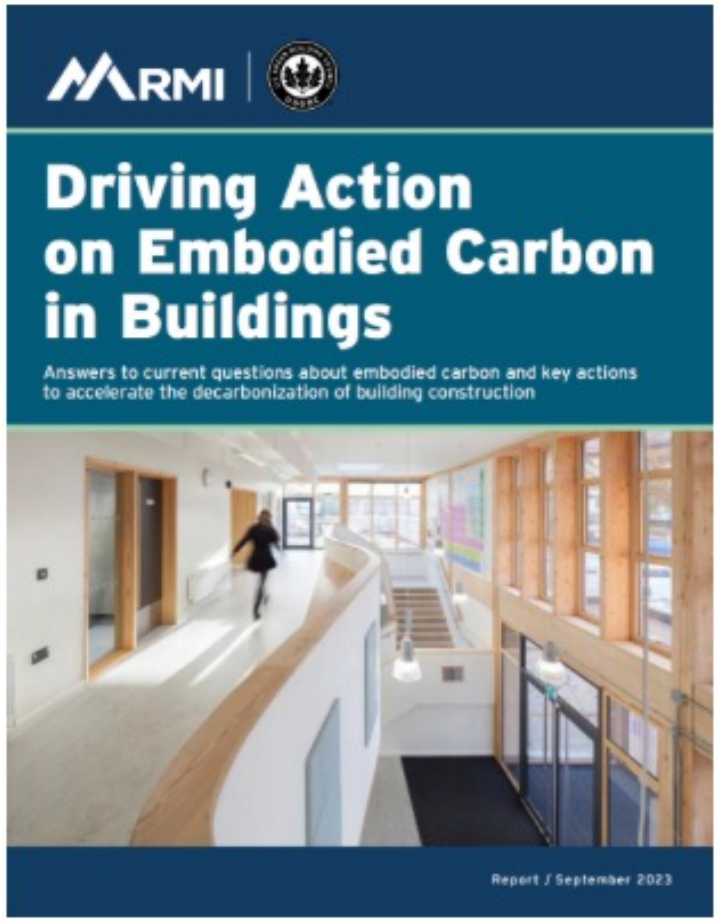
SUSTAINABLE INTERIORS

Green Globes is a science-based, three-in-one building rating system that evaluates the environmental sustainability, health & wellness, and resilience of commercial buildings and portfolios.

Supporting a wide range of new construction and existing building project types, Green Globes certification demonstrates an owner and occupant commitment to sustainability & ESG goals.

Carbon

Driving Action on Embodied Carbon in Buildings Rocky Mountain Institute and USGBC



