



# IMPACT REPORT

2021-2022

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# LETTER FROM OUR FOUNDING DIRECTOR

All people deserve to have healthy and inspiring places to live, work and learn. To construct the needed buildings and infrastructure AND meet global climate targets, we will need to transform how, what and when we build as well as the materials that we use. Strong intersections between efforts to decarbonize energy, decarbonize industry and decarbonize the building sector are increasingly recognized. It's become almost impossible to read an article in any mainstream media about "green construction" without seeing heavy emphasis on the carbon footprint of the materials used in buildings and infrastructure.

We are seeing heightened consciousness of embodied carbon reflected in our daily work—by a growth in members, new organizational partnerships, new sources of funding, additional corporate sponsors, expanded participation in our NGO/Governmental Roundtable, a doubling of our web traffic, and growth in our social media audience. We've been able to expand staff to increase our capacity to address embodied carbon within civil infrastructure, government policy implementation and community engagement. We remain focused on research, educating and fostering cross-sector collaboration to radically reduce the embodied carbon of buildings and infrastructure.

Some key outcomes over the past year include:

- Awarded four year, \$4M grant to support development of data, methods and tools to assess and optimize the carbon storing potential of novel materials and building systems. (**POD|LCA**)
- Completed the pilot stage of version 2 of the **Whole Building LCA Benchmark** project integrating over 100 full building models (materials and LCA impacts) into a research database.
- Provided technical support to policy makers including on the use of IRA funding, informing Buy Clean Policies within five states and evaluating

transportation infrastructure embodied carbon.

- Three programs initiated by the CLF (MEP 2040, SE 2050 & CLF Hubs) were highlighted in a recent **White House Fact Sheet** as examples of industry decarbonization action.
- Developed an **Embodied Carbon Policy Educational Series** that includes pre-recorded videos and curriculum for in person local discussions.



As we look forward to the coming year, we are paying close attention to the development of programs resulting from the Inflation Reduction Act as well as policies that continue to expand at the **city, state and federal levels** as well as within the private sector. We expect that the next few years will be exciting and challenging as we work to scale needed action to radically reduce embodied carbon while simultaneously working to evaluate the effectiveness of policies and practices we're putting in place today. I am grateful for the excellent leadership from CLF's growing staff, the support we're receiving to conduct this work, and the open collaborative spirit we find within the growing community of embodied carbon leaders. Thank you for joining with us!

A handwritten signature in black ink that reads "Kate".

**Kate Simonen**

Founder and Executive Director

# MEET OUR STAFF



## FROM LEFT TO RIGHT

Brook Waldman | Researcher

Anthony Hickling | Managing Director

Stephanie Carlisle | Senior Researcher

Monica Huang | Researcher

Meghan Byrne | Engagement and Communications Lead

Meghan Lewis | Senior Researcher

Megan Kalsman | Researcher

Milad Ashtiani | Researcher

Kate Simonen | Executive Director

Brad Benke | Researcher

Andrew Himes | Director of Collective Impact

Allison Hyatt | Researcher (not in photo)

# MEET OUR BOARD

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**Courtney Blodgett**

McKinstry



**Eden Brukman**

San Francisco Dept. of the Environment



**Scott Henson**

Carbon Innovations



**Amanda Kaminsky**

Building Product Ecosystems



**Deepshi Kaushal**

Academic, Architect, Urbanist and Sustainability Consultant, Switzerland



**Dirk Kestner**

Walter P. Moore



**Sarah King**

Kilroy Realty Corporation



**William Paddock**

WAP Sustainability



**Marta Schantz**

Urban Land Institute (ULI)  
Greenprint Center for Building Performance



**Reshma Singh**

IMPEL+ at Berkeley Lab

# WHO WE ARE

## Innovation and Collective Action to Solve the Embodied Carbon Challenge

The Carbon Leadership Forum accelerates the transformation of the building sector to radically reduce embodied carbon of buildings and infrastructure. We research, educate and foster cross-collaboration to bring embodied carbon emissions of buildings and infrastructure down to zero.



### OUR VISION

We envision a transformed, decarbonized building industry—better building for a better planet.



### OUR MISSION

To radically reduce the carbon in buildings and infrastructure to enable a just and thriving future.



### OUR VALUES

Determination | Inclusion  
Collective Action | Empowerment  
Transparency | Justice



# OUR STRATEGIES

Reducing embodied carbon will require transformation of significant sectors of the global economy—not just construction but also manufacturing and transportation. This is clearly a bigger challenge than any one organization or network can handle. The CLF is uniquely positioned to influence the global building sector in specific ways with a set of highly leveraged initiatives and interventions. This is our theory of change, our assessment of the essential contribution that the CLF can provide to help decarbonize the global economy. To enable systemic change, we work to: improve data and methods; inform effective and just policy, and build community for impact.



## Improve Data and Methods

Data is essential for driving effective public and private decarbonization policies and targets. We align, assess and advance embodied carbon data and life cycle assessment methodology and standards to increase access and availability of quality embodied carbon data for effective decision-making.



