MEETING THE CHALLENGE OF RAPID DECARBONIZATION

SmithGroup Roundtable Discussion
Washington, DC

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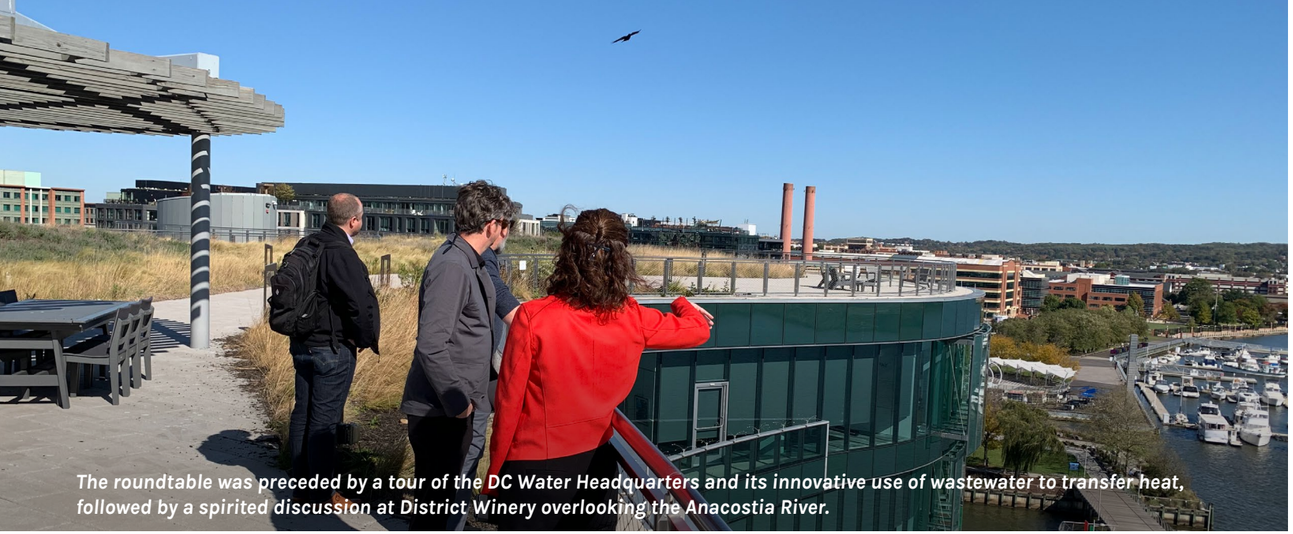
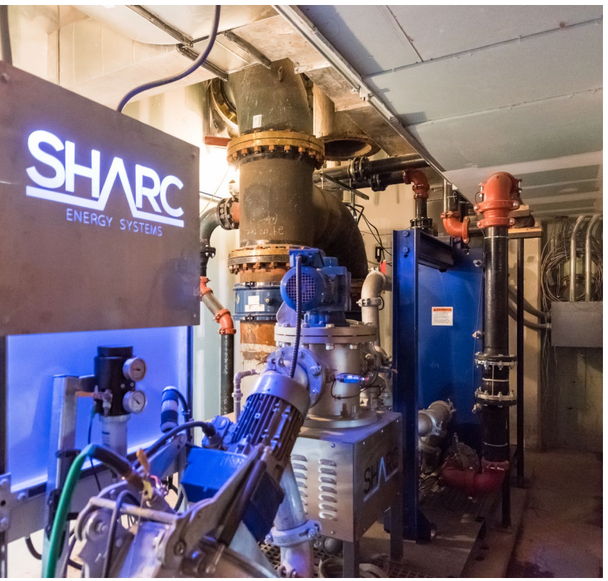


The roundtable was preceded by a tour of the DC Water Headquarters and its innovative use of wastewater to transfer heat, followed by a spirited discussion at District Winery overlooking the Anacostia River.



MEETING THE CHALLENGE OF RAPID DECARBONIZATION

The policies and requirements for decarbonizing building operations and construction are changing quickly – along with the pressing demand for accelerated results as the impacts of climate change continue to intensify. In conjunction with ASHRAE's 2023 Decarbonization conference for the Built Environment, SmithGroup held an interactive discussion in the nation's capital with a think-tank of experts representing a range of professional perspectives and markets. The group discussed trends and challenges, and shared strategies and success stories for advancing deep decarbonization at increasing scales of impact.