https://www.usgbc.org/resources/driving-action-embodied-carbon-buildings

But first, a roadmap of acronyms and terms

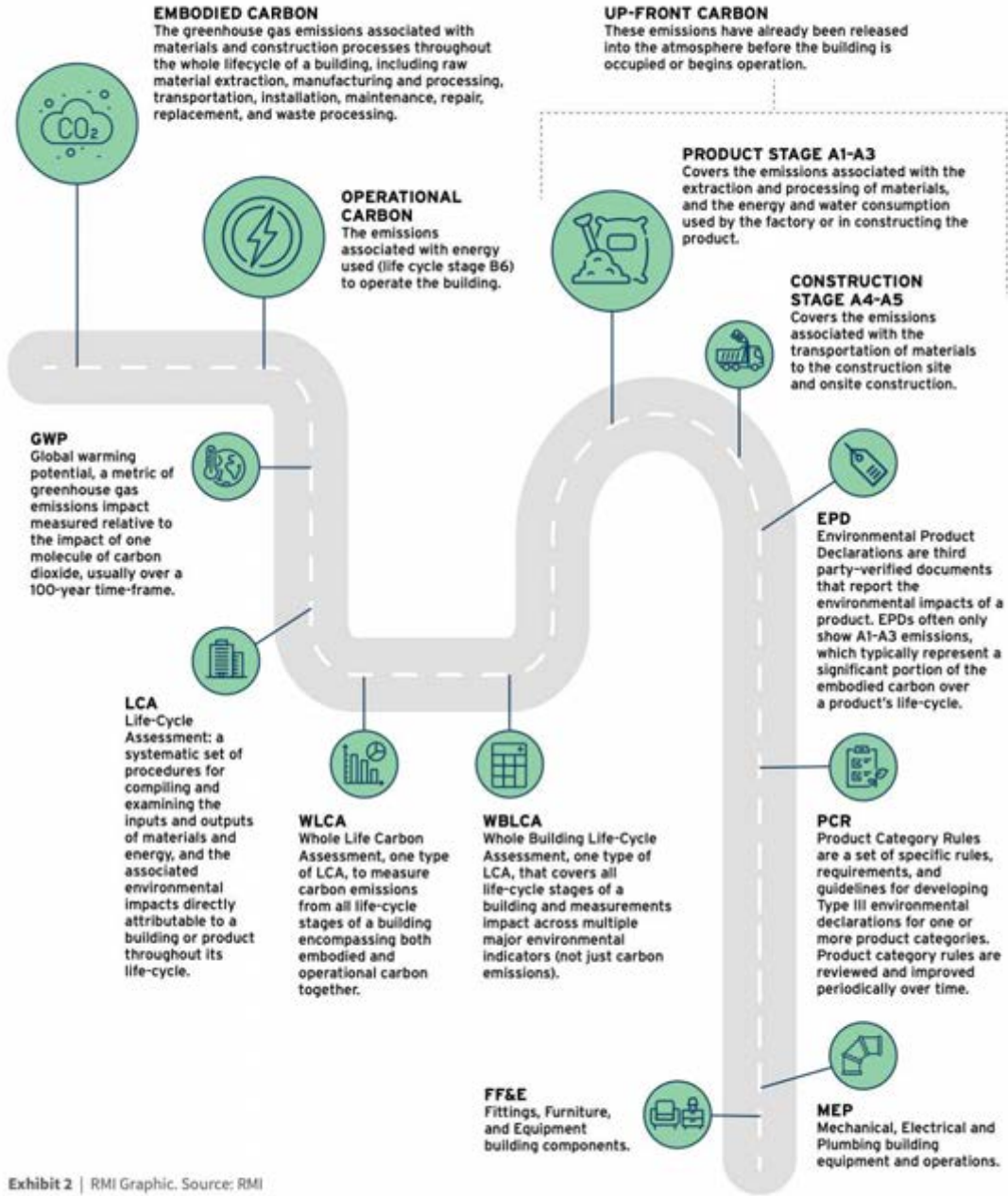


Exhibit 2 | RMI Graphic. Source: RMI

11 critical questions addressed in this report

	**1 How big an opportunity is embodied carbon?**	Millions of tons of emissions can be avoided with known strategies today! Measure and implement strategies for easy reductions.
	**2 Which should we priortize: operational or embodied emissions?**	We can and must reduce both without pitting one against the other. Examine both to find the win-win scenarios for maximum reductions.
	**3 What should we prioritize to reduce embodied carbon today?**	Reuse more, dematerialize, and substitute with low-embodied-carbon materials. Use life-cycle assessments (LCA) to find reduction strategies.
	**4 Do low-embodied-carbon materials cost more?**	Opportunities exist today with little to no cost or schedule impact. Request costs for low-embodied-carbon products early and balance cost and carbon.
	**5 What should I measure and how?**	Choose an appropriate LCA type. Decide on a scope of analysis for your calculations – you can start small!
	**6 Is the data good enough?**	We know enough today to make meaningful reductions. Don't wait, act now! Support standardization efforts and filling the gaps.
	**7 Is there enough data on interiors and furnishings?**	The data gap is big. The impact could be big and is worth paying attention to. Include interior elements in LCA and support their data collection.
	**8 What is the future of concrete and steel?**	They will remain important in construction and are decarbonizing. Accelerate decarbonization with transition to renewables and low-carbon alternatives uptake.
	**9 Can wood products benefit the climate?**	A net increase in regional forest carbon storage is good for the climate. Ask for more disclosure in wood products (e.g., source forest).
	**10 Is carbon storage in buildings really possible?**	Buildings could become a carbon storage solution. Encourage the development of bio-based materials, carbon storing concrete, and others, by using them.
	**11 What does the policy landscape look like for embodied carbon?**	Low-embodied-carbon material legislation exists, and whole building limits are coming. Familiarize with building LCA and material procurement regulations.

We must accelerate our position on this curve to meet climate thresholds

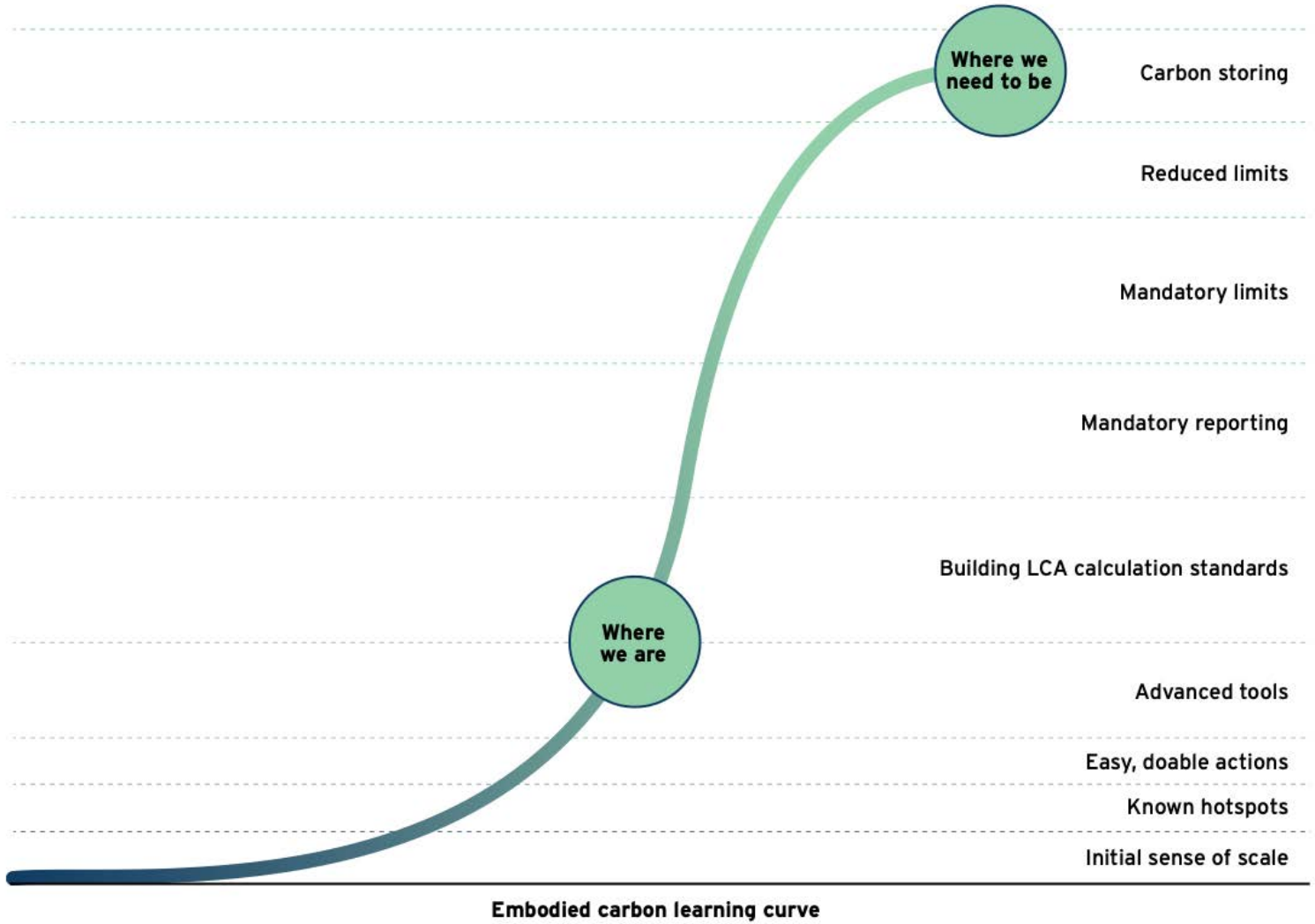


Exhibit 1 | RMI Graphic. Source: RMI analysis

Which Should We Prioritize: Operational or Embodied Emissions?

