



An Introduction to Decarbonizing Buildings

Delivered by:

Digital Energy
Decarbonization Office

Understand the basics behind decarbonization

Life Is On

Schneider
Electric

Carbon Emissions in Buildings



~30%

Design & Build

Embodied carbon emissions relate to the building materials manufacturing, transport, installation, use, maintenance, and replacement / disposal.



~70%

Operate & Maintain

Operational carbon emissions relate to the energy consumed during the use phase of the building.

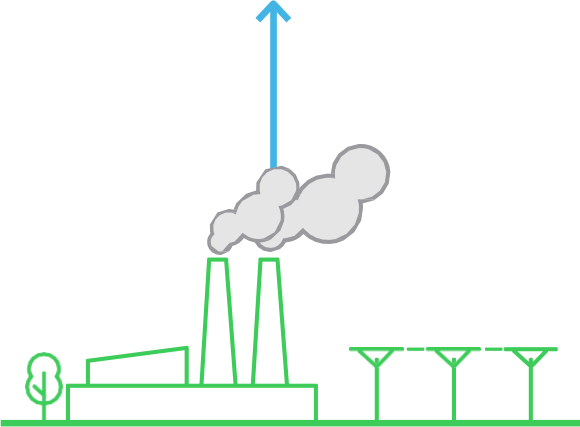
What are Scope 1, 2, and 3 Emissions?

Atmospheric Greenhouse Gases



Scope 1 Direct Emissions

Emission Source: All direct emissions within the operational control of an organization.



Scope 2 Indirect Emissions

Emission Source: Indirect emissions generated from purchased electricity, heat, steam, or cooling.



Scope 3 Indirect Emissions

Emission Source: All other indirect emissions from sources such as business travel, waste management, and the value chain.

Decarbonization is Growing in Importance

Net-zero commitments continue to rise, increasing pressure to act

140+

countries have proposed or committed to net-zero carbon emissions by 2050¹

63%

of Global Fortune 500 companies have emissions reduction targets²

96%

of companies with approved SBTi targets include Scope 3³

50%

of today's building stock will still be in use in 2050⁴

37%

buildings contribution to global GHG emissions⁴

¹ [International Monetary Fund](#)

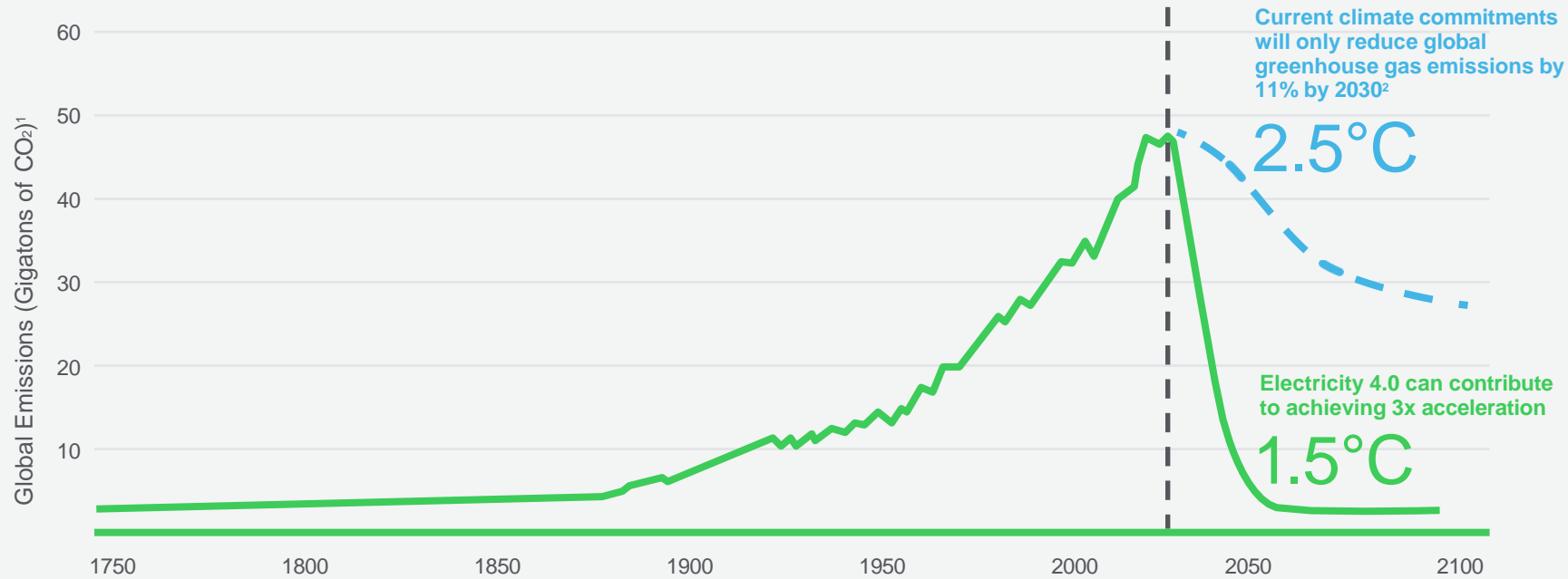
² [Fortune](#)