## Inform Effective Policy

To advance government and corporate policy, tools and resources are required to provide the clarity needed for meaningful action. We develop model embodied carbon policy, act as a technical advisor to inform the development of effective policies, provide technical support to agencies implementing embodied carbon policy, and collaborate with NGOs to align and advance embodied carbon policies.



## Build Community for Impact

Action must span professions, sectors and geographies. We build, unify and convene a diverse community of leaders to enable widespread action to reduce embodied carbon. Our network of regional CLF members is equipped with resources and educational opportunities that build capacity for local leadership to develop and comply with embodied carbon policies.



## TAKE ACTION TO REDUCE EMBODIED CARBON!

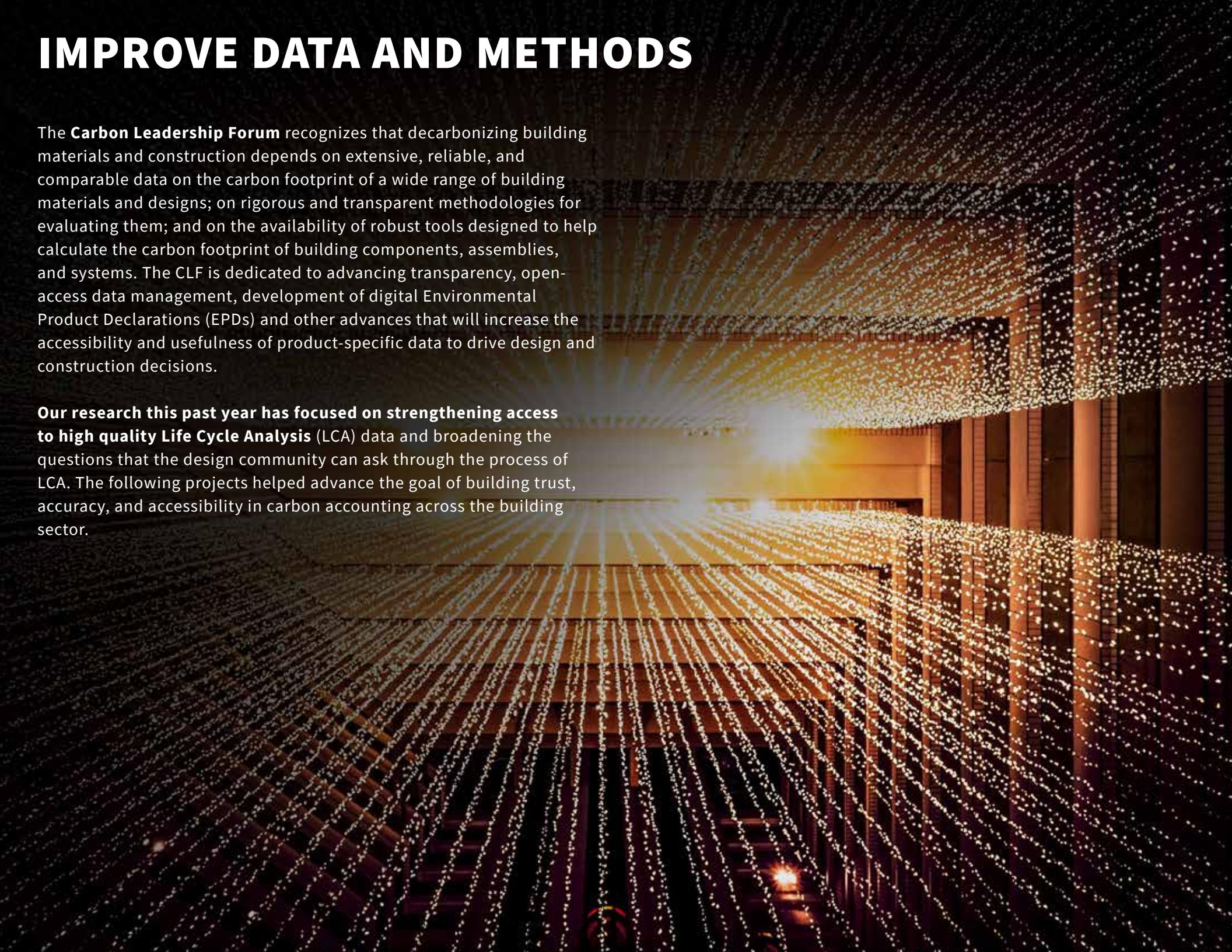
Join our coalition of architects, engineers, contractors, material suppliers, building owners, policymakers, and associations committed to radically decarbonizing buildings and building materials.

[carbonleadershipforum.org/take-action/](https://carbonleadershipforum.org/take-action/)

# IMPROVE DATA AND METHODS

The **Carbon Leadership Forum** recognizes that decarbonizing building materials and construction depends on extensive, reliable, and comparable data on the carbon footprint of a wide range of building materials and designs; on rigorous and transparent methodologies for evaluating them; and on the availability of robust tools designed to help calculate the carbon footprint of building components, assemblies, and systems. The CLF is dedicated to advancing transparency, open-access data management, development of digital Environmental Product Declarations (EPDs) and other advances that will increase the accessibility and usefulness of product-specific data to drive design and construction decisions.