KEY TAKEAWAYS

- We can and must reduce both operational and embodied carbon emissions in the next decades to avoid the worst effects of climate change.
- It is possible to achieve excellent climate performance in both embodied and operational emissions without pitting one against the other.
- Most embodied carbon is emitted up front during the manufacturing and construction of products and buildings and has an outsize climate impact in the first decade of a new building.

Tackling both operational and embodied carbon emissions is essential

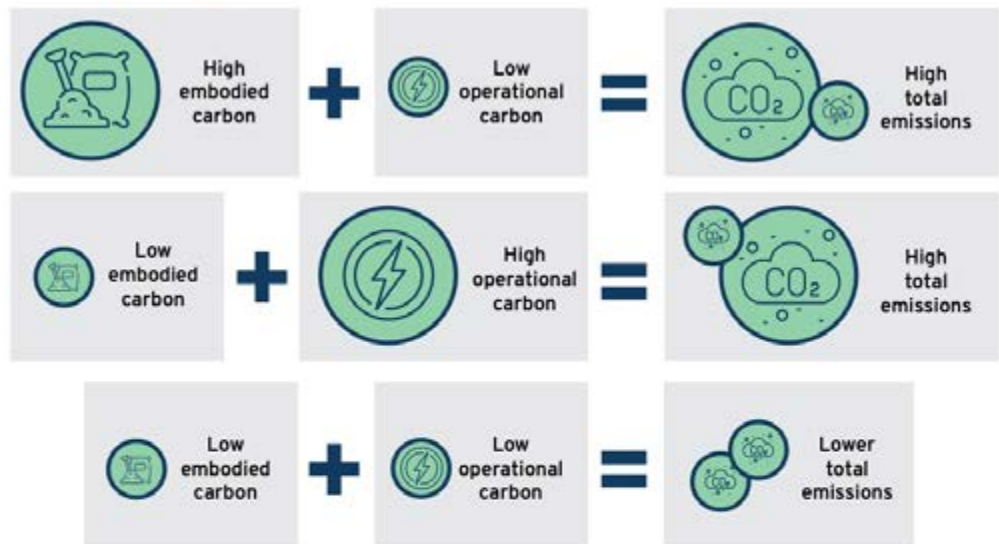


Exhibit 1 | RMI Graphic. Source: RMI analysis

We Can and Must Prioritize Both

The majority of building product embodied emissions occur up front

Breakdown of product life-cycle, not including building operational emissions

50%-85%
PRODUCT STAGE
(A1-A3)

3%-10%
CONSTRUCTION
(A4-A5)

6%-22%
USE
(B1-B5)

1%-15%
END OF LIFE
(C1-C4)

Exhibit 2 | RMI Graphic. Source: See endnote 7

A combination of interventions can result in deeper reductions than pursuing just one

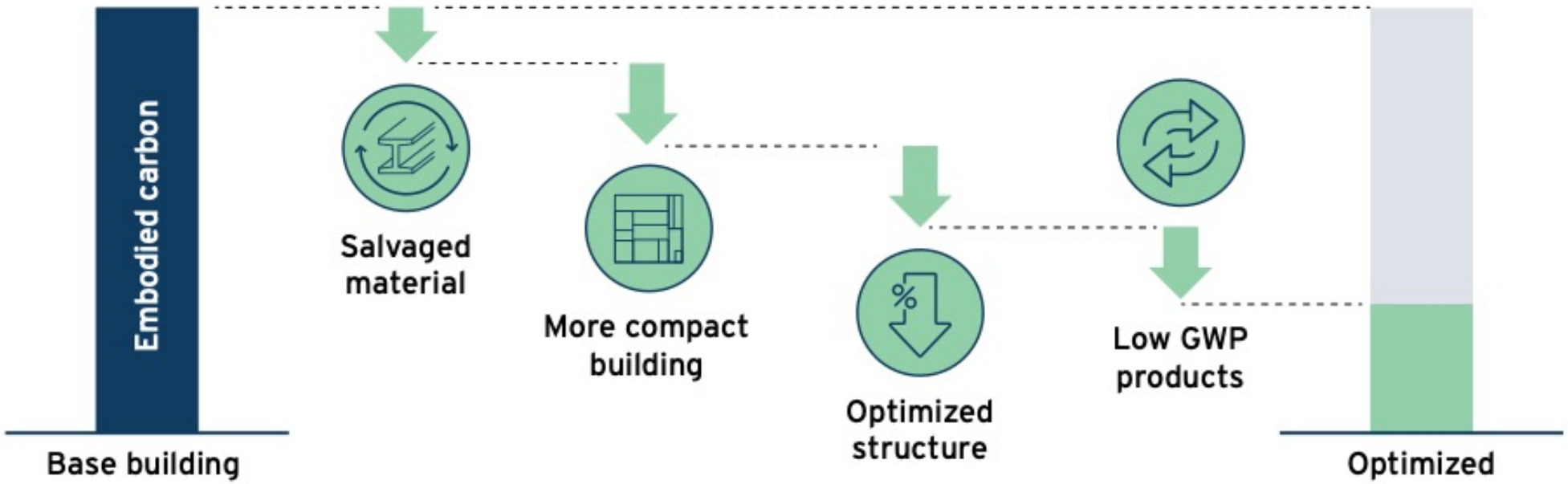


Exhibit 3 | RMI Graphic. Source: RMI analysis

CASE STUDIES: EC REDUCTION WITHOUT MAJOR COST INCREASES

Peter Molick Photography photo

Houston Advanced Research Center

EC REDUCTION

20%

structural and enclosure

- Structural system optimization
- Lighter overall structure
- Minimized long spans which reduced foundation requirements
- Minimized concrete slab thicknesses
- Longer strength development mixes and cement substitutions
- LEED Platinum certification

COST IMPACT

0% No cost premium

Diamond Schmitt / gh3* rendering

Toronto Emergency Medical Services Station

EC REDUCTION

30%

- Lower-impact extruded polystyrene (XPS) insulation
- Higher supplementary cementitious materials (SCM) % concrete mix
- Low-impact concrete slab sealant
- High recycled content steel
- Hempcrete block instead of concrete masonry unit (CMU)
- Recycled glass gravel insulation

COST IMPACT

0% No cost premium

Mixed Use Mid-Rise Office Building

EC REDUCTION

46%

- Lower cement concrete mixes
- Longer concrete cure time mixes
- Polyiso/mineral wool instead of XPS
- High recycled content steel
- Gypsum sheathing substitution
- Lower-carbon glazing products

COST IMPACT

0%

Premiums due to lower carbon glazing products and strategic procurement of steel

Exhibit 2 | RMI Graphic. Source: various (see endnote 5).