³ [SBTi, Annual Progress Report, v 1.2 June 2022](#)

⁴ [IEA Energy Technology Perspectives](#), Note: When both the construction and use phases are taken into consideration, it contributes around 37% of today's global CO₂ emissions

Decarbonization Progress is Being Made...

But we need to go **3x faster**



The Intergovernmental Panel on Climate Change (IPCC) warns that we must limit human-caused global warming to 1.5°C or risk catastrophic planetary impacts. Impacts already being felt today will dramatically increase without immediate and substantial emissions reductions.

Electricity 4.0 is a combination of **digital** and **electric**. Digital for efficiency – and electric for decarbonization. The combination of both is what makes energy **green** and **smart**, creating a more sustainable world.

¹ Global Carbon Budget (2019); IPCC (2020), ETC, [Making clean electrification possible \(2021\)](#), [Schneider Electric Research Institute](#). Note: View includes industry process emissions, changes in land uses, such as deforestation
² [International Monetary Fund](#)

The Ambition to Action Gap

Biggest implementation challenges

We surveyed 540 C-level executives across the globe, each with annual turnover of more \$1B.

Only **8%** are delivering on their ESG targets*



Stakeholder alignment



Data collection, reporting, transparency



Budget, financing



Technology, workforce skills



CO₂ science understanding



Roadmap execution

*Out of 539 respondents.
2022 CXO ESG Report, Schneider Electric Research Institute

We Can Help Close the Ambition to Action Gap

Carbon emission reduction impact in existing buildings



Sources:
<https://architecture2030.org/why-the-building-sector/>
<https://www.mckinsey.com/industries/engineering-construction-and-building-materials/our-insights/call-for-action-seizing-the-decarbonization-opportunity-in-construction>
<https://www.se.com/ww/en/insights/sustainability/sustainability-research-institute/back-to-2050.jsp>

Our Commitment

We are decarbonizing our own operations and supply chain

- 2025** Carbon neutral in our operations¹
- 2030** Net-Zero ready in our operations
- 2040** Carbon neutral entire value chain¹
- 2050** Net-Zero entire value chain

¹ With carbon offsets
² Cumulative since 2018-2025 commitment
³ 2014 reference year