**Our research this past year has focused on strengthening access to high quality Life Cycle Analysis (LCA) data and broadening the questions that the design community can ask through the process of LCA.** The following projects helped advance the goal of building trust, accuracy, and accessibility in carbon accounting across the building sector.



# IMPROVE DATA AND METHODS

## CLF WBLCA Benchmark Study v2

### Research Project:

In the spring of 2022, the CLF launched a Benchmark Study of Whole Building Life Cycle Assessments (WBLCA) and began development of a database to contain and allow comparisons between LCAs performed on a wide variety of buildings. The study will cover material quantities; building characteristics (e.g., building use, construction type, height, structural system, building code, structural loads, etc.); future trends; and how rapid industrial decarbonization can be supported by the building and construction sector.

## Parametric Open Data (POD) | LCA

### Research Project:

Building materials that make use of agricultural feed stocks, wood products, and direct carbon utilization can actually draw down atmospheric carbon and store it over time. Funded by the Department of Energy's ARPA-E Program (Advanced Research Projects Agency-Energy), a United States government agency tasked with promoting and funding research and development of advanced energy technologies, the CLF is digging deeply into the science and methods of carbon drawdown and storage, developing a robust LCA framework and ecosystem of tools that can support the flow of data on novel materials into robust, comparative WBLCA tools. This will assist the development of carbon-storing materials and building designs over the next few years and accelerate our collective goal of making buildings a solution to climate change.

# IMPROVE DATA AND METHODS

## Construction Material Baseline Reports

### Research Project:

In order to set achievable carbon reduction targets, it is necessary to have a baseline from which to compare building products within appropriate material or product categories. Each year, the CLF develops and updates **material baselines** that are based on publicly-available, peer-reviewed documentation on embodied carbon of building materials. These are intended to give a rough order of magnitude of embodied carbon impacts for each category of materials and reflect the significant variability of product manufacturing and uncertainty of LCA data available. These baselines form the basis of carbon assessments in various LCA tools and calculators and green building certification programs like LEED. This research supports building designers, owners, policymakers, and others to set carbon reduction targets and select low-carbon products during procurement and design.

## Embodied Carbon Tools Evaluation

### Research Project:

The CLF **reviews and provides technical guidance** for a wide variety of tools aimed at architects, engineers, and consultants to help them evaluate the environmental impacts of buildings and building materials using LCA.



# INFORM EFFECTIVE AND JUST POLICY

There has been exciting progress around policies targeting embodied carbon in the past year, and the Carbon Leadership Forum has had the great opportunity to work with a variety of stakeholders providing technical guidance and knowledge-sharing on this topic.

In the past year, we have continued to see a growing interest in low-carbon procurement bills in the US like **Buy Clean**, which prioritize disclosure and reduction of embodied carbon associated with high-impact materials used in public construction projects. The policy team provided technical guidance to a number of states around procurement including Washington, Colorado, Minnesota, and Oregon. We advised the US federal government on a variety of areas including LCA tools, methodology for calculating the carbon footprint of concrete, Environmental Product Declaration reporting, federal low carbon

procurement, and improvements to Product Category Rules. A major step this year came when the Biden administration established the first-ever federal Buy Clean Task Force, harnessing the federal government's massive purchasing power to support low-carbon materials made in American factories. The **General Services Administration** and the **US Department of Transportation** also announced new efforts to promote use of low-carbon materials in construction projects funded by the Bipartisan Infrastructure Law, and the CLF engages with both agencies to address embodied carbon.

The CLF consulted with city and regional governments on the West Coast of the US as well as British Columbia in Canada on other policy areas including embodied carbon and codes, zoning, reuse and deconstruction, equity, and emerging low-carbon construction technologies.



# INFORM EFFECTIVE AND JUST POLICY

## Policy Research

CLF research evaluates emerging innovations in low-carbon designs, models the targets required to truly effect change, and evaluates the challenges and success of already-proposed or existing policies to proactively provide more strategic support for policymakers. The CLF provides data-driven guidance on which policy models can be effective with model language that articulates how limits can be set, what design strategies can be incentivized, what standards should be followed, what tools can be used, etc.