Consider embodied carbon budgets with the same rigor and strategies as financial budgets

Use Life Cycle Analysis (LCA) tools to balance project costs and embedded carbon to discover cost-neutral and low cost strategies

Assessment types differ by environmental impacts studied and life-cycle stages covered

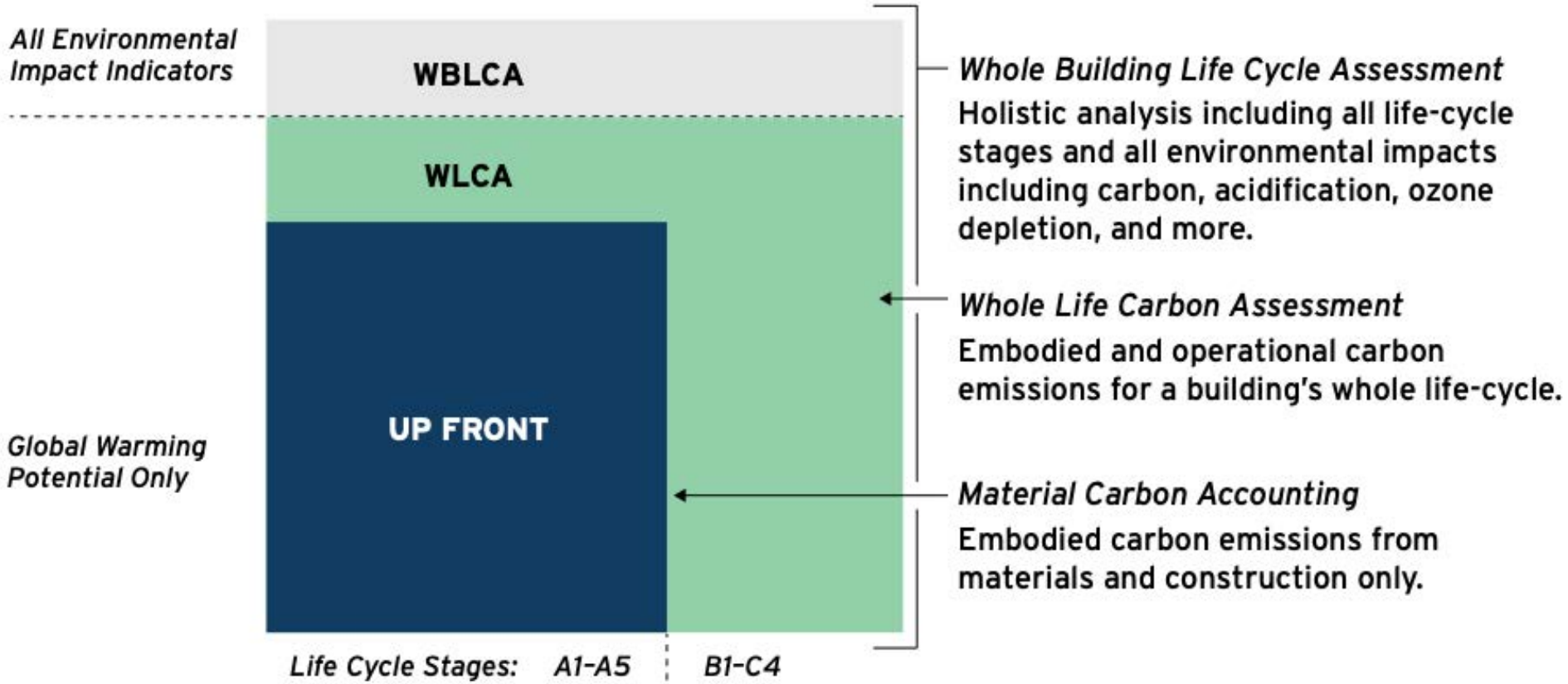
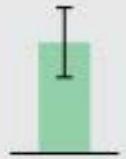
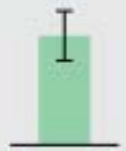


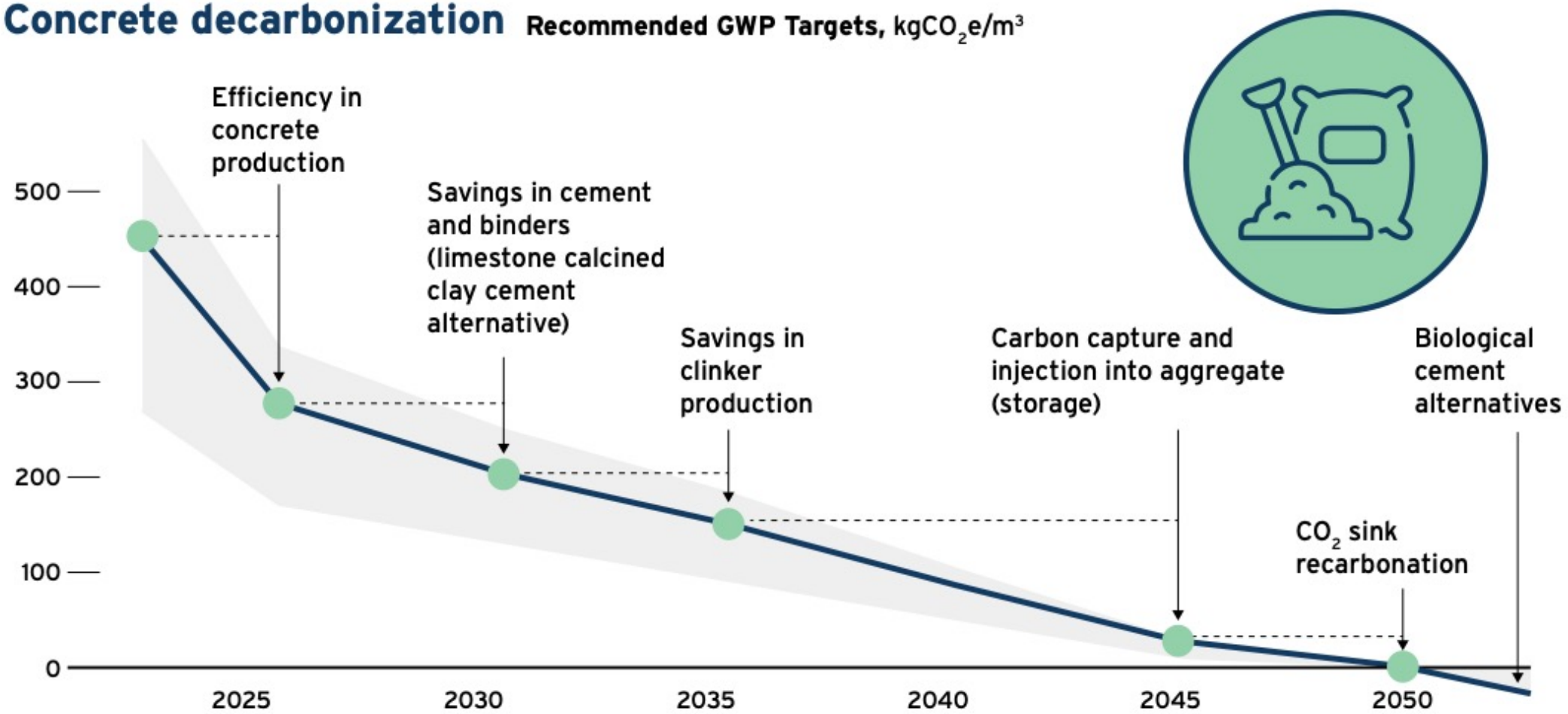
Exhibit 1 | RMI Graphic. Source: RMI analysis