We are helping others decarbonize



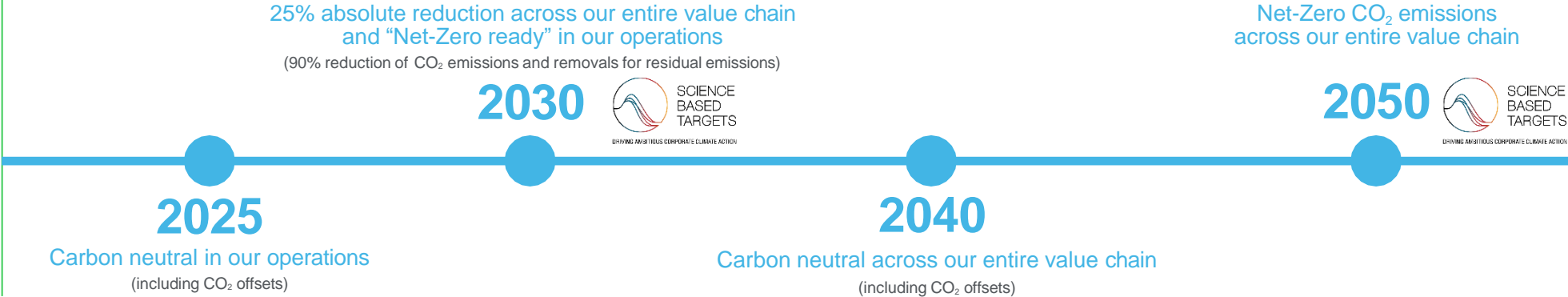
- 50M** People access to green energy by 2025
- >14 GW** PPAs advised with our clients³
- 800 MtCO₂e** Saved / avoided for our customers by 2025²

Schneider Electric Net-Zero Commitment



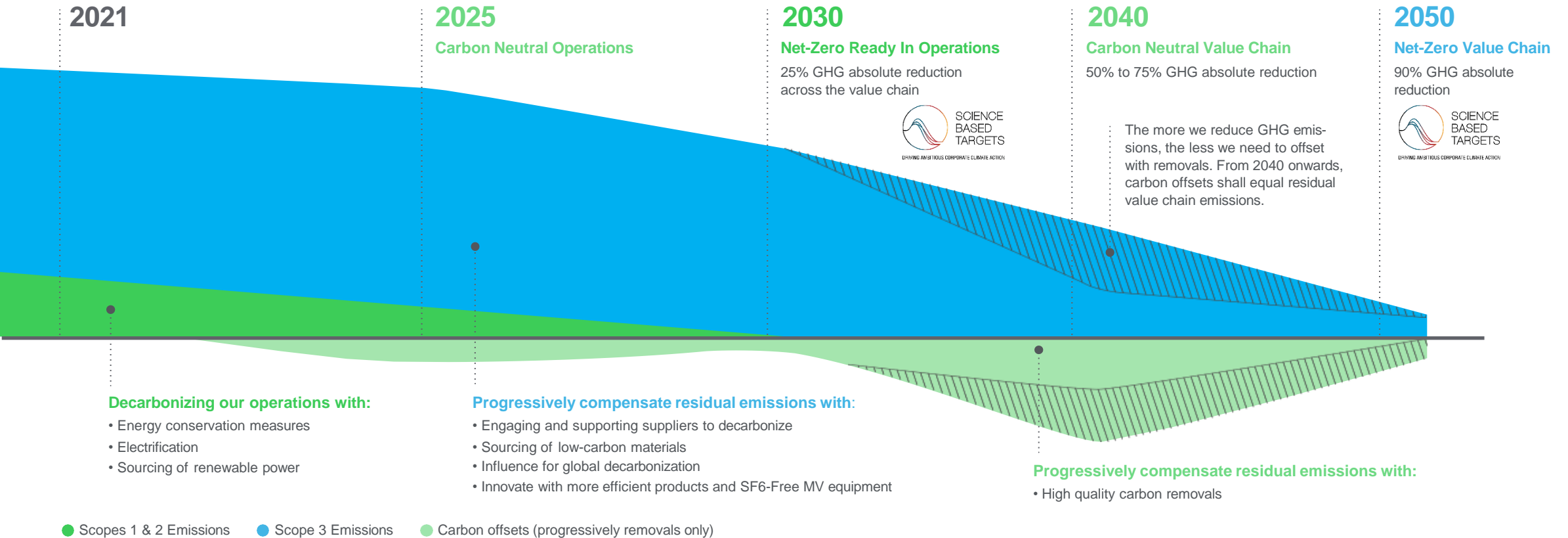
Schneider Electric is an Impact company, committed to bridge progress and sustainability for all. Not only are we a sustainability enabler, supporting partners and customers with our digital solutions and services, we are also a sustainability practitioner, leading in ESG and committed to become net-zero across our end-to-end value chain.