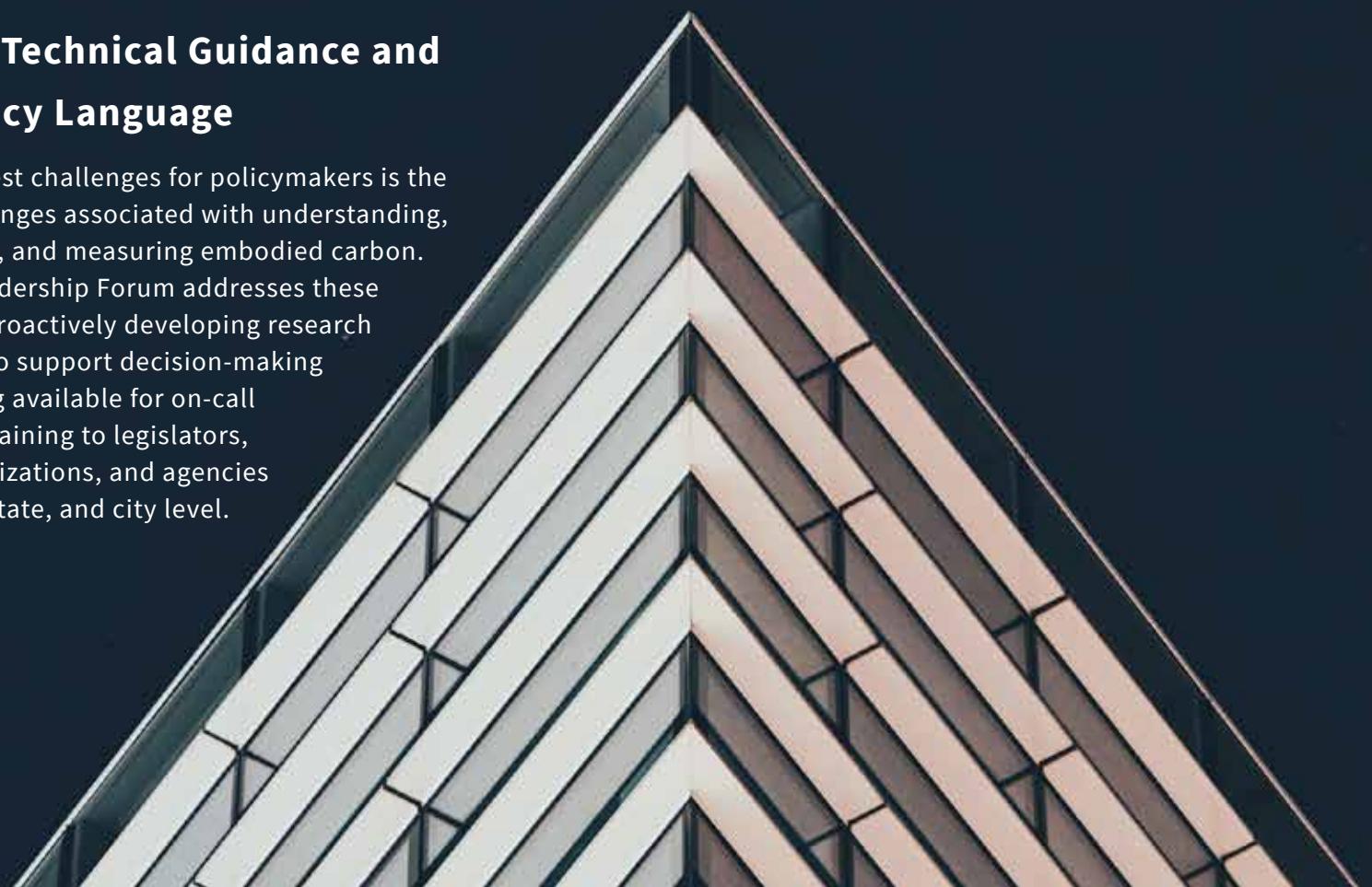
## Hands-On Technical Guidance and Model Policy Language

One of the largest challenges for policymakers is the technical challenges associated with understanding, communicating, and measuring embodied carbon.

The Carbon Leadership Forum addresses these challenges by proactively developing research and resources to support decision-making while also being available for on-call guidance and training to legislators, advocacy organizations, and agencies at the federal, state, and city level.

## Education and Outreach

In FY 2022, the Carbon Leadership Forum provided over 40 presentations related to policy and participated in 8 workshops supporting policy development, for a combined audience of over 10,000 policy-makers, advocates, and professional staff from hundreds of firms and organizations.