What we know today: We can make decisions with meaningful impacts

Decision area	Margin of error	What we know:
Embodied carbon emissions		Up-front emissions can be minimized by reducing material quantity, reuse, and selection of products with lower gwp.
Building energy models		Building energy efficiency is improved with more insulation, better windows, and increased air tightness.
Fuel mileage in cars		Fuel mileage for cars is improved with smaller engines, lighter cars, and good driving habits.

We should not let perfect get in the way of progress.

Exhibit 1 | RMI Graphic. Source: RMI analysis

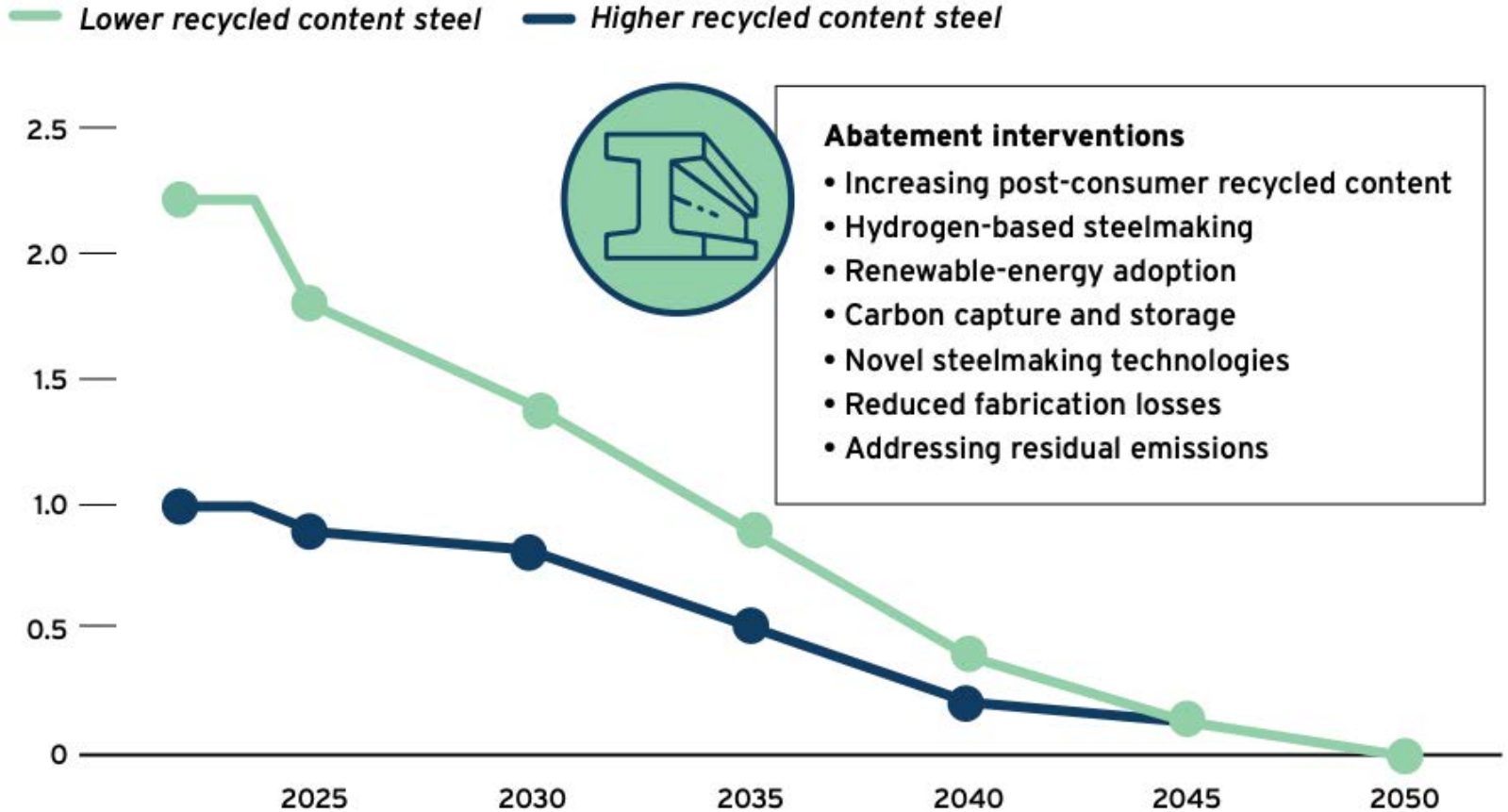


Note: The line represents concrete strength 4,001-5,000 psi concrete. The shaded region represents the range of GWP values for all other strengths of concrete.

