A structured methodology for planning commercial real estate portfolio decarbonization

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Executive summary

The race to net-zero carbon is challenging the global commercial real estate (CRE) market. Banks, the broader investment community, tenants, and all CRE stakeholders now demand sustainable building practices. The valuation of building stocks and investment strategies is increasingly tied to sustainability, wellness, and resilience. To reduce risk and avoid compromising future profitability, a path must be set to decarbonize existing building assets.

This paper offers a recommended 6-initiative methodology that CRE teams can use to analyze and prioritize brownfield modernization projects across large asset portfolios to achieve maximum payback with minimal disruption to occupants. These recommendations are based on the successful collaboration between Brookfield Asset Management, WSP, and Schneider Electric on a modernization plan for portfolio decarbonization that encompasses a variety of property types within a European asset fund.

The methodology has delivered three early wins:

1. Greater data coverage across the portfolio
2. An increase in Brookfield's GRESB score
3. A springboard for the next level of asset modeling

Table of contents

Introduction

A primary objective for commercial real estate (CRE) owners, asset managers, and investors is to maximize the value of their assets, portfolios, and investment funds during the period properties are held. All this while providing a clear transition of data governance responsibility after they are sold. The global impetus for sustainable practices is now shifting perceptions of asset value aligned with stewardship and continuous improvement.

All buildings must decarbonize

"The Corporate Sustainability Reporting Directive (CSRD) will be rolled out in a phased approach from 2024. It will require companies [in the EU] to report on how sustainability issues, such as climate change, impact their business and how their operations, in turn, affect people and the planet."

- Carbon Trust[1]

As countries commit to net-zero carbon targets and implement regulations related to building performance standards, physical climate risk awareness and transition concerns are growing. Many businesses have stated net-zero carbon commitments as part of their environmental, social, and governance (ESG) reporting to strengthen their competitive positions. In some regions – such as the European Union (EU) – governments and banks are making sustainability reporting mandatory, and many global regions are adopting similar rules.

Beyond compliance with reporting and regulations, building owners and operators are also facing new market pressures. Tenants, employees, and hiring prospects now demand work and living spaces that are more sustainable, healthy, and resilient. It is within this scope of greener assets – ones that avoid a "brown discount" in the perception of the wider real estate market – that investors are increasingly focusing on maximizing returns and reducing risk.

The European energy crisis also reinforces the need to reduce price volatility related to reliance on fossil fuels. This requires accelerating net-zero goals to help remove the risk of future fuel poverty.

The path to sustainability through retrofit and renovation

The value of commercial real estate, regardless of building type – residential, office, retail, industrial, and others – is now being examined through the lens of sustainability. Nowhere is this stewardship more important than in modernization work performed on behalf of ownership during financial control of an asset.

Asset owners and managers are faced with a confluence of needs related to decarbonization, resilience, efficiency, and human centricity within the modernization strategy of their current building stocks. For this paper, we distinguish between three typical intervention scenarios:

- **Scenario 1:** Very little disturbance is acceptable. Interventions typically include equipment retrofits that require low capital expenses (CapEx), are fast and easy to deploy, and can provide incremental benefits regarding data visibility and actionable insights. This is mainly the space of internet of things (IoT) solutions, data management, and digital transformation.

- **Scenario 2:** Disturbance must remain limited, occupants can mostly stay, and interventions are done in phases. Minor physical improvements can enable connectivity, efficiency, and measurable modernization impact while the facility remains in operation.

- **Scenario 3:** Interventions bring high disturbance and can consist of the complete renovation/refurbishment of a building, including upgrading the building envelope. Therefore, this kind of project can displace occupants for an extended period.

When viewed in the context of large portfolios or real estate funds, these modernization scenarios occur simultaneously across an array of building types. Due to this complexity – sometimes involving dozens or even hundreds of facilities – these programs tend to take place independent of ESG commitments made by organization leadership, even though these same

1 "Corporate Sustainability Reporting Directive (CSRD) explained," The Carbon Trust, December 2022

entities are held accountable for carbon regulation. This increases the importance of data governance and stakeholder engagement to meet the confluence of needs – especially in the cases of carbon reduction efforts in aggregate.

The decarbonization dilemma: turning ambition into action

Though many organizations have publicized commitments to net-zero targets on specific timelines, they may not have action plans for achieving net-zero buildings. Due to the inherent complexity of the challenge, many do not know where to start.

For example, consider a portfolio of more than 100 properties across multiple countries with different regulations and parameters to work through:

- How do you set decarbonization objectives that support the priorities of your asset management and operations teams (ESG, resilience, etc.)?
- How do you empower and inspire stakeholders at all levels – from the C-level to portfolio, asset, facility managers, and users – giving them the agency to contribute input and guide actions?
- How do you acquire baseline energy consumption data to support actionable insights?
- How do you leverage best practices to help prioritize opportunities and determine the best site(s) to start working on?
- How do you choose the best decarbonization opportunities and the most appropriate retrofit or renovation interventions?
- How do you start to build a capital plan to fund these projects, who gets the benefit, and how are savings directly realized?
- How do you execute interventions to minimize disruption to occupants?

Case study Brookfield Premier Real Estate Partners – Europe

This white paper offers CRE management teams a recommended methodology for strategy and planning to decarbonize large asset portfolios.

As Brookfield Asset Management (Brookfield) bridges the gap between the current state of operations and forward-looking climate commitments, it has become increasingly important for them to empower stakeholders along the ESG value chain. This paper aims to establish a framework for delegated participation – vertically within a complex real estate organization and transversally across symbiotic recognition and regulatory-based validation schemes.

The recommended methodology is based on an ongoing modernization plan for portfolio decarbonization developed through **the collaboration between Brookfield, WSP, and Schneider Electric.** The project encompasses a variety of European property assets within the Brookfield Premier Real Estate Partners – Europe (BPREP-E) fund.

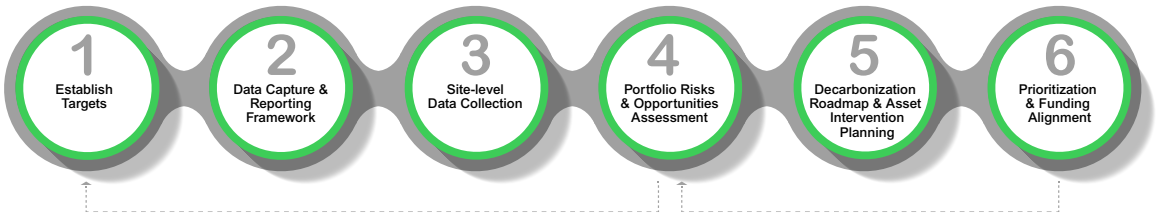
***BPREP-E** is a core-plus, medium-term hold portfolio comprising a mix of multi-family, logistical warehouse, office, and alternative assets.*

The decarbonization planning methodology is a 6-initiative process (see **Figure 1**). In the following sections, you will learn guiding fundamentals for each initiative, supported by relevant case study examples from the Brookfield project:

1. Establish targets
2. Data capture and reporting framework
3. Site-level data collection
4. Portfolio risks and opportunities assessment
5. Decarbonization roadmap and asset intervention planning
6. Prioritization and funding alignment

Figure 1

Portfolio decarbonization planning methodology, simplified view.