# INFORM EFFECTIVE AND JUST POLICY

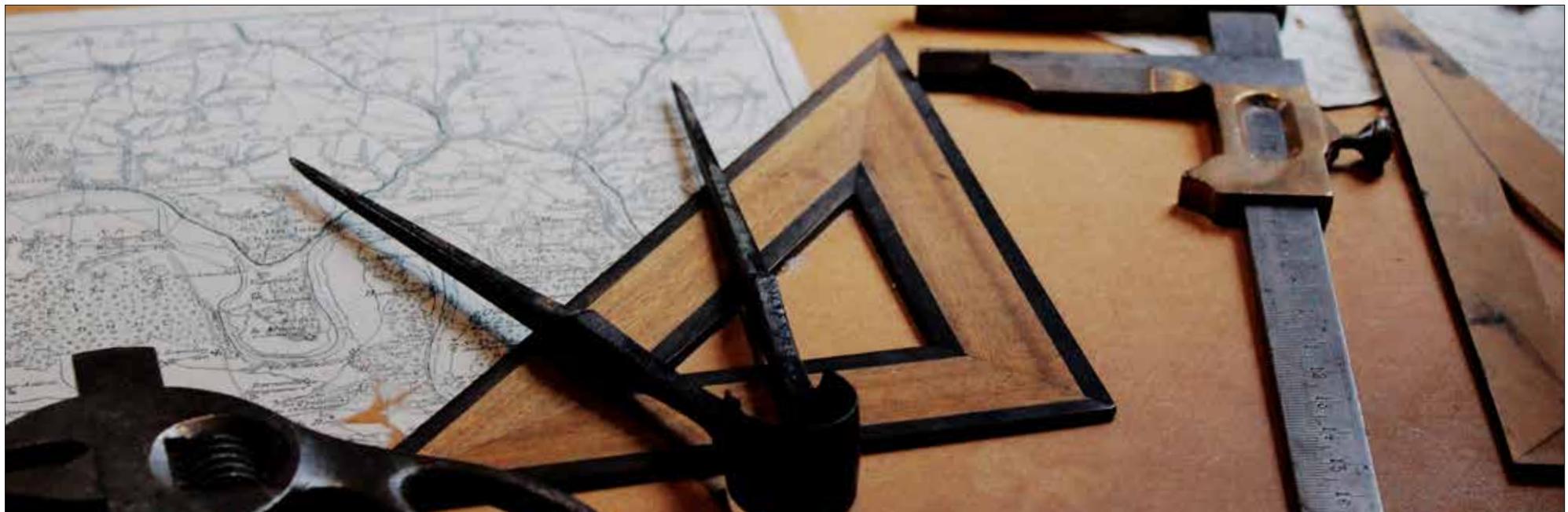
## CLF Embodied Carbon Toolkits

The CLF publishes a variety of Toolkits to aid practitioners in understanding and reducing embodied carbon in built environments. CLF Toolkits are designed for a variety of audiences, (e.g., architects, owners, and policy makers) and include essential embodied carbon education, tailored strategies for each audience, suggested templates, models for effective action, examples and case studies, and links to additional resources.

In January of 2021, the CLF launched a **Policy Toolkit**, and in May of 2021, CLF launched a **Toolkit for Building Owners**. In the past fiscal year, these Toolkits were downloaded **900** times.

## AIA-CLF Embodied Carbon Toolkit for Architects

In January of 2022, Carbon Leadership Forum partnered with the American Institute of Architects (AIA) to publish an **Embodied Carbon Toolkit for Architects**, which serves to provide architects an overview and the necessary steps to be taken to reduce embodied carbon in their projects. This resource introduces embodied carbon, discussing its significance in furthering architects' influence in decarbonizing the building industry; provides an understanding of measuring embodied carbon through the methodology of a life cycle assessment; equips them with strategies to reduce embodied carbon in their own projects, and incorporates additional resources for implemented strategies and tools. This toolkit has been downloaded from the CLF website almost **1,000** times, and is also directly available from the AIA for its 94,000 members.



# INFORM EFFECTIVE AND JUST POLICY

## Implementing Buy Clean

A growing number of government agencies at the local, state, and federal levels are integrating greenhouse gas reduction requirements into their procurement policies for construction materials. While many of these policies are referred to as "Buy Clean" policies, each policy varies widely in scope and structure and may be a result of legislation, executive orders, agency purchasing standards, or building code. The **Implementing Buy Clean** report summarizes guidance for government agencies who are responsible for implementing procurement policies, focusing on how agencies can increase success once a policy has been established.

## Buy Clean California Limits

The Buy Clean California Act (BCCA) requires the California Department of General Services (DGS), in consultation with the California Air Resources Board, to establish maximum acceptable global warming potential (GWP) limits at industry-average for the most widely used construction materials. For GWP limits to be effective they must be scientifically derived, transparent in their underlying methodology, and clear in scope and definition. The goal of **Buy Clean California Limits: A Proposed Methodology for Setting Industry-Average GWP Limits** is to propose industry-average GWP values for eligible materials under BCCA.

## Embodied Carbon Policy Reduction Calculator

A growing number of cities are committed to tackling the urgent challenge of their built environment carbon footprint through their policies and programs. 110 cities took the Cities Race to Zero Clean Construction Pledges to reduce embodied emissions in their policies and programmes in 2021, and 40 leading cities are participating in the C40 Clean Construction programme and mayors are setting the direction of travel by signing the Clean Construction Declaration, which requires collective action to halve embodied emissions by 2030.

The **Developing an Embodied Carbon Policy Reduction Calculator** report summarizes findings from the development of a proof-of-concept calculator and pilot study focused on estimating the carbon savings potentials of city-wide embodied carbon policies.

## Embodied Carbon Educational Series

The **Embodied Carbon Policy Educational Series** is a resource designed to empower Carbon Leadership Forum Regional Hubs to play a role as local knowledge leaders related to embodied carbon policy opportunities and to inspire regional discussions on policy. The series was designed for the CLF Regional Hubs to use to host educational events around embodied carbon policy types.



# BUILD COMMUNITY FOR IMPACT

## A Growing Collaborative of Connected Members

The Carbon Leadership Forum connects its members—from architects, engineers, contractors, material suppliers, building owners, policymakers, and associations—through its robust Online Community Platform, active Focus Groups, burgeoning Regional Hubs, and NGO Roundtable. Together they contribute to and access our research projects and resource library, connect at vibrant, interactive events and webinars and actively engage in member-led Initiatives. This network is dedicated to accelerating the transformation of the building sector to radically decarbonize buildings and building materials through collective action.