Exhibit 2 | RMI Graphic. Source: RMI, *Roadmap to Reaching Zero Embodied Carbon In Federal Building Projects*, https://rmi.org/insight/roadmap-to-reaching-zero-embodied-carbon-in-federal-building-projects/

Steel decarbonization

GWP pathway based on technology transitions and other considerations, $kgCO_2e/m^3$



Note: This trajectory shows steel reaching absolute zero by 2050 and includes carbon removals against residual emissions.

Exhibit 3 | RMI Graphic. Source: RMI, *Roadmap to Reaching Zero Embodied Carbon In Federal Building Projects*, https://rmi.org/insight/roadmap-to-reaching-zero-embodied-carbon-in-federal-building-projects/

Promising technologies for lower-embodied carbon material alternatives

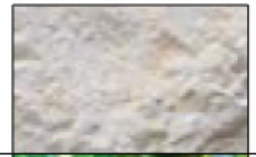
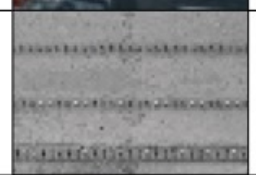
LC3 cement		Limestone calcined clay cement: uses current cement kiln technology but replaces much clinker content with clay (40% clinker reduction)
Bio-cement/ bio-concrete		Ultra-low-embodied-carbon biocement and bio-concrete from microalgae and other natural components (90% carbon footprint reduction)
Synthetic limestone aggregate		Carbon capture and mineralization into aggregate (-494 kg CO_2 stored per cubic yard of concrete)
Rammed Earth components		Walls made of 100% natural and recyclable earthen material that can be sourced directly from building excavation sites
Automated prefabrication of rebar		Automated assembly of simple and complex steel reinforcement bar cages, shipped to site fully prefabricated
Lightweight Steel girders		Lightweight steel plate girder using a corrugated web (30% less steel for the same strength)
Electrolysis technology		Molton oxide electrolysis technology to separate iron from ore without releasing CO_2, eliminating the need for coal in steel production

Exhibit 4 | RMI Graphic. Source: RMI analysis

Is Carbon Storage in Buildings Really Possible?

KEY TAKEAWAYS

- Carbon-storing building products, whether biogenic or mineral, offer the building industry an unprecedented opportunity to not only reduce emissions but also to eventually reverse the carbon flow from the sector.
- Only a small percentage of building construction material would need to be carbon storing to become a leading climate drawdown solution.
- Although some carbon-storing materials are nascent, others are well-established incumbents with proven histories. Support is needed to increase the uptake of carbon-storing materials.

Categories of carbon-storing materials

SOURCES			PRODUCTS
Biogenic Carbon Storage			
Agricultural and forestry residues and by-products	Straw (rice, wheat), hulls (rice), shells (nuts), stalks		Board products, insulation, cladding, aggregate
Waste stream fibers	Paper, cardboard, textiles		Board products, insulation
Purpose-grown crops	Cork, bamboo, hemp		Boards, flooring, insulation, structure, cladding
Lab-grown materials	Mycelium composites		Insulation, structure
Timber	Lumber, mass timber, sheet goods		Structure, board products, flooring, cladding
Mineralized Carbon Storage			
Biomineralization	Algae and microbe-grown cement		Concrete, concrete masonry unit (CMU), brick
Captured carbon	Synthetic limestone aggregate and accelerated carbonation		Concrete, CMU, brick
Biochar	Biogenic carbon transformed into stable, pyrogenic carbon through combustion in the absence of oxygen		Aggregate, tiles, bricks

Exhibit 2 | RMI Graphic. Source: RMI Analysis.

In August 2023, California became the first state in the United States to approve a whole-building embodied carbon policy in CALGreen, effective starting in July 2024. This policy is applicable to most large buildings and has three possible compliance pathways, one of which is the demonstration of a 10% reduction of GWP from a baseline.[5]

Regulations have different starting points, but are headed toward whole building GWP limits