1

Establish Targets

1.1 Introduction

Establishing targets has traditionally been focused on a "top-down" approach, combining organization-led commitments to decarbonization with regulatory mandates set forth at a country or regional level. This leads to communication breakdowns as stakeholders at the asset level are constrained by:

- Physical limitations on environmental impact reductions
- Contractual relationships with service providers
- "Agency gaps" related to training and empowerment

Organizations must enable visibility on performance – i.e., what "good" looks like – and the progress towards improvement. These are key drivers to establishing a "bottom-up" program aligned with "top-down" goals.

1.2 Methodology

Each industry has a different path in establishing ESG targets and a specific set of reporting entities within the "ESG ecosystem" that can aid adoption, improvement, and sustained performance. For the real estate industry, understanding relevant reporting organizations that can provide sufficient validation for ESG efforts can help reduce gaps in communication and create a practical means to benchmark decarbonization progress.

As illustrated in **Figure 2**, relevant ESG reporting types when establishing 'top-down, bottom-up' targets include:

- Guidance frameworks
- Data aggregators

- Ratings, rankings, and recognition programs
- Accreditations, certifications, and target-setting
- Regulatory authorities

The requirements set by regulatory authorities are mandatory for real estate assets within the geographies they preside, as compliance impacts the viability of business operations. However, mandatory regulations can work together with voluntary ESG target-setting programs as there are often "crosswalks" of similar metrics between them (e.g., targeted reduction of energy, water, waste, or carbon). In some cases, regulations have influenced aspects of voluntary programs and vice versa.

Figure 2

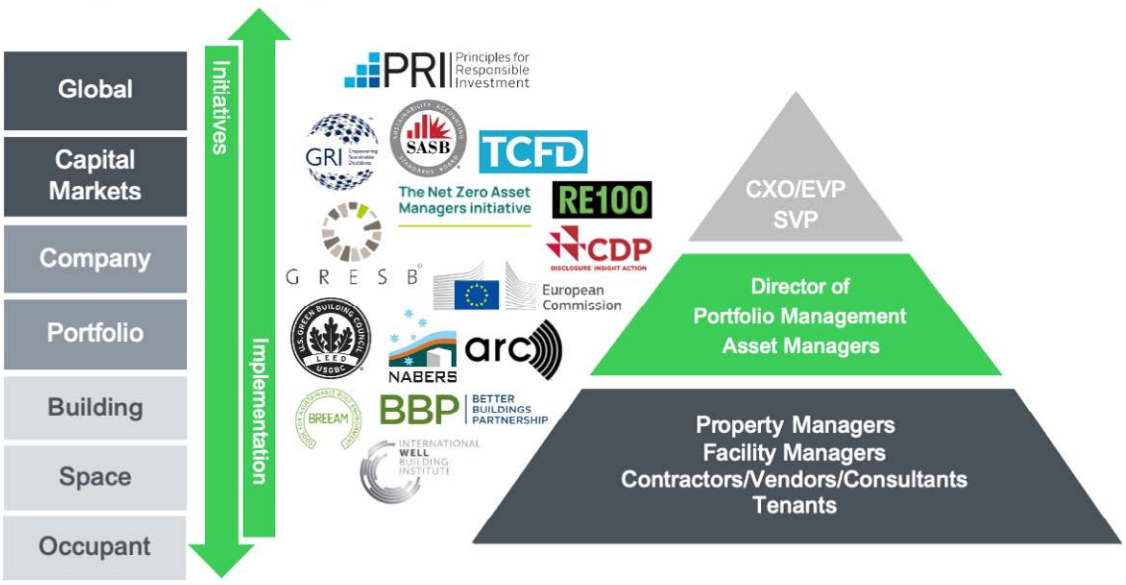
Five types of reporting (and associated organizations) within the ESG reporting ecosystem.

Guidance Frameworks	Data Aggregators	Ratings & Rankings	Accreditations, Certifications, & Target-setting	Regulatory Authorities
GRI	GRESB	MSCI	RE100	UK ETS
SASB	CDP	ISS	SBTi	EU ETS
SGDs	Bloomberg	Sustainalytics	EP100	NFRD
TCFD	Refinitiv	FTSE	EV100	CSRD
CDSB	S&P CSA	Vigeo Eiris	LEED	SFDR
IIRC	B Analytics	Corporate Knights	BREEAM	EED
GHG Protocol		EcoVadis	ENERGY STAR	SECR
UNGC		CSRHub	B Corp	EU Taxonomy
COSO ERM			UL SPIRE	BEGES
ISO				Décret tertiaire

The ESG reporting ecosystem involves guidance frameworks, data aggregation recognition, and regulatory authorities. Each part of the ESG reporting ecosystem advances works within a set topography, from the organization level to the asset, and can include mandatory regulatory schemes and organizationally-aligned recognition programs, see **Figure 3**.

Figure 3

The top-down, bottom-up, and inside-and-out relationships between ESG drivers and their impact on different levels of an organization.



Note: this list is representative and not exhaustive

1.3 Case study

Using established ESG data aggregation programs that bridge 'top-down, bottom-up' topology, Brookfield began aligning expectations in Europe at the organizational level through the Global Real Estate Sustainability Benchmark (GRESB),[2] which provides:

- An easily transferable snapshot of performance across building types and regions.
- High alignment with established guidance frameworks.
- Visibility on asset-level performance for facility managers and property stakeholders regardless of location and type of asset.

Further efforts by Brookfield to bring ESG-based benchmarks to each portfolio consolidated around a matrix for ESG maturity. This brought measurable performance tracking to both leadership and site management stakeholders. These targets' focus areas included building assessments (including environmental impact studies, climate risk, and cybersecurity), energy efficiency measures, and biodiversity. These components fit neatly within the regional peer analysis through GRESB and allowed internal benchmarks to be scrutinized by industry-established benchmarks.

Providing a site-level benchmark for performance brought a final layer of stakeholder alignment, as programs ranging from regulatory (e.g., EU and UK Energy Performance Certificates) to recognition-based (e.g., Arc, Better Buildings Partnership, GRESB "like-for-like") were easily understood by local site managers, occupants, and service providers.

Teams from Schneider Electric and WSP worked to connect these programs to:

- Fund-level programs within the Sustainable Finance Disclosure Regulation (SFDR) and GRESB frameworks.
- Organization-level commitments with the Net Zero Asset Managers initiative.