# BUILD COMMUNITY FOR IMPACT

## The CLF Community

The Network brings together thousands of professionals from across the building industry, from **50** US states and **5** territories, **94** countries, and **1,378** cities around the world.

Often described as “collaboration at its best”, the CLF Online Community is a key tool in accomplishing our mission to decarbonize the built environment. The CLF Community is characterized by its determination to make a difference; a welcoming, inclusive environment; encouragement and empowerment of its fellow members; along with the integrity and transparency of the information exchanged.

The result: The **CLF Community**, rooted in a collective action model and positive, productive collaborations is constantly inspiring innovation and spurring change.

## Regional Hubs

Since the first CLF Regional Hub launched in Vancouver, Canada the fall of 2019, new Hubs have flowered around the world. Hubs are convened by groups of CLF Community members to help interested professionals share best practices, discuss solutions, and spread the word about embodied carbon. By the summer of 2022, Regional Hubs have been initiated in 30 cities across the globe.



## Sharing Knowledge, Facilitating Action

Kjell Anderson with Alex Ianchenko, co-leaders of Carbon Leadership Forum’s Regional Hub in Seattle:

*“As CLF-Seattle looks forward, we aim to continue our role of facilitating knowledge share in as many pathways as possible—panels, Q&As, recorded videos, and live demonstrations among others. We aim to invite more of our colleagues to bring their expertise to the embodied carbon puzzle, raising embodied carbon literacy across the entire profession. For those who are already on-board, we will continue to convene expert panels that prompt us to dig deeper, learn more about our industry, and elevate our ability to deliver low-carbon designs. From site selection to material installation, we believe there is a role for every building industry professional, in Seattle and beyond, in making climate-smart buildings a reality.”*



# BUILD COMMUNITY FOR IMPACT

## Online Engagement, Depth, Exploration

The CLF's Online Community allows members to join discussions, engage with others and share news. Members use this shared learning laboratory to seek advice and feedback, propose initiatives, share resources, and launch animated discussions on diverse topics, including how to advance the discipline and practice of life cycle assessment (LCA), how to specify low-carbon materials, how to decide whether to reuse and retrofit existing buildings or demolish and build new, how to ensure that the use of mass timber supports carbon storage both in buildings and forests, and how to use tools such as EC3, Tally, and Revit to reduce carbon in construction.

### 3,300 CLF Members Online:

- Connect with others in their communities who are interested in reducing carbon emissions associated with buildings.
- Learn how to reduce embodied carbon in projects, using tools, data, and other resources.
- Engage in discussions to advance embodied carbon understanding and action.
- Create, share and utilize educational resources that aid in reducing embodied carbon.
- Act with others to advance public and organizational policies to reduce embodied carbon.
- Connect their firms, companies, and organizations to the CLF's embodied carbon mission as partners and sponsors.



# BUILD COMMUNITY FOR IMPACT

## NGO/Governmental Roundtable

**Building industry nonprofits share news, resources, programs, opportunities, events, aligned goals and objectives**

The Carbon Leadership Forum has assembled a Roundtable of over **35** non-governmental organizations collaborating to advance common goals and spur accelerated outcomes.

NGO/Governmental Roundtable meetings feature timely updates from a variety of organizations on new initiatives, programs, events, and resources focused on reducing embodied carbon emissions in built environments.

Organizations participating in the CLF's NGO/Governmental Roundtable share news, strategic plans, resources, and tools related to embodied carbon.

The CLF's purpose is to inspire and facilitate ongoing communication and conversation among key leaders related to embodied carbon, while encouraging convergence on shared embodied carbon terminology, data standards, benchmarks, and targets for embodied carbon reduction to support more collective and effective action.



**Visit the Carbon Leadership Forum  
NGO/Government Roundtable—**  
[carbonleadershipforum.org/ngo-government-roundtable/](http://carbonleadershipforum.org/ngo-government-roundtable/)


# BUILD COMMUNITY FOR IMPACT

## MEP 2040

Designs for mechanical, electrical, and plumbing (MEP) systems have a critical impact on the lifetime carbon emissions of buildings—for both operational and embodied carbon. Over several months in 2021, a group of CLF members worked with CLF staff to develop the MEP 2040 Challenge, which states:

**"All systems engineers shall advocate for and achieve net zero carbon in their projects: operational carbon by 2030 and embodied carbon by 2040."**

By September 2022, **50** MEP firms had responded to the Challenge by signing the MEP 2040 Commitment, including a set of specific actions:

- Establish a company plan to reduce operational and embodied carbon across MEP systems
- Request low-GWP refrigerants when designing MEP systems
- Request Environmental Product Declarations (EPDs) in project specifications
- Participate in quarterly MEP 2040 Forums.