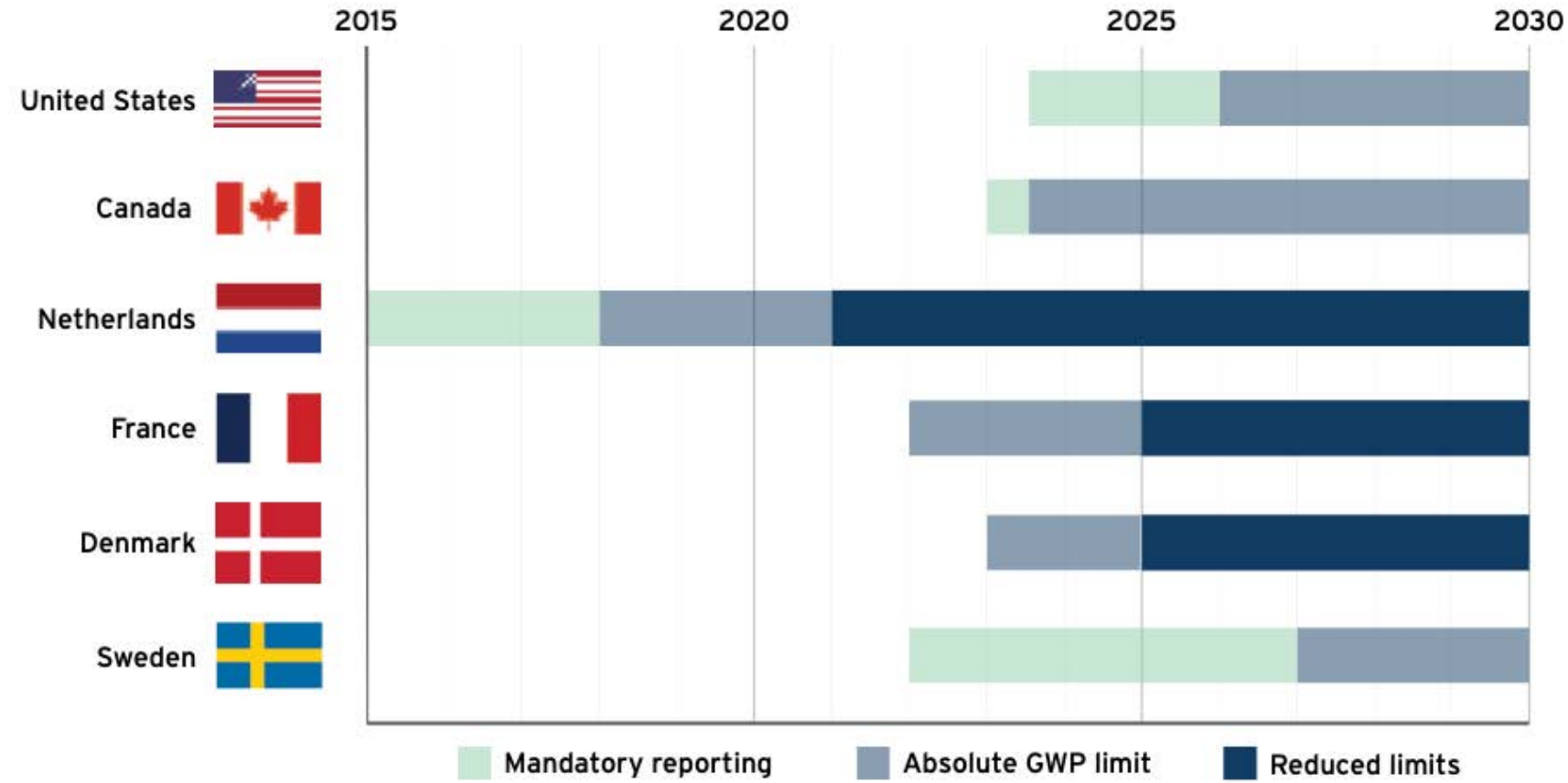


Exhibit 1 | RMI Graphic. Source: Jannik Giesekam, http://www.jannikgiesekam.co.uk/embodiedcarbon/

Embodied Carbon Policy Limits Are Coming

Timeline of addressing embodied carbon

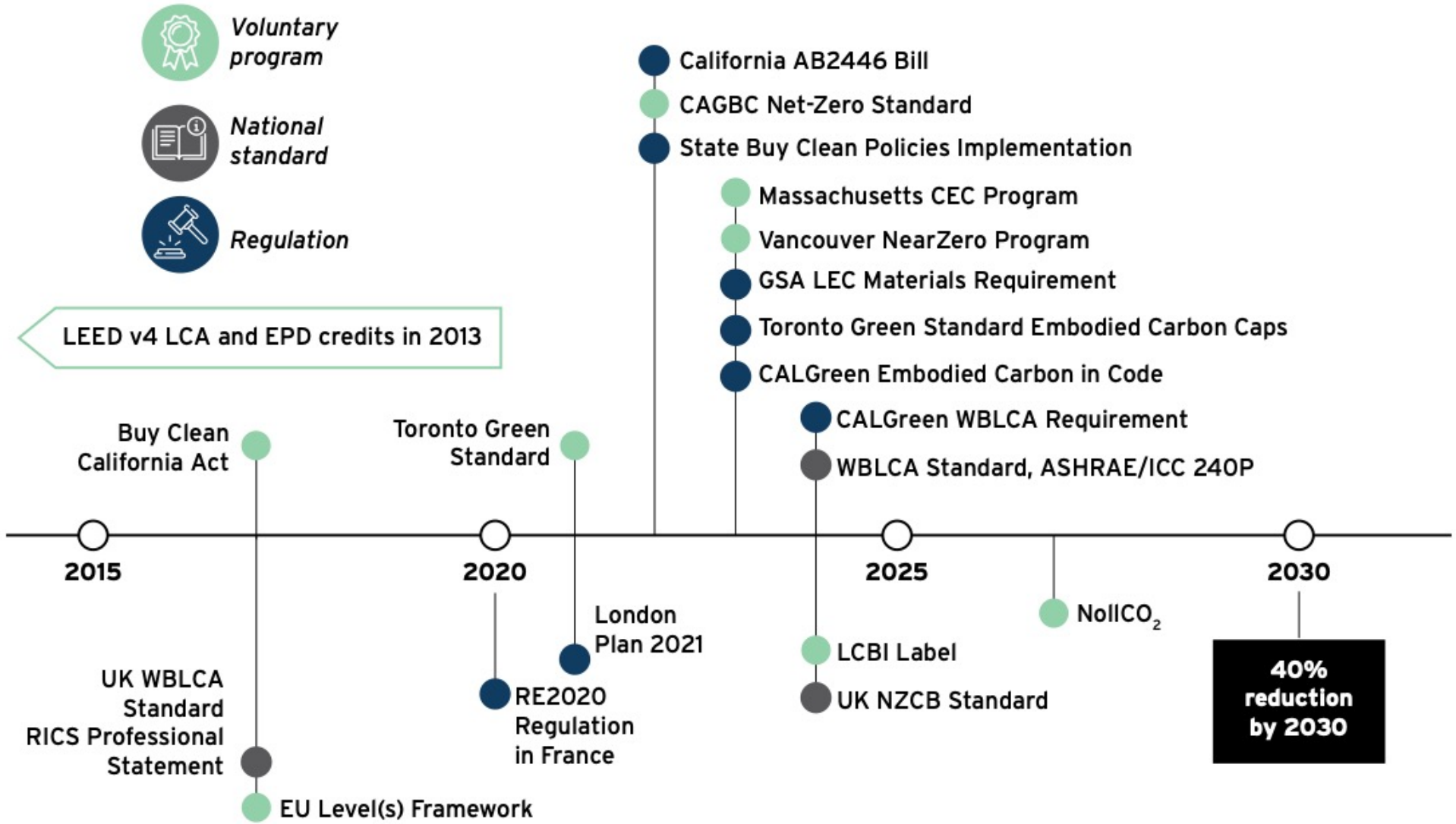


Exhibit 2 | RMI Graphic. Source: RMI analysis

This we know…

Climate change is among the **biggest challenges of our time.**

The warming planet will **affect virtually every aspect of life** as we know it—often falling **disproportionately on our most vulnerable and least resilient communities.**

Buildings are responsible for **almost 40%** **of global CO2 emissions**.

Greenhouse gases (GHG) generated by buildings come from the carbon of the energy used to pump and treat water, on-site consumption of fossil fuel for heating and cooling, employee or resident transportation, hauling and disposal of waste, and more.