This summary highlights key takeaways from the discussion, as well as a sharing of programs, processes, tools and technologies that are changing the game for how quickly and effectively we can advance decarbonization by design.

KEY TAKEAWAYS: TRENDS AND CHALLENGES

The group discussed the trends that are driving their decarbonization efforts forward, as well as the primary barriers and gaps that are limiting how rapidly decarbonization can be achieved. The conversation encompassed emerging market, policy and funding dynamics as well as building design, construction and operational practices.

OPPORTUNITIES FOR ACCELERATED DECARBONIZATION ARE EVOLVING QUICKLY

One of the most encouraging trends is the growth in higher-performance technologies accompanied by the emergence of new tools, codes and guidelines – all helping to energize the decarbonization market. With more groups and organizations set to release new research and resources in 2024, this positive momentum is expected to continue. It was also observed that this rapid pace of change and innovation presents challenges to practitioners to stay on top of where best practices and design performance are headed next.

WE NEED TO CLOSE THE GAP BETWEEN DECARB GOALS AND IMPLEMENTATION

Hannah Debellius of U.S. DOE initiated a conversation on the divergent approaches to decarbonization we have been seeing across different markets with owners who operate multiple buildings. Some portfolio holders (like the industrial sector) tend to analyze and plan first, letting their planning process inform their decarbonization options, goals and schedule for meeting them. Other sectors (eg, commercial real estate) have tended to set significant carbon-reduction goals with ambitious target dates before they have a plan in place for how they're going to achieve them.

This goal-first/plan-later approach was widely taken in higher education, after institutions began signing on to the American College & University Presidents' Climate Commitment (now the Presidents' Climate Leadership Commitments) in 2006. These efforts have played a pivotal role in elevating awareness and spurring climate action efforts within higher ed. However, many institutions are finding that their climate action planning from a decade or more ago lacked the campuswide specificity needed to reach their targets. These plans set a series of milestone goals that were followed by separate building plans but were not integrated at the portfolio level.

For many portfolio owners, the gains in performance being realized on a per-project basis are not meeting their overall decarbonization targets and timelines. Helping to address and close this gap by scaling up emissions reduction master planning is a key priority moving forward. This is where Debellius has seen the DOE's partners in the Better Climate Challenge program having the most success.

WE NEED TO INVEST – NOT OFFSET

Carbon offsets have provided an essential pathway for companies and organizations to close their decarbonization gaps and achieve carbon neutrality while they continue to advance operational improvements. However, the veracity of these offsets is being called into serious question as more and more studies indicate most of them do not deliver the emissions reductions they claim to.

The group observed that current carbon pricing is inadequate, not only to cover what it actually costs to achieve a metric-ton reduction but also to account for the full social and environmental costs of greenhouse emissions. Given that there aren't enough quality offsets out there to help us meet the targets we need to hit by the end of this decade, advancing combustion-free operations must become the primary way that building and portfolio owners invest in decarbonization. As one anonymous attendee succinctly put it: "Unless we're willing to do the hard work of actually not burning fossil fuels, it's all bulls**t, right?"

The international real estate and construction company Lendlease was cited as an example of an organization that is planning for and pursuing science-based Net Zero Carbon targets using zero offsets – providing methodologies worth learning from and emulating. As stated on their website: ***"We've made it our mission to achieve Net Zero Carbon by 2025 and Absolute Zero Carbon by 2040, with no offsets and no excuses."***

WE NEED SHARED STANDARDS TO ACCELERATE OUR PROGRESS

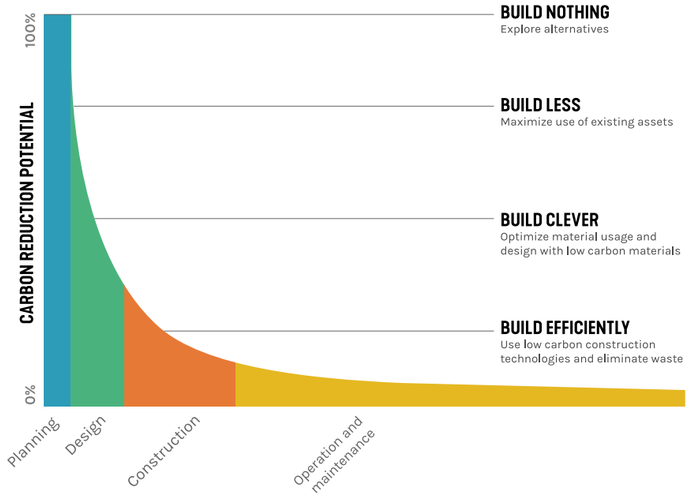
The group identified inconsistent policies and insufficient regulatory standards as a key challenge to decarbonization in the U.S. The lack of national policy standards and consistent green-pricing structures and incentives is making for a slower and more difficult process. It leads to a lack of the signals and controls needed to establish a viable decarbonization market.