Here is our roadmap to do so, with concrete net-zero targets validated by the Science Based Targets initiative. We are already tackling the reduction of emissions across all scopes (1, 2 and 3) and we will keep bringing our ecosystem along, in line with our ambition to contribute to limiting global temperature rise to 1.5°C.





Roadmap Towards Net-Zero Value Chain



Disclaimer: emission reduction curves are indicative and do not commit the group to annual reduction targets. Proportions between scope 1, 2 and 3 are not exact to facilitate the visualization of our emissions reduction's trajectories. All precise carbon footprint data are published in the Group's Universal Registration Documents, and CDP Climate Change responses and are externally assured by accredited third party verifiers

Four Key Drivers for Decarbonization Action

1

Increase transparency of emissions data – meet mandatory reporting and carbon reduction regulations, as well as report through voluntary frameworks.

2

Address financial risks and opportunities – mitigate energy price, escalation and volatility, minimize exposure to carbon taxes, and take advantage of available incentives while reducing operating costs.

3

Respond to stakeholder pressure including tenants, employees, customers, and investors – commit to net-zero targets, and enhance occupant satisfaction while strengthening brand image.

4

Overcome operational challenges due to aging infrastructure and skilled workforce shortage – invest in digitization.

Mandatory and Voluntary Reporting Drive Transparency

Companies are increasingly reporting or being asked to report through voluntary frameworks like CDP



Mandatory reporting ordinances often require energy data disclosure, but focus is shifting to mandatory carbon reporting following the SEC’s proposed Climate-Related Disclosures rule. The intent in these rules is that transparency will lead to action.

Local Law 97 in NYC, the EU’s Minimum Energy Performance Standard, and Decret Tertiare in France are further examples of regulations moving beyond transparency to require energy and carbon emissions reductions.

The growing market demand for environmental disclosure



680+

investors with US\$130+ trillion in assets are requesting thousands of companies to disclose to them through CDP in 2022



18,700+

companies worth over half of global market capitalization disclosed through CDP in 2022



280+

CDP Supply Chain members, major buyers with US\$6.4 trillion in procurement spend requested thousands of their suppliers to disclose through CDP in 2022

Source: <https://www.cdp.net/en/companies>

Managing Financial Risks: Carbon Pricing Instruments

Carbon Tax:

A government policy fixing a fee on GHG emissions and/or providing a financial incentive to lower emissions. The market determines the level of emission reductions incentivized by the price.

Emission Trading System (ETS):

Two systems in place where the price of carbon is not fixed by the government but determined by the supply/demand of emissions allowances or credits.