LEED buildings and carbon reduction

LEED-certified buildings contribute to climate mitigation in several ways:

1. Use less energy and water: building projects are rewarded for deeper energy and water efficiency retrofits, in the opportunity to reduce the consumption of fossil fuel and electricity. Similarly, LEED rewards reductions in water use and the “embodied carbon” used to produce, move and treat that water.

2. Consider life cycle impacts: encourages life cycle assessment (LCA) of building materials and products, and, in turn, whole buildings. Assessing alternatives based on life cycle GHG is a critical first step to selecting lower-impact approaches and providing market feedback.

3. Support sustainable strategies: provides mechanisms to actively influence inhabitants in ways that support the climate. For example, buildings can create opportunities for more composting and reduced landfill waste and for alternative transportation.

4. Shrink carbon footprint: LEED rewards thoughtful decisions about building location with credits that encourage connection with transit and amenities, as well as retention and creation of natural vegetated land areas and roofs.

Two studies of note...

- According to a 2018 assessment by the U.S. General Services Administration, its portfolio of high performing buildings - many of them LEED – certified, used:

  23% less energy
  28% less water
  generated 9% less landfill waste than GSA's legacy stock buildings.

- A study from the University of California at Berkeley for the California Air Resources Board quantified the GHG reductions from non-energy categories for LEED-certified existing buildings in California. The study found that buildings certified under LEED for Operations and Maintenance were associated with:

  50% less GHG emissions from water use
  48% less GHGs from solid waste
  5% less GHGs from transportation.

Each of these resources has associated GHG emissions, so reducing their use can shrink a building's total operational GHG footprint.

- **Transportation energy use**: Credits in the Location and Transportation category enable new buildings to improve land use patterns and position occupants to take advantage of public transportation, which contributes to a reduction of GHG emissions from single-passenger vehicles.

- **Materials-embodied energy use**: Materials and Resources credits address a building's embodied carbon by targeting the energy use and processes required in the extraction, production, transportation, manufacturing, distribution and disposal of materials and products used throughout the entire life cycle of a building.

- **Water-embodied energy use and source**: Water Efficiency credits address the significant use of energy related to the treatment, processing and distribution of water by requiring a reduction of water used. Efficiencies that reduce the use of potable water, and replacing it when possible with nonpotable water sources, will indirectly reduce energy use and help mitigate GHG emissions.

- **Green infrastructure and siting**: Sustainable Sites credits focus on the non-energy-related drivers of climate change, including land use changes, heat island effect and pollution through solutions such as green infrastructure and purposeful decisions on building location and siting.

LEED credit categories address topics such as reduction in energy use, connection with public transportation and the embodied energy associated with materials and water use.

- **Building operations energy use and source**: Credits in the Energy and Atmosphere category not only directly reduce energy use, but they also address systems that rely on carbon-based energy sources and award the use of low-carbon energy sources. LEED also targets the reduction of potent GHGs associated with refrigerants.

- **Renewables selection:** Credits in the Energy and Atmosphere category recognize the diverse contract mechanisms project teams use to procure renewable energy off-site and articulate a hierarchy for renewable energy generation and procurement that rewards selections that are high value. Establishing LEED criteria addressing the age of a renewable energy–generating asset helps to guide project team decision-making and direct investments toward increasing the supply of renewable energy on the grid (versus using existing renewable energy capacity where possible).

The next level of climate repair with LEED

LEED projects achieving the highest level of sustainability can now obtain an additional certification recognition with the **LEED Zero program**, including **LEED Zero Carbon**, which recognizes buildings operating with net zero carbon emissions over 12 months.

Carbon from energy consumption and occupant transportation is compared to **carbon avoided** due to renewable energy generation.

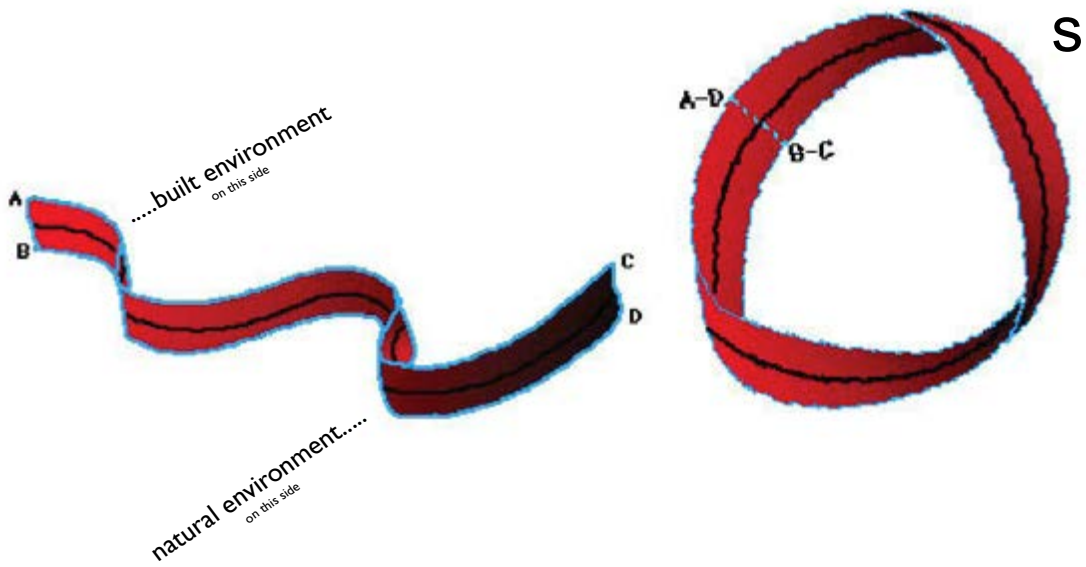
Capturing data is a vital step in understanding what contributes to the **carbon footprint of a building.**

A continuum…one design step at a time
a Mobius strip of sustainability

sustainable public buildings

sustainable public structures

sustainable public property



source: Mobius Strip Illustration, Wikipedia

At a time when we are dealing with lean budgets and hard decisions we might appreciate this quote from architect and the legendary Brazilian Mayor of Curatiba, Jamie Lerner:

"If you want creativity, take a zero off your budget; if you want sustainability, take off *two zeros*".

BIG PICTURE

ecology

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