Net Zero Asset Managers initiative

An international group of asset managers committed to supporting the goal of net zero greenhouse gas emissions by 2050 or sooner…and to supporting investing aligned with net zero emissions by 2050 or sooner. A formal partner of the United Nation's Framework Convention on Climate Change Race to Zero Campaign.[3]

The Sustainable Finance Disclosure Regulation

A European regulation was introduced to improve transparency in the market for sustainable investment products, prevent greenwashing, and increase transparency around sustainability claims made by financial market participants.[4] In addition, other emerging standards around the globe are helping accelerate sustainability by requiring the disclosure of asset portfolio carbon footprints.

2 GRESB

3 The Net Zero Asset Managers initiative

4 "SFDR," Eurosif

2

Data capture and reporting framework

2.1 Introduction

By focusing on key integrated ESG drivers for reporting and iterative improvement, real estate stakeholders will have a scalable decarbonization planning strategy from site-level facility management stakeholders up through asset, portfolio, and organizational leadership (see **Figure 4**).

Whether through recognition or regulatory requirements, the external validation reporting schemes provide:

- Empowerment of stakeholders, internal and external, to real estate organizations.
- Improvement measurements in a replicable framework for all parties to understand.

Figure 4

Portfolio decarbonization planning methodology, illustrating levels of organizational responsibility and collaboration during each initiative.

As data is captured, it must bring meaning to the progress and improvement at each site while expressing the aggregate performance of a portfolio or broader fund. A metric captured by site personnel or related vendors must immediately be put into the context of planning opportunities, related risks, and finite capital resources meant for driving modernization outcomes.

2.2 Methodology

The "plan, do, act" structure of ISO 14001 exemplifies a meaningful data capture methodology for assets, regardless of the technology deployed or professional skillset. As a guidance framework for data collection and reporting, inputs – from manual entry to automated data feeds – are consolidated and tracked, allowing groups of buildings to become peers.

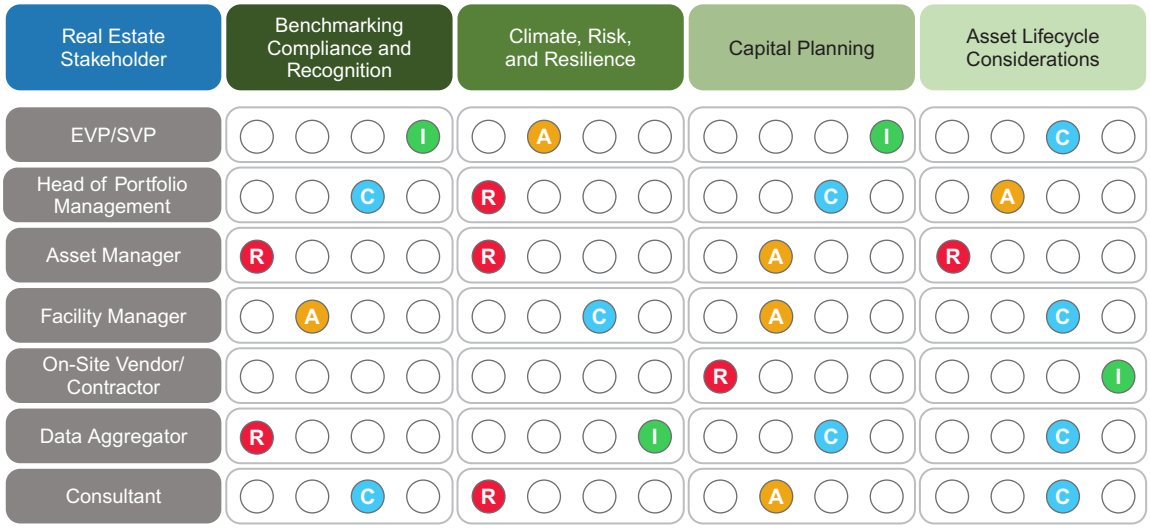
The iterative nature of frameworks like ISO14001 can match each facility's continuous, dynamic operation. This allows facility stakeholders to grow within a reasonable progression towards broader portfolio external requirements or organizational commitment.

Tying these site outputs higher in the topography of ESG reporting responsibilities is made easier through a *data responsibility matrix* (see **Figure 5**). The matrix provides context for how a metric is used and, in turn, helps reduce friction in data capture and reporting. Metric context should include:

- Outcome
- Data type
- Stakeholder responsible and ownership

Figure 5

Example of a data responsibility matrix.



R = Responsible, A = Accountable, C = Consulted, I = Informed

2.3 Case study

Working with top-to-bottom fund stakeholders, Brookfield's global ESG governance team and Schneider Electric created a data capture and reporting program for the BPREP-E fund that brought quality of data and shared responsibility of effort. This program has defined key metrics for tracking, and quality assurance and quality control (QAQC) protocols verified by internal and external stakeholders.

Outputs from the program are easily digestible into GRESB, and data points are similarly aligned with ongoing recognition programs, regional regulatory requirements (such as SFDR) as well as global investment requirements, such as the U.S. Securities and Exchange Commission ESG Disclosure Rule 33-11042.[5]

Data collected on-site provides immediate reporting insight while establishing the basis for planning needs related to long-term decarbonization. This is all brought into the context of current and projected energy prices and climate-stranding risks in the coming years, consolidated within cloud-based analytic and reporting tools so each stakeholder can access relevant data to their responsibilities within the fund (see **Figure 6**).

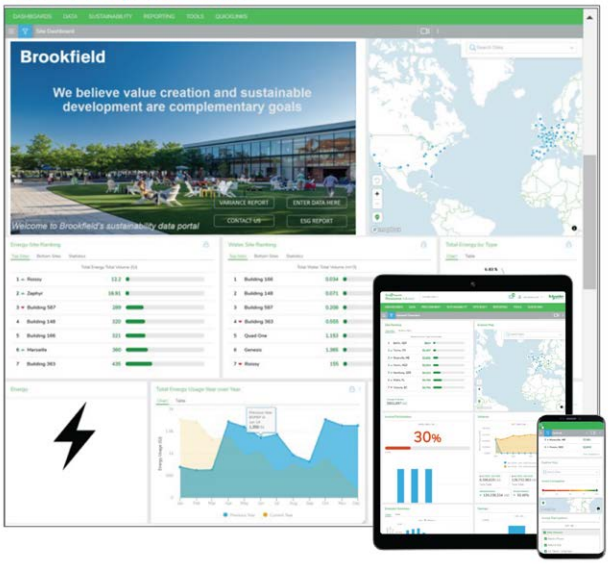
5 "The Enhancement and Standardization of Climate-Related Disclosures for Investors," SEC, 2022

Figure 6

An example of Brookfield's use of the EcoStruxure™ Resource Advisor cloud-based analytic and reporting platform.