The lack of shared rules and measurement standards also makes it extremely difficult to address **Scope 3 emissions** (aka embodied carbon). The group acknowledged that while progress is being made, there is still considerable work that needs to be done.

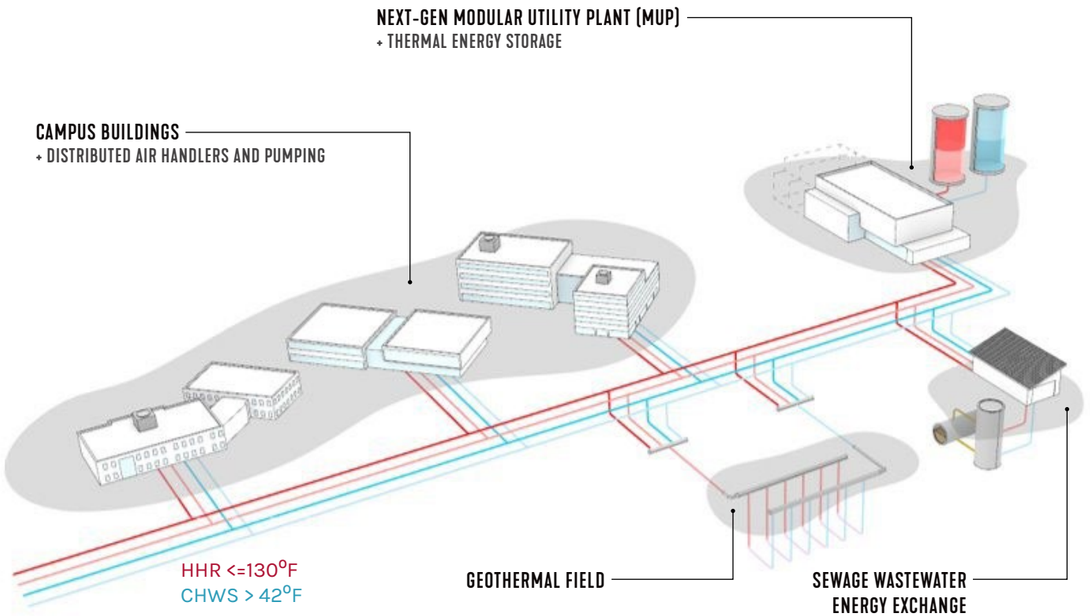
Similar to different U.S. states and jurisdictions having different requirements, Steve Teiler of the U.S. Department of State Overseas Building Operations noted this is also an issue for international portfolio owners. He pointed out that meeting consistent decarbonization standards "gets complicated because we're working globally, with very different local requirements and regulatory standards depending on where we are. This can potentially limit what we're able to do."

"One of the most effective ways to say yes/and to the challenges of addressing Scope 3 emissions is to renovate existing buildings whenever possible. Reuse can save 50-75% of embodied carbon emissions compared to building new."

- STET SANBORN, SMITHGROUP



The most significant opportunities for reducing embodied carbon occur during a project's planning and design phases.
Source: "Bringing embodied carbon upfront", World Green Building Council, Data Source: HM Treasury: Infrastructure Carbon Review, 2013



District Energy solutions utilizing geothermal systems and heat exchange will play a pivotal role in rapid decarbonization.

THERE ISN'T ALWAYS A PAYBACK IN CONVENTIONAL ECONOMIC TERMS

In addition to the recent cost challenges posed by supply chain disruptions, high inflation rates, and tightening budgets, participants observed that the promise of a payback for sustainable design improvements within an X-to-XX-year timeframe doesn't always pan out. This isn't a reason not to decarbonize; however, it is much harder to make the case in a cost-payback model that doesn't factor in the full current and future costs of the global climate crisis.

Part of the issue is that conventional planning and budgeting timeframes aren't long enough. Decarbonization benefits from a longer-term, "legacy planning" timeframe – which is more realistic than "we're going to achieve everything within a single planning cycle." While life-cycle analysis (LCA) is helping to expand the timeframes considered, the carbon and energy pricing employed are usually inadequate – especially in relation to equity, which the group explored as a key life-cycle cost consideration.