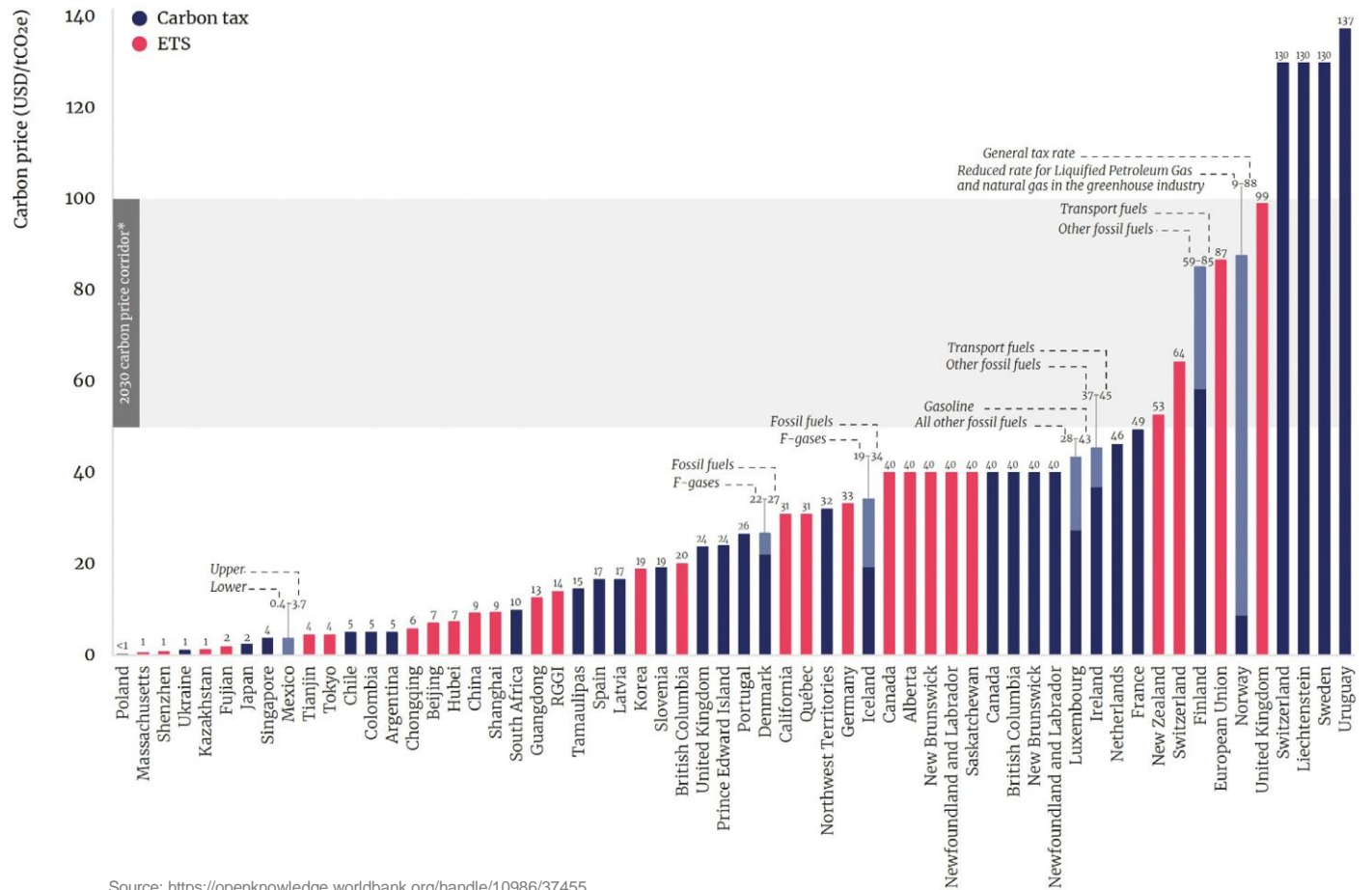
Carbon Credit Mechanism:

System where tradable credits are generated through voluntarily implemented emission reduction or removal activities. Organization can generate carbon credits by demonstrating that emissions have been reduced relative to a contractual baseline.

Evolving Legislation in US:

In the United States, rules and pressure is generated primarily in local city or state markets, such as LL97 in NYC and BERDO in Boston.

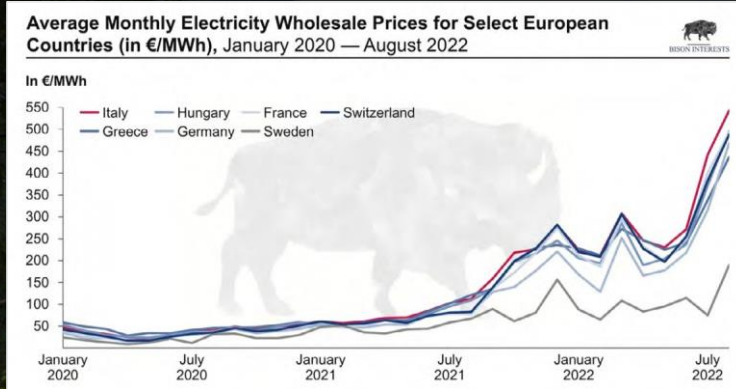
Carbon prices as of April 1, 2022