Invoice
- Collected by aggregator
  - Bill payment/redirect services
  - Invoice collection
- Client/3rd party provided
  - API feeds

Meter
- Utility feeds
- Data loggers
- 3rd party software
- Building management system
- EcoStruxure Resource Advisor app



Custom
- Stakeholder surveys
- Efficiency project tracking
- User data entry/custom KPI tracking (dates, numbers, percentages, etc.)

Market
- Commodity pricing
- Weather
- GHG emissions factors
- Market outlooks reports
- Energy contracts
- Benchmarking API feed

Tenant
- Tenant billing related lease terms
- Stacking plan

3

Site-level data collection

3.1 Introduction

As responsibilities are established, and the "why" of ESG data reporting is communicated to increase participation throughout the real estate stakeholder map, site-level data collection still brings challenges. Many existing facilities today do not have the option to automate data feeds for environmental data, as many data sources are obtained manually. Depending on building type, many more are restricted through a mix of leasehold agreements and government data confidentiality regulations.

Site-level data collection programs that feed into mutually aligned targets and meaningful reporting frameworks are never left without data. Empowered real estate stakeholders can invariably find collaboration with a tenant incentivized for their data through access to enhanced refurbishments. Similarly, a site manager and asset manager may be able to find an approval for low-cost metering if it brings compliance with an upcoming regulatory mandate or improvement in voluntary reporting.

3.2 Methodology

A continuous site data collection model is the basis for benchmarking and rollup to portfolio, fund, and organizational reporting needs. Per the ESG reporting needs established in previous initiatives, the key metrics attained – many overlapping and consolidated by the data aggregator – can be attributed to each required reporting scheme.

A tiered approach that works to lessen the burden for site personnel brings the greatest efficiency and coverage. Many building characteristics, leasehold changes, and even vendor-provided environmental data can be brought into the portfolio level of a fund through automated workflows. This will allow a facility manager to stay informed without being overwhelmed by menial data collection tasks.

This process is made more complete through an external data aggregator, tied to the same reporting rules as internal stakeholders across topographies, and held to account through data type and coverage profiles relevant to each building type. Examples of typical 'bucket' types for data aggregation include:

- Asset location
- Billing parameters (e.g., energy consumption, demand, power factor)
- Power quality
- Renewable energy generation (e.g., photovoltaic, wind, geothermal, etc.)
- Water consumption
- Fuel consumption (e.g., gas, oil, etc.)
- Waste (e.g., recycled, composted, donated/reused, disposed)

Scheduling recurring updates and deliverables related to QAQC protocols can bridge gaps in the data that comes into the program. Analytics and predetermined external benchmarks can also derive actionable on both drivers for performance and capital planning – moving that drive environmental metrics further toward targets.

3.3 Case study

As established in BPREP-E's core European fund, global and regional leadership engaged with Schneider Electric as a data aggregator to align global ESG programming with site-level personnel. This brought consistency in the quality of reporting, with automated data acquisition bringing data streams (utilities, occupancy, pertinent financials, etc.) to the portfolio level.

A comprehensive data capture worksheet was engineered to aid in the seamless, continuous capture and consolidation of rationalized, aggregated data from all portfolio assets and sources (e.g., manual and automated data collection). Data types collected were carefully selected to ensure compliance with all reporting requirements defined in previous initiatives.

The worksheet acts as a single 'source of truth,' giving data visibility to all stakeholders at every level of the organization. From this extensive engineering exercise, there is a plan to leverage what has been learned to develop a dynamic, web-based data aggregation tool for easier implementation, customization, and scalability in the future.

At the same time, ongoing discussions with site-level stakeholders afford a bilateral communication program regarding what is feasible within data coverage and quality and plans for capital improvements that would meet environment reduction and reporting targets.

The process to align these components of the site-level data program began with asset-level surveys that minimized effort, where applicable, for on-site facilities management teams. Using a cloud-based analytical tool as a system of record across all portfolios within the fund, Brookfield could consistently view the level and quality of data needed to drive broader ESG efforts. Site personnel could still use tools at their disposal at each facility, providing they met the agreed-upon criteria for reporting, quality, and frequency that fed the organization-wide program.

Integration of systems is critical at this level, as each site represents a “lowest common denominator” for legacy hardware, communications protocols, and data consolidation processes. The cloud-based analytics platform, in turn, serves as a crucial repository, managing a diverse set of inputs from automated metering interface to spreadsheet upload to character recognition from scanned utility bills.Utility interface (e.g., kWh, KVAR)

Easing the effort related to bringing data into the system was part of the process, as validation of data and delivery of analytics and planning tools allowed the contextual importance of this data to come to life. For example, a simple document from a vendor could validate a policy put in place for wider ESG efforts, and a meter read could become a “like-for-like” benchmark for properties within GRESB or compliance within SFDR.

Each site within a portfolio was measured and compared against a wider peer group; this also relieved pressure from site personnel to be held to arbitrary standards while empowering capital plans to meet future improvements that mean something to players up and down the stakeholder map.

4

Portfolio risks and opportunities assessment

4.1 Introduction

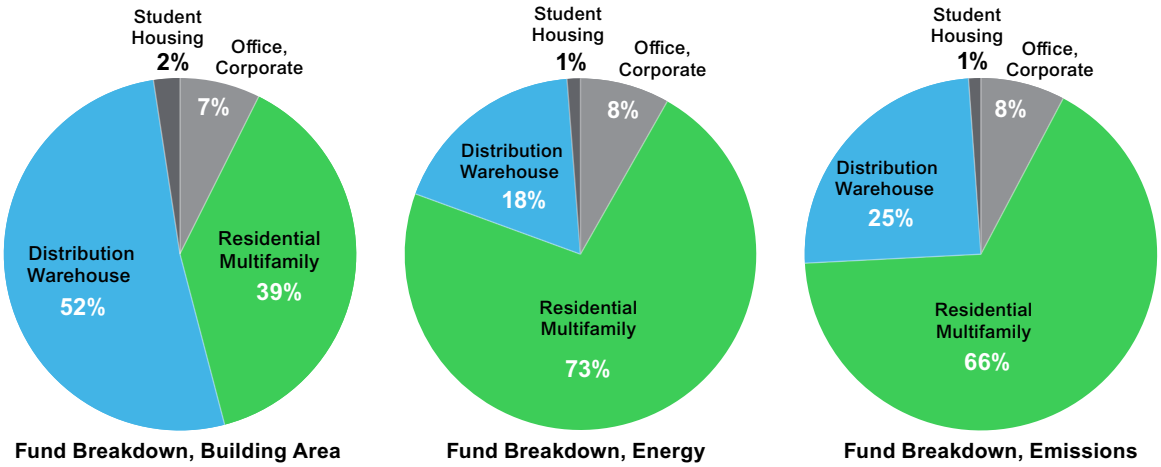
For initiative 4, WSP was engaged to identify portfolio risks and potential asset intervention opportunities by using the compiled site data from initiative 3 to develop key insights and trends organized by property archetypes with similar characteristics. Calculating the cost-per-ton of carbon saved enables high-level prioritization to be included in the decision-making process.