IDEA THAT GRID MUST BE CLEAN FIRST IS INHIBITING ELECTRIFICATION

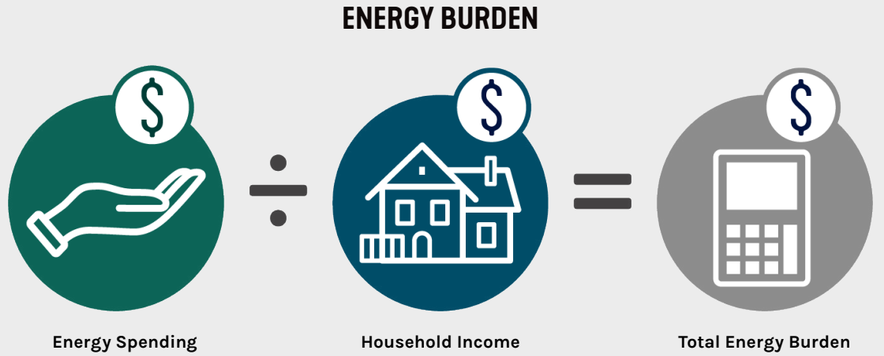
The group explored a question frequently posed by building owners: "How do I know if my investment in electrification is helping with decarbonization if I don't know how clean my electricity is?" Participants acknowledged that the uneven status of grid decarbonization leads to uncertainty about the net-reduction benefits of building electrification. Electrification and cleaning up the grid need to happen in parallel to accelerate decarbonization. However, some critics are advocating for a delay in electrification efforts until after the grid has been sufficiently decarbonized.

SmithGroup's Stet Sanborn said the firm developed a tool that helps designers better understand the dynamics of building-scale vs. grid-scale decarbonization in the region they're working in. This allows for more nuanced understanding of the energy mix for a project, and provides ways for designers to hedge where the grid is going by identifying carbon break-even points based on different grid-decarbonization scenarios.

Nancy Kohout of SmithGroup observed that significant GHG reductions can often be realized through building-system electrification independent of the grid. For example, the latest electric heat pump systems are more efficient than gas-burning heating systems by a factor of 3 to 1; this performance improvement leads to net decarbonization even with a dirty grid. Building- and district-scale green energy generation and storage also change the calculations of how quickly electrification can provide net decarbonization benefits regardless of changes to the grid.

People sometimes bring up the grid issue as an excuse not to electrify – rather than a design consideration. We need to be prepared with big-picture understanding and takeaways to respond to that.

- NANCY KOHOUT, SMITHGROUP



WE NEED TO FACTOR IN AND PRIORITIZE EQUITABLE DECARBONIZATION

As Ted Tiffany of the Building Decarbonization Coalition (BDC) noted LCA can't just be economically based – or not factor in social costs. "We need to put more thought process into our LCA calculations. We need to make these capital investments equitable – especially with housing, so they won't impact and overburden tenants."

Tiffany said BDC has frequent discussions about how to put equity first in their work with multi-tenant owners. "We ask ourselves how do we solve the problem for the hardest to reach and least able to afford the transition and do that first. Then everybody else is easier. That's where the perspective starts for us when we do neighborhood decarbonization. But there are still plenty of holes we need to identify and address for the rest of the industry."

Mary Thomas of Building Innovation Hub/Institute for Market Transformation (IMT) said equitable decarbonization is also at the forefront of her organization's mission, "and in particular focusing on prioritization. How do you identify the buildings that need the most help first – and the projects that will provide the most equitable impact and benefit?"

WE NEED HIGH-PERFORMANCE OPERATIONS AND MAINTENANCE

Sven Shockey, SmithGroup Design Director, noted that owners aren't always operating their high-performance buildings in ways that allow them to fully realize that performance. "Designing for the long term requires more than investing in the building's modeled performance. We need to ensure buildings are maintained and operated optimally by providing better education and support for those operating net-zero buildings on a daily basis."

Addressing the need for more educational resources to support decarbonization emerged as a major priority in the group's discussion of opportunities and recommendations.