**MEP 2040**  
Committing to Zero

[www.mep2040.org](http://www.mep2040.org)

AHA	AKF	Altieri	BALA ENGINEERS	ballinger
CANNONDESIGN	CLARKNEXSEN	Caserini <small>A TETRA TECH COMPANY</small>	ELARA ENGINEERING	EWING COLE
exp.	fisair <small>air humidity control</small>	FISCHERENGY	GLUMAC <small>A TETRA TECH COMPANY</small>	GOLDMAN COPELAND <small>CONSULTING ENGINEERS</small>
GreenViet <small>Building Sustainable Practices</small>	HJM <small>HAMMERSCHLAG &amp; JOFFE INC. Consulting Engineers</small>	hok	INTEGRAL	JBB
KR <small>KOHLER RONAN, LLC</small>	LITTLE <small>DIVERSIFIED ARCHITECTURAL CONSULTING</small>	LONESTAR <small>ENVIRONMENTAL CONSULTANT</small>	MaGrann <small>ASSOCIATES</small>	BRA+
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MEPCE	P2S INC	PLAXEX <small>BUILDING SYSTEMS INC.</small>	Taylor <small>GREEN</small>	ryan saimes engineering
SÄZÄN	SMITHGROUP	STAENGL <small>ENGINEERING</small>	taylor engineers	ATLC <small>ENGINEERING SOLUTIONS.</small>
VANDERWEIL	verDIUS <small>Assured Energy Solutions</small>	Virtual Journeywork™	Wight	WINDWARD <small>ENGINEERS &amp; CONSULTANTS</small>

# BUILD COMMUNITY FOR IMPACT

## SE 2050

The SE 2050 Challenge, an initiative conceived of and developed by members of CLF, was designed to ignite structural engineers and their firms to meet embodied carbon benchmarks and ambitious reduction goals, and be recognized for the significant role they can play towards these targets. The SE 2050 Challenge states:

**"All structural engineers shall understand, reduce and ultimately eliminate embodied carbon in their projects by 2050."**

Since April of 2020, the SE 2050 Commitment has been an official program of the Structural Engineers Institute, and by mid-2022 over **90**

structural engineering firms have signed the Commitment, promising to work together to track the embodied carbon impacts of structural systems, assess the trends for various systems and then establish achievable reduction targets over time.



# BUILD COMMUNITY FOR IMPACT

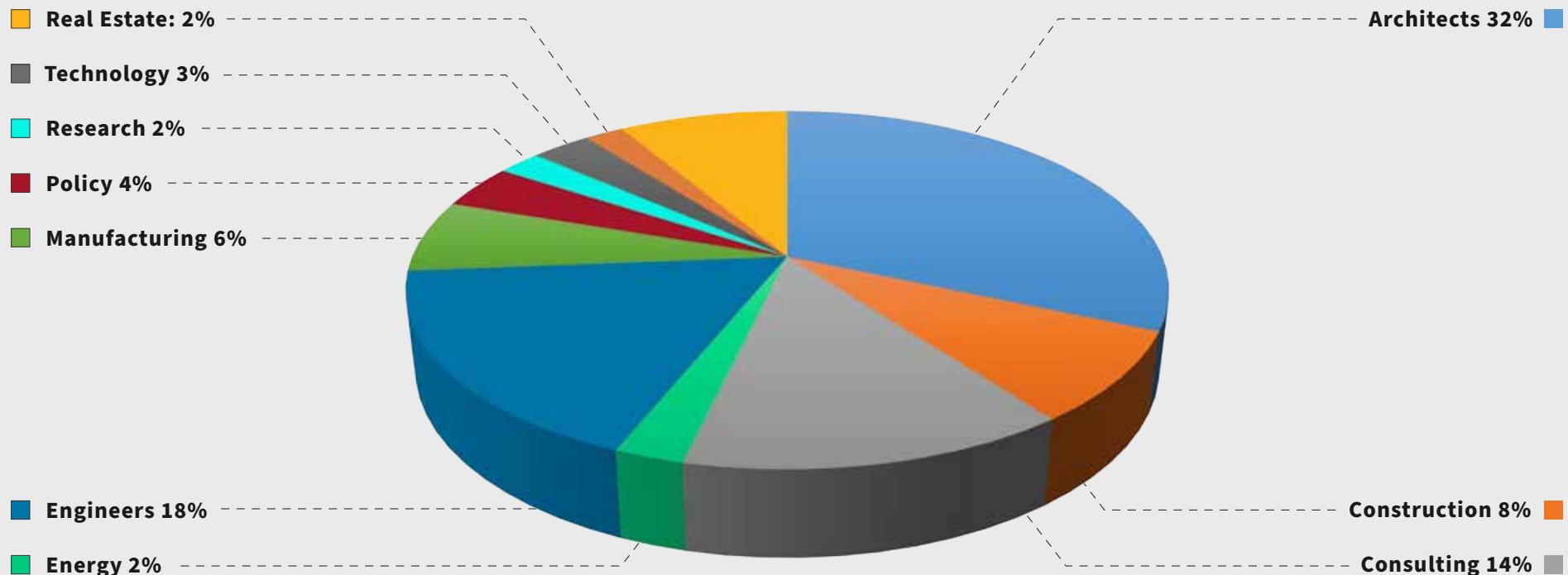
## Member Diversity

The Carbon Leadership Forum network includes over **8,500** individuals from **4,500** companies and organizations, spanning the construction industry from both the private sector and public sector, including companies, nonprofits, educational and research institutions, government agencies and policy groups, consultants and foundations.