4.2 Methodology

To establish a portfolio baseline for analysis and comparison, properties are grouped by characteristics (e.g., usage, location, size) into archetypes. For Brookfield, four key archetypes were identified: Residential Multifamily, Distribution Warehouse, Office/Corporate, and Alternatives (see **Figure 7**).

Figure 7

BPREP-E asset archetypes are compared by size, energy, and emissions.

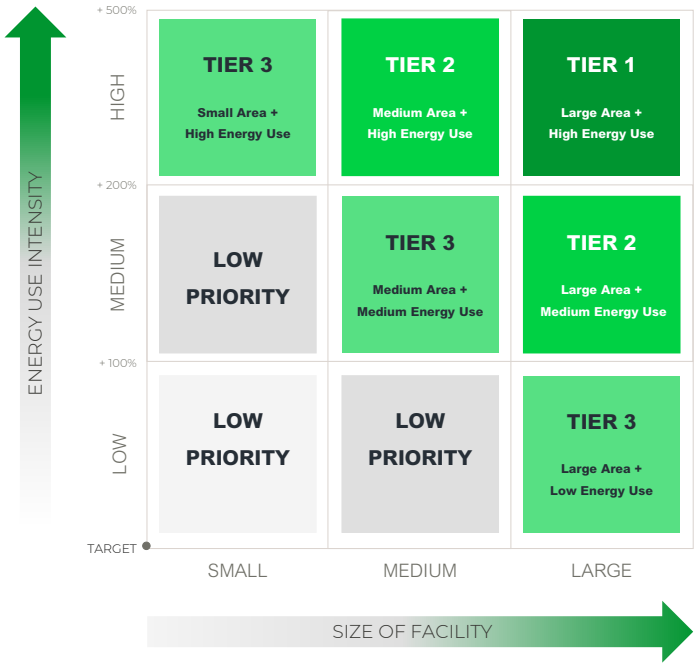


Risks are defined as assets with characteristics that fall outside the average for their archetype. For example, these 'outlier' assets may use more energy per area than their counterparts.

Based on this high-level study, a three-tier system is adopted to focus decarbonization efforts on those assets where the biggest impacts can be made, as illustrated in **Figure 8**. Those assets that fall into the low-priority tiers will be reappraised once those assets in Tiers 1, 2 & 3 have been decarbonized.

Figure 8

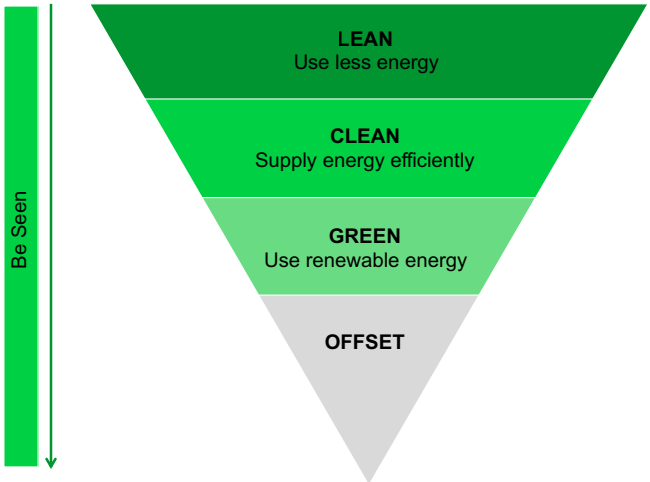
Tiered ranking of asset intervention opportunities by energy intensity and facility size.



Once these building archetypes have been formed, outlier assets are allocated into tier 1, 2, or 3. These risks and opportunities are identified per archetype by exploring the operational decarbonization hierarchy illustrated in **Figure 9.**

Figure 9

Operational decarbonization hierarchy.



LEAN
- Fabric first approach (enhanced insulation and air tightness)
- Metering to incentivize lower consumption
- Enhance daylight to reduce lighting requirements
- Water efficient appliances

CLEAN
- Mechanical ventilation and heat recovery to create a high-quality internal environment

GREEN
- On-site generation (PV, solar thermal)
- Utilize existing/proposed heat networks
- Heat pumps (ground/air/water)
- Power purchasing agreement

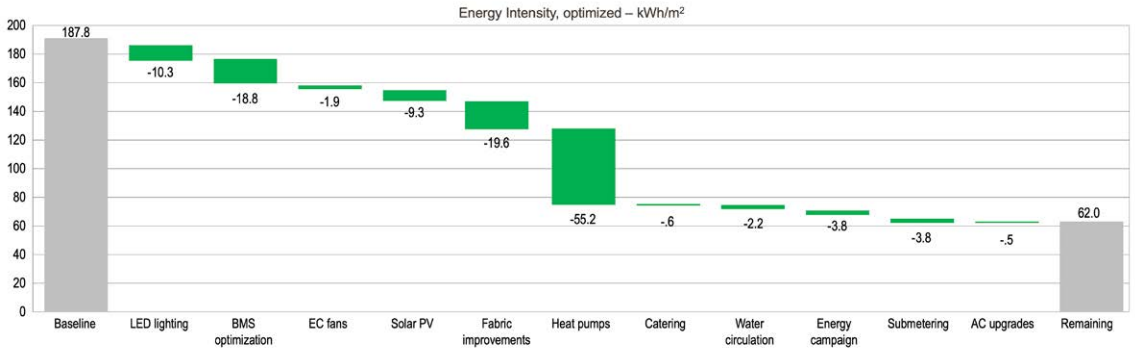
OFFSET
- Minimized carbon as far as practical via the above approach
- Scheme selection chosen to reflect client values and local community benefit (inline with ESG credentials)

BE SEEN
- Publicize design and results, plus POE to review

Opportunities are asset interventions that can help remediate risky assets. Proposed interventions (aligned to the three scenarios previously described) include system upgrades, enclosures, and heat and water sources. These interventions are evaluated by feasibility, costs, installation timeline, and benefits to prescribing the asset's overall value proposition. This is visually represented within a *cascade diagram*, as illustrated in **Figure 10**.

Figure 10

Asset intervention value proposition cascade diagram.



Costs and timing should be viewed within a CapEx lens to develop accurate cost planning/ forecasting and prioritization of implementation.