KEY TAKEAWAYS: OPPORTUNITIES AND RECOMMENDATIONS

The group devoted much of the discussion to sharing success stories, lessons learned, and the most promising directions and priorities for accelerating decarbonization efforts. It was clear that while planning, design and construction play pivotal roles, it is also essential for design-focused professionals to engage the policy and financial dynamics and to embrace their role as advocates and educators for rapid decarbonization.

PROVIDE MORE EDUCATIONAL SUPPORT – AND MORE SHARED, COLLABORATIVE RESOURCES

As one attendee noted, we are past the building-awareness phase and need to focus our efforts on building net zero outcomes. However, many major portfolio owners still lack a plan that addresses the scale at which they need to decarbonize. There is a vacuum of knowledge – not just technical expertise but also the communication skills needed at every step of the process. Owners frequently don't know what to ask their designers, engineers and financers – and often lack access to the top practitioners advancing the work.

The group felt strongly that given the compressed timeframe we have to work within, everyone needs to dedicate more effort to the educational side of decarbonization. We need to share our insights and approaches more broadly to help accelerate decarbonization at scale.

Mary Thomas noted, "So many great resources exist – but why are so many people coming up with essentially the same resources? Why can't we all do it together? We need to stop reinventing the wheel and amplify what people are already doing that gets the message out more effectively." The group agreed we need to counter the proprietary mindset and put more emphasis on democratization of knowledge and acceleration of collaborative impact. As one attendee framed it: "No more secret sauce."

ARTICULATE AND ADVANCE HOW DECARBONIZATION IS "GOOD FOR BUSINESS."

Tom Skinner of Redbrick, LMD commented, "Decarbonization is good for the climate and it's good for business." After which he was jokingly asked "So the real estate sector is convinced now?" While acknowledging that Redbrick's built commitment to decarbonization makes them a minority in the real estate development industry, Skinner outlined the kind of forward-looking business philosophy that is essential for the transition to a decarbonized economy.

> "The upfront costs are higher – and inflation has made it more challenging – but decarbonization is part of Redbrick's ethos. We have a long-term perspective and a shared responsibility in paying for the cost of what we didn't do before. We're not operating from a 'Don't think out more than four years because it's too risky – build it and sell it' mindset."

> "We've asked ourselves what's the value of taking on decarbonization? It attracts long-term capital that aligns with our philosophy. It can also be a differentiator in the current market while helping to move the market in the direction it needs to go. There's clear residential appeal for those who want to pay for net zero versus greenwashing – it aligns with their values. We're about to start a CLT building here – the largest in the District – so there is market demand for this." (See sidebar.)

> "DC regulations are pushing the design requirements more than many parts of the U.S. But the benefit to your project is it offers a kind of future proofing by being ahead of the rest of the country. Your project's design and performance won't be obsolete in 10 years"

NEW MARKET LEADERSHIP

Redbrick LMD's current development efforts in DC's proposed Bridge District feature a blend of highly sustainable design and creative, equitable financing. Phase-one construction will feature a zero-carbon multifamily residential building anticipated to be the largest of its type in the U.S. certified by the International Living Future Institute. Subsequent phases currently in design are expected to include the city's largest mass timber project to date. The development is taking place within a qualified Opportunity Zone— a unique investment vehicle combining tax incentives with reinvestment in an underserved area of the community.

Attendees also discussed how more and more public and private organizations are looking for net-zero leasing options to meet their carbon-reduction goals – a demand that is not being met within the current market. As the real estate sector looks for ways to address its post-COVID leasing and vacancy issues, helping organizations that lease meet their carbon commitments could be part of a larger adaptive strategy.

LEVERAGE THE POWER OF GREEN LEASES FOR GREEN BUILDING INVESTMENT

Skinner also observed that given the large capital expenditures required for high-performance residential buildings, ideally owners could capture more return from their investment in energy use reduction and savings. This led to an exploration of the key role green leases can play in advancing decarbonization.

Green leases – more common in the commercial sector but an expanding part of the residential sector in the past few years – provide a framework for **split incentives** between owner and tenant based on energy use and costs. Language can be inserted into different sections of leases to establish data transparency for energy use, and to provide mutual financial benefits as well as incentives for meeting or exceeding energy use targets.

GREEN LEASE LEADERS

The Green Lease Leaders program was developed by the Institute for Market Transformation (IMT) with support from the U.S. Department of Energy's Better Buildings Alliance. Owners and tenants can apply, get support on how to improve their leases, and be recognized as a Green Lease Leader for their efforts. The program has recently evolved to address multifamily leases, providing more social equity as well as energy efficiency options.

"If I could just snap my fingers and fix all the leases, that's what I would do."

– HANNAH DEBELIUS, DOE ON ADDRESSING A KEY CHALLENGE TO DECARBONIZATION IN THE MULTIFAMILY SECTOR

INTEGRATE RESILIENCE WITH IMPROVED DESIGN PERFORMANCE

The group discussed how climate adaptation and resilience are essential life-cycle considerations for sustainable building performance. Steve Teiler commented that staying operational through disruptive events is as much a priority for the State Department OBO as decarbonization. "We need to be able to function when the world around us is not."

Many areas of the U.S. are confronting changes in insurability and skyrocketing insurance rates due to the increased recurrence of damaging storms, floods and wildfires. At the same time, building owners are facing the prospect of extended periods of power blackouts and brownouts as climate change impacts increasingly challenge the grid. But as Ted Tiffany pointed out, "You don't necessarily need a generator – you need resilient power."

The discussion highlighted how on-site renewables and energy storage represent ways to both advance decarbonization and increase energy resilience. Advancing district energy solutions and lease structures for microgrids can also scale up the resilience benefits for multiple building owners and tenants while helping to accelerate overall decarbonization.

DO REPRESENTATIVE CARBON AUDITS TO UNDERSTAND YOUR ISSUES – AND BUILD A PORTFOLIO-SCALE FOUNDATION

In 2020, The George Washington University (GWU) moved its target date for carbon neutrality from 2040 to 2030. In need of a game plan for how to get there, GWU's new Director of Sustainability Josh Lasky proposed campuswide decarbonization planning to his Vice President.

"My VP said let's start with a representative subset of buildings first, get into the nuts and bolts of what we need to do to retrofit them," said Lasky. "Then we can do our larger scale planning after that, when the key issues and challenges are more clear. That's when I realized, 'Why am I worried about scalability? Our buildings are all so different, with so many specific issues and upgrade requirements to address.'"

GWU's resulting phase-one plan does a deep-dive decarb. analysis into five existing campus buildings, with relevant lessons-learned that can be applied to similar campus building and equipment types during future phases of planning. This approach was enthusiastically discussed during the roundtable in relation to the point that the devil is in the details with decarbonization – especially with retrofits. Members of the group felt Josh's approach relates to a larger shift in the market that is currently underway: peer-reviewed decarb. audits of representative building and equipment types, with upgrade scenarios that can be scaled across larger portfolios.

"Now we have a much deeper understanding of what we need to do, and really elegant solutions for decarbonizing five campus buildings. This effort lays out a path for GWU to achieve carbon neutrality with no/minimal offsets."

- JOSH LASKY, DIRECTOR, OFFICE OF SUSTAINABILITY, THE GEORGE WASHINGTON UNIVERSITY

INCREASE OUR FOCUS ON RETROFITTING EXISTING BUILDINGS – AND ASSUMPTIONS

While the pathways to net zero when building new are well established, decarbonizing existing buildings is much more challenging. The group discussed that is imperative for us to crack the code of retrofitting, and the complex decarbonization issues that reuse poses for different building types in different climate zones at different points in their life cycles.

The group discussed how a perfect end goal can become a limiting factor – especially for retrofits – and has the potential to derail highly impactful decarbonization efforts. As Stet Sanborn framed it, "We need to design for the 90% solution – not the all-or-nothing perfect solution. Understand your project's specific cost and physical limitations, as well as its 15-year equipment replacement cycles, and design to those limits."

Participants also discussed how conservative assumptions can lead to overspecifying, especially the common practice of designing for energy-use peaks that happen very infrequently over the course of a year. We need to move away from peak-thinking, understanding the critical roles that proper metering, smart control systems, and onsite energy generation and storage can play in moving both new and existing buildings closer to net zero.

BUILD LESS TO LAST LONGER

SmithGroup's Director of Sustainability Greg Mella commented, "If we can't retrofit to meet a client's needs, we need to ask ourselves how can we build less? Architects can play a key role in this: creating multiuse and flexible spaces with higher rates of utilization. Doing more with less square footage reduces operational and embodied carbon and lowers construction costs. We also need to be designing for 100 years of service – not just the grand opening."

SmithGroup Design Director Sven Shockey noted that we need to think about more than carbon to design a building for the next 100 years. He cited DC Water's nearby historic pumping station from 1907 as an example – with its enduring materials, its aesthetic and sculptural details inspired by the City Beautiful Movement, and other human-centered design considerations. "These human factors need to be well baked into our designs so they will be useful for 50 to 100 years."

MOVE BEYOND TRADITIONAL BUDGET MODELS AND ADVOCATE FOR CREATIVE FUNDING

The group agreed "How do I pay for it?" remains a pivotal question staring down rapid decarbonization. However, the recent growth in funding availability – especially following the Inflation Reduction Act – has changed the financial calculations. In many cases, the available incentives can pay for more sustainable versions of things the owner was going to have to pay for anyway.

While there are more funds and tax credits available, they are so new that people frequently don't know how to access them. Tapping into them can also require financial advisory expertise, along with more complex considerations of long-term cost-benefit calculations and community partnerships. SmithGroup's Katrina Kelly-Pitou stressed the importance of advancing a new type of "design economics": a specialized financial planning service that can help owners and consultants find new answers to the question of how we pay for decarbonization.

"There is an integrated role for economists and social scientists in the decarbonization space," said Kelly-Pitou. "A lot of us are already sneaky policy makers – but there can be a disconnect with how we're going to pay for it. What we really need economists for are creative approaches to funding – new financing strategies designed to pay for decarbonization over time."

"Economists in the U.S. can be boring, to be honest. They are bound by accounting standards, and will give you a four-year forecast on energy pricing and call it a day. But we must include externalities in our fees, what is being left out of those forecasts. A price on carbon emissions, a potential cost of resilience, and realistic fees for utility prices. Past-performance with a simple 2% efficiency gain is not going to get us to our 2035 goals"

– KATRINA KELLY-PITOU, SMITHGROUP

BE WILLING TO SHARE YOUR CASE STUDIES – ESPECIALLY THE FINANCIAL DETAILS

The value of shared case studies came up frequently during the discussion. People are looking for decarbonization roadmaps to help guide them to where they need to go – successful pilot projects that provide proof of performance and demonstrate return on investment. This makes case studies a key component of the increased educational support needed to support rapid decarbonization.

Hannah Debelius said that while DOE has a lot of resources to draw on, they are pursuing case studies that provide detailed information on financing and funding. More financial transparency – even if it's anonymous – is essential to providing the decarbonization roadmaps people are looking for.

"Everyone wants and needs that financial information – but few are able to share it. The case studies can be anonymous – we can put a shield over where the information came from – but we need that real-life information and examples of how people made the dollars and the budgeting work."

– HANNAH DEBELIUS, US DOE

RECOMMENDED RESOURCES FOR DECARBONIZATION

This list reflects key resources that were referenced during the roundtable discussion. Click on the links to learn more.

The Building Decarbonization Practice Guide: A Zero Carbon Future for the Built Environment

Seven-volume edition released by the William J. Worthen Foundation in 2023

Building Decarbonization Coalition Resource Library

BDC offers a wide range of online resources covering key industry topics and developments.

Neighborhood Scale: The Future of Building Decarbonization

Thermal Energy Networks (TENs)

Clean Building Compass
For additional resources

U.S. Department of Energy Resources

The DOE has multiple resources to support decarbonization – along with new resources that will be coming out in 2024.

Better Buildings Solution Center – Decarbonization Resource Hub

Better Buildings Green Finance Navigator

Better Climate Challenge Program
Program to assist members committed to reducing their Scope 1 and 2 emissions by 50% in the next 10 years.

Green Lease Leaders

A Guide to Energy Master Planning of High-Performance Districts and Communities

2020 publication by National Renewable Energy Laboratory (NREL) in conjunction with the U.S. Department of Energy, Rocky Mountain Institute, Integral Group and BluePoint Planning

ASHRAE Technical Resources: Building Decarbonization Guidebooks

ASHRAE has developed a new series of seven guidebooks to provide essential decarbonization technical support for the A/E/C industry – **with five scheduled for release in 2024**:

Decarbonizing Hospital Buildings

Heat Pump Application, Design and Operation Guide

Building Decarbonization Retrofits for Commercial and Multifamily Buildings

CIBSE TM65 for North America

Whole Life Carbon Guide for Building Systems

2023 AIA COTE Top-Ten winner DPR Sacramento blends renovation of a 1940s-era building with a new addition to create a benchmark zero net energy office.

THANK YOU TO OUR ROUNDTABLE PARTICIPANTS!

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***ASHRAE Conference Presenters**

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Design a Better Future

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