### Core Insight: Further, faster, together

Innovation and transformation are the product of collective action by diverse individuals and organizations.

## PROFESSIONS OF CLF MEMBERS



# FUNDING



# FUNDING

## Funding Summary

The Carbon Leadership Forum grew significantly in 2022 and is projecting continued growth in the coming years. A significant portion of carry-over funds from this year will help the CLF hire a backlog of new staff members while also maintaining the organization's reserve fund.

The Carbon Leadership Forum is funded through a mix of generous philanthropic support from climate-focused foundations, private individuals, and corporate sponsors as well as earned income for research that helps our partners make informed decisions to reduce embodied carbon.

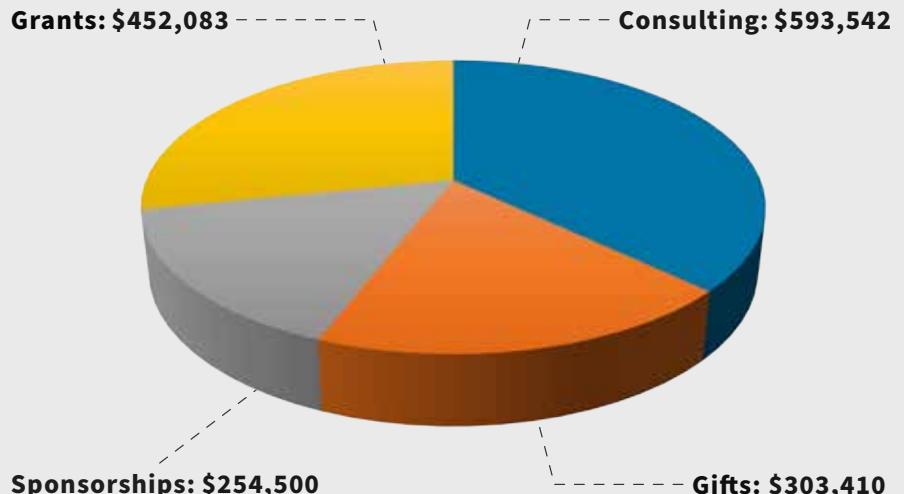
In 2021-22, the CLF has 12 core staff members, 1 student intern, and hundreds of volunteer members who together are leading research and taking action to radically reduce the embodied carbon in buildings and infrastructure. In the coming years the CLF plans to continue scaling our research and leadership to ensure that buildings play a major role in reversing the effects of climate change.

The Carbon Leadership Forum is dedicated to developing the resources, tools and platforms needed in order to take meaningful action.

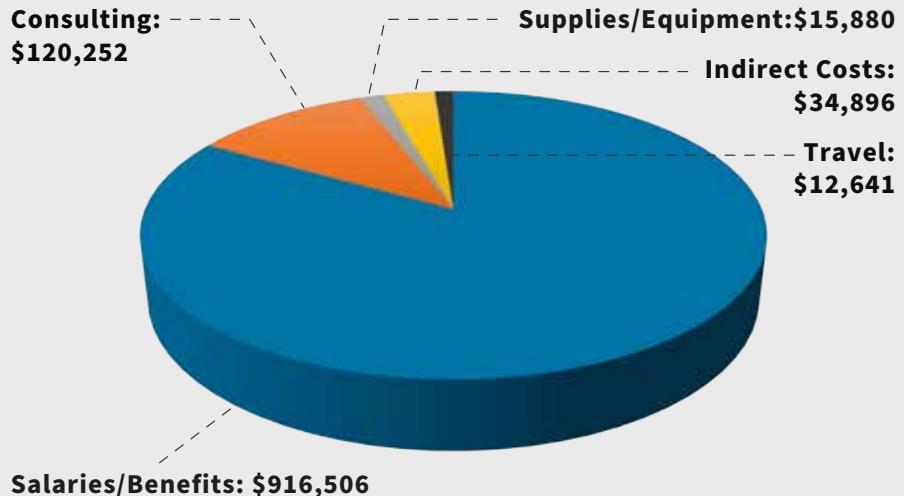
But **WE NEED YOUR HELP.**

Contact Anthony Hickling ([hickling@uw.edu](mailto:hickling@uw.edu)) to learn how you can help make buildings a climate solution.

### 2021-22 CLF Actual Income \$1,603,534



### 2021-22 CLF Actual Expenses \$1,100,175



# CARBON LEADERSHIP SUPPORTERS

## CLF Sponsors

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Sera Design  
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Skidmore Owings & Merrill (SOM)  
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Webcor  
Weyerhaeuser  
WRNS Studio  
WSP

## CLF Donors

We're deeply grateful to the foundations and individuals that make our work possible. Special thanks goes to:

Breakthrough Energy Foundation  
Brian Arbogast and Valerie Tarico  
The Bullitt Foundation  
The ClimateWorks Foundation  
Don Davies and Joan Crooks  
Judy Pigott  
Hindawi Foundation  
Matt Zumwalt  
RWN Foundation  
The Stolte Foundation



# Thank you

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