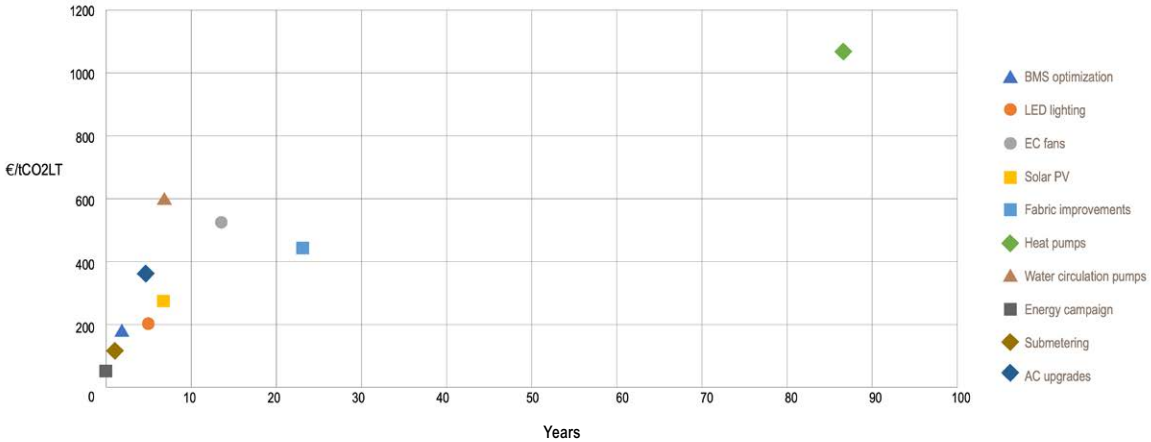
All interventions are generated considering predicted changes to the climate that will impact the performance of the asset, alongside carbon factors for energy supply associated with local provision or green tariffs as appropriate.

The creation of the cascade diagram is stress tested with a whole-life carbon assessment (in accordance with standards BS EN 15978, ISO14044:2066, or similar) to establish the lowest overall utilization of carbon during the lifetime of the asset, as some traditional interventions (e.g., external shading/triple glazing) may not return sufficient operational savings against the capital carbon investment.

The projected carbon savings can then be represented in graphical format (see **Figure 11**) to illustrate the relative costings of each proposed intervention. Future energy costs, inflation, and predicted reduction in costs of each intervention due to scaling are factored within the costing assessment.

Figure 11

Projected carbon savings for each intervention type. (€/tCOLT = ratio of CapEx over lifetime carbon savings.)

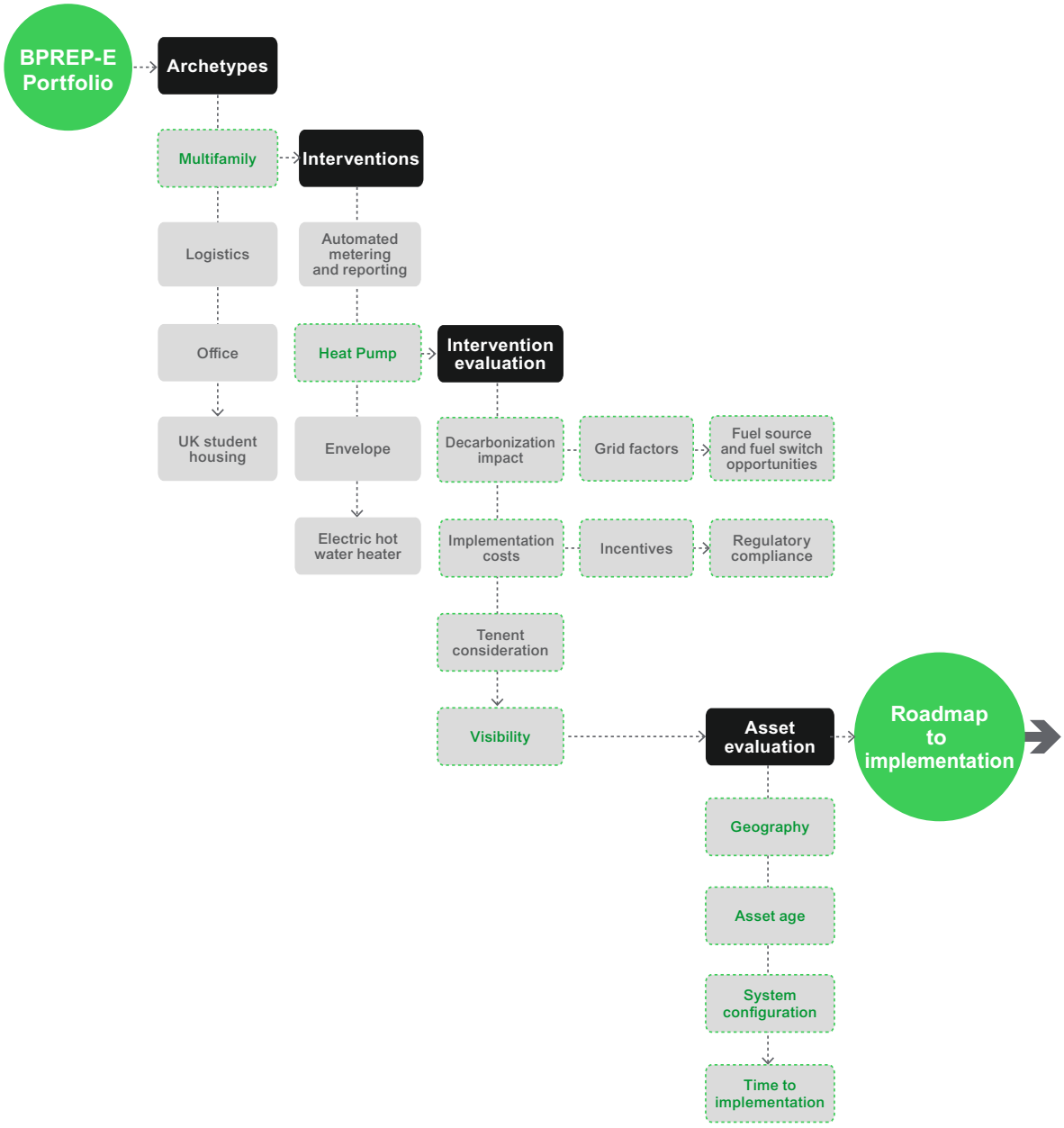


4.3 Case study

Figure 12 illustrates the complete portfolio and asset intervention analysis process used for the BPREP-E fund.

Figure 12

BPREP-E portfolio and asset intervention analysis process.



Evaluating the current portfolio and available data, the interventions shown in **Figure 13** were holistically reviewed for implementation within the Residential Multifamily archetype.

Figure 13

Review and ranking of asset intervention options for BPREP-E, Residential Multifamily archetype. Matrix scoring: low is bad, high is good. Note: Baseline, costs, timeline, and reduction goals are needed to calculate measurable ROI. Future carbon pricing (taxation and/or offsetting commitments) must be considered during financial appraisals.

	Decarbonization impact	Implementation costs	Tenant-friendly installation	Viability
Automated energy metering and reporting **Opportunity/Why:** Enhanced data provides detailed visibility into energy and utility usage. Initially, metering data to be used to set a unit baseline – further evaluation will create metrics for analysis and hold tenants/landlords accountable for setting usage goals while incentivizing energy reduction. **ROI:** Granular, in-depth review of energy data, insights to optimize energy performance, accurate and real-time energy consumption, reduced maintenance costs by insights to low-performance sites – fixing the problem before major repairs are needed, and opportunities for financial benefit through incentives and grants. **Risks/Concerns:** Time required to establish baseline to create targets against.	●●●●○	●●○○○	●●●●◐	●●●●●
Improvements to building envelope **Opportunity/Why:** Energy reduction through enhanced fabric performance is essential to decrease heating and cooling loads, alongside efficient mechanical ventilation with heat recovery (MVHR). Phased interventions associated with window, walls, roofs, and floors were considered. Design and installation quality are imperative to deliver a high-quality internal environment. **ROI:** Increased market value, increased energy efficiency, decreased utility bills, and opportunity for financial benefit through incentives and grants. **Risks/Concerns:** Extent of intervention required to lift an asset into the required condition may involve user disruption. Consultation with users is essential to educate and facilitate seamless workflow to ensure the "S" of ESG is delivered.	●●●●●	●●○○○	●●○○○	●●●●●
Air-sourced heat pumps (in-unit) **Opportunity/Why:** Heats pumps save money by cutting the cost of heating in most cases. They also help decarbonize by replacing fossil-fuel-based loads like gas-fired boilers. According to the Environmental Protection Agency (EPA), heat pumps can reduce electricity usage for heating by up to 50% compared to electrical furnaces and baseboard heaters. **ROI:** Reduced carbon footprint, reduced maintenance costs, maintenance costs, reduced risk of gas leaks, increased efficiency savings over lifetime, and opportunities for financial benefit through incentives and grants. **Risks/Concerns:** Invasive installation, requiring vacant units or tenants to agree to vacate the property for installation. Has to be considered in conjunction with building envelope upgrades.	●●●○○	●●●●○	●●●●○	●●○○○
Electric hot water (in-unit) **Opportunity/Why:** Scope 2 emissions are decreased over time as the building owner currently purchases building-wide district hot water (DHW) from the utility, which uses natural gas to heat the DHW system. **ROI:** Increased efficiency, increased life of system, decreased costs, and opportunities for financial benefit through incentives and grants. **Risks/Concerns**: Invasive installation requiring vacant units or tenants to agree to vacate the property for installation. Not ideal for centralized hot water heating where gas water heaters may be necessary.	●●○○○	●●●○○	●●●●○	●●●○○
Renewable energy generation **Opportunity/Why:** Opportunities associated with existing/ proposed local district energy networks to be explored, alongside on-site generation through solar PV, solar thermal, and heat pumps (air, ground, and water) depending on local conditions. Storage of energy should also be considered for additional resilience and charging during low-cost periods. **ROI:** Increased scaling of technologies and improve financial returns while alleviating fuel poverty. **Risks/Concerns:** Behavioral training for users to maximize benefits.	●●●●●	●●●●○	●●●●○	●●○○○

5

Decarbonization roadmap and asset intervention planning

5.1 Introduction

After generating carbon interventions and costs during initiative 4, initiative 5 determines the most efficient roadmap to achieve the designated targets. The roadmap must align with asset-level practicalities, financial constraints, and program requirements.

5.2 Methodology

Having identified the assets with the greatest decarbonization potential and the cascade diagrams illustrating a range of available interventions, initiative 5 requires additional drivers to be factored into the decision-making process to generate a roadmap.

These additional drivers can be grouped as follows:

1. **Disruption to tenants**. As noted in the introduction, some renovation scenarios require minimizing disruption to occupants. This can often be accomplished using a phased approach to renovation work.

2. **Asset.** Considerations include residual service life, planned maintenance, lease duration, and ownership of bills which determines who gains the benefit of improvements.

3. **Technical.** This includes evaluating ease of installation, utility capacity, and connections.

4. **Regulation.** This can include reporting requirements, planning implications associated with over-cladding or PV installations, or specific regulatory deadlines for energy efficiency (e.g., UK regulations require lettable buildings in England and Wales to have minimum EPC C by 2027 and EPC B by 2030).

5. **Procurement.** Consider partnerships that can:

   - Facilitate continuous rollout
   - Incentivize the supply chain
   - Enhance training and skills
   - Enable a win-win scenario for the client and partner that leverages continuous learning and leveraging best practices to drive cost efficiencies and scalability, e.g., for bulk purchasing, design, and installation.

In developing the optimum roadmap, each variable requires additional investigation and is allocated a relative weighting. All decision-makers must engage in this process as there will be conflicting requirements, with compromise being essential.

Once the weighting is agreed upon, a scoring matrix generates the sequence of interventions. Key stakeholders must review the route map to prevent inappropriate sequencing of tasks and to agree on where compromises can occur.

Having narrowed the options appraisals to those assets within tiers 1, 2, and 3 (refer again to initiative 4, **Figure 8**), the site-specific constraints and weightings applied will generate the preferred intervention and order of priority for each asset. For example, interventions could range from meter installations, automatic controls, and LED replacements to more intrusive façade enhancement works.

Before actioning the roadmap, physical non-intrusive surveys should be undertaken to review site-specific details and verify appropriate interventions. Note that by performing asset intervention tiered ranking first (initiative 4), on-site surveys at this stage can be limited to properties where interventions are anticipated in the short to medium term. Where new information is discovered, the weightings can be revisited to assess whether the original interventions are still appropriate or not.

5.3 Case study

Following a defined roadmap is imperative for successfully implementing selected and prioritized interventions for an archetype. Once agreed upon by key stakeholders, a roadmap can help ensure that portfolio goals are met, and desired benefits are delivered.

As an example from the BPREP-E program, automated energy metering and reporting is one of several identified interventions. This is due to automated reporting and metering being a key requirement for establishing portfolio baselines and developing a measurable way to validate success in carbon/energy reduction and ESG goals supporting further road-mapped interventions.

Intervention(s) implementation should be viewed within a CapEx total cost-of-ownership lens to develop accurate cost planning/forecasting to determine the prioritization of implementation solutions. Furthermore, having direct data to establish the baselines and indicate the actual improvements across all utilities is easily defendable. This enhances reporting credibility.

For the implementation of an automated energy metering and reporting intervention, an example roadmap may be as follows:

1. **Analyze portfolio trends**
   - Down-select the Residential Multifamily archetype and automated energy metering and reporting intervention as a prioritized intervention.
   - Establish the goals of intervention: What energy or cost savings over X years are feasible with this intervention? What type of data needs to be captured to measure this? These goals must encompass the timeframe and desired reduction in carbon footprint.
   - Note any regulatory requirements, either in place now or upcoming.
2. **Select assets and technologies**
   - Select prime Residential Multifamily assets to determine the number of units and building area, which informs the number of meters, technical specifications, and required granularity needed.
   - Device specifications and selection shall be based on data capture requirements.
3. **Determine intervention impact**
   - Coordinate with local property and facilities management teams to develop preliminary schedules with defined impacts on tenants.
   - Coordinate with local utilities (i.e., power, water, gas, etc.).

4. **Evaluate technical solutions**

   - These must meet granularity and data reporting requirements.

5. **Create procurement RFP**

   - This should include acceptable solutions, the number of meters needed for installation, and the timeframe.

6. **Develop data acquisition protocol and reporting strategy**

   - This will ensure data can be used as a valuable asset for stakeholders and tenants.

6

Prioritization and funding alignment

6.1 Introduction

The capital planning process for existing assets is a collaboration between facility and asset managers in support of future goals for ESG. The collaboration is a long process based on each asset's long-term rolling strategy. Planning for improvements falls into three categories referring to:

- Refurbishments
- Connectivity and technology
- Basebuild systems that are critical to the asset

As ESG becomes an integral part of the asset lifecycle, programs related to retrofits and renovations become expenditures that also improve the asset's environmental performance. For instance, sustainable sourcing of material, the energy efficiency of upgrades, and an increase in occupant experience bring pathways for ESG data for reporting and measurable improvements from business as usual.

6.2 Methodology

Focus on building archetypes, with a view of capital planning concerning the financial and operational control of CRE stakeholders. Whereas a dormitory retains the entire asset's financial ownership and operational control, leasing constraints to existing sites need to be refocused as part of the ROI of the realized savings of the capital expended.

6.3 Case study

When considering the prioritization of funding requirements for the renewal and upgrade of the BPREP-E assets, Brookfield Asset Management follows three criteria:

- Energy efficiency
- Electrification
- Decarbonization

As well as the above criteria, the following considerations are also taken into account and aligned to reach a decision, with each decision made on its own basis – cognisant that individual assets in a portfolio will change and, therefore, will be more difficult to analyze.

- **Divestment model** – Driving it from the perspective and benefit of the tenants. Can the tenants be incentivized to reduce their energy costs?
- **Duration model** – Short, medium, and long term.
- **Financial and climate-related** – Ensuring continued alignment with CapEx based on 'pay for itself' on cost savings or value through an exit, i.e., will the asset be unsellable without the intervention, and will it add a premium with it? Where is the asset on the ESG maturity matrix?
- **Lease completion** – Ensuring that access is available to energy and usage data following the renewal of a lease, especially in the context of a Triple Net lease. For example, can 3rd party management terms be negotiated for automated metering?
- **Distributed energy resources (DER)** – Consider different models of the power purchase agreement for the installation of photovoltaics, e.g., use the roof space and sell energy back to the grid.
- **Existing performance** – Understand the 'laggard' assets and the 'performer' assets.

Conclusion

The valuation of building stocks and investment strategies is increasingly tied to sustainability. Commercial real estate firms must set a path to decarbonize existing building assets or risk impacting future profitability.

While it is incumbent on asset owners and managers to enable modernization work on behalf of ownership during financial control of an asset, they are faced with a confluence of needs when managing large portfolios or funds encompassing an array of building types. This presents a multi-dimensional challenge, from setting objectives, engaging stakeholders, and acquiring data, to prioritizing opportunities and interventions, minimizing disruptions, and funding projects.

The intent of the BPREP-E decarbonization project was to create an expedited pipeline for asset improvements through a structured approach. This is an active, ongoing program for which decisions continue to be made and actions are taken.

The program has successfully established a repeatable structured methodology that:

- provides greater data coverage across the portfolio
- increases Brookfield's fund-level GRESB score
- acts as a springboard for the next level of modeling

The program has revealed the vital need for organizations to define goals with overarching implementation timelines and policies informing their intended outcomes. A bottom-up approach must be used to meet these top-down goals, supported by comprehensive data capture and ongoing monitoring and reporting.

In addition, universal lessons gained from the program can help other CRE firms build a robust plan for their own decarbonization journey, see **Figure 14.**

Figure 14

Lessons learned

Action	Lessons Learned
1. Establish targets	• Understand your stakeholder hierarchy and empower all to participate. • Understand relevant reporting organizations that can provide sufficient validation for ESG efforts.
2. Data capture and reporting framework	• Consider how data supports your goals. Use a data capture methodology that supports an iterative approach. • Guide actions with a data responsibility matrix. • Enable data sharing with all stakeholders.
3. Site-level data collection	• Develop a continuous site data collection model that encompasses all data types (and collection methods) needed to satisfy ESG reporting requirements. • Use automation to reduce the impact on the stakeholders.
4. Portfolio risks and opportunities assessment	• Establish a baseline and metrics to help determine reduction goals and use metering/reporting analytics to validate that interventions have delivered desired energy and carbon reductions. • Group properties by archetypes to enable baseline comparisons. • Reveal best decarbonization opportunities by identifying energy performance 'outliers.' • Evaluate and rank asset intervention options by decarbonization impact, cost, tenant disruption, and viability.
5. Decarbonization roadmap and asset intervention planning	• For assets with the greatest decarbonization potential, investigate and weigh other relevant drivers in decisions to choose the best interventions and establish your roadmap.
6.Prioritization and funding alignment	• Focus on building archetypes, with a view of capital planning in relation to the financial and operational control of CRE stakeholders. • Prioritize funding based on relevant criteria (e.g., energy efficiency, divestment model, duration, lease, etc.).

The journey will differ for every organization based on its business, assets, regions, and other drivers. To simplify and accelerate this process, it is recommended to choose partners with relevant experience and deep expertise in all aspects of commercial real estate decarbonization planning and execution.

About the authors

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Resources

- WSP Property and Buildings
- WSP “The realist’s road to zero”
- WSP Guide: Fresh thinking for the office of the future
- WSP “The Business Imperatives Of Sustainable Buildings”
- Schneider Electric EcoStruxure™ for Commercial Real Estate solutions
- Schneider Electric Sustainability Consulting
- IDC Solution Brief: The Business Value of Schneider Electric’s EcoStruxure Solutions for Commercial Property
- Guide: Build It for Zero Carbon: A Roadmap to Realizing Decarbonization of Buildings
- Guide: Retrofit for sustainability: A facility manager’s guide for Net-Zero Buildings

List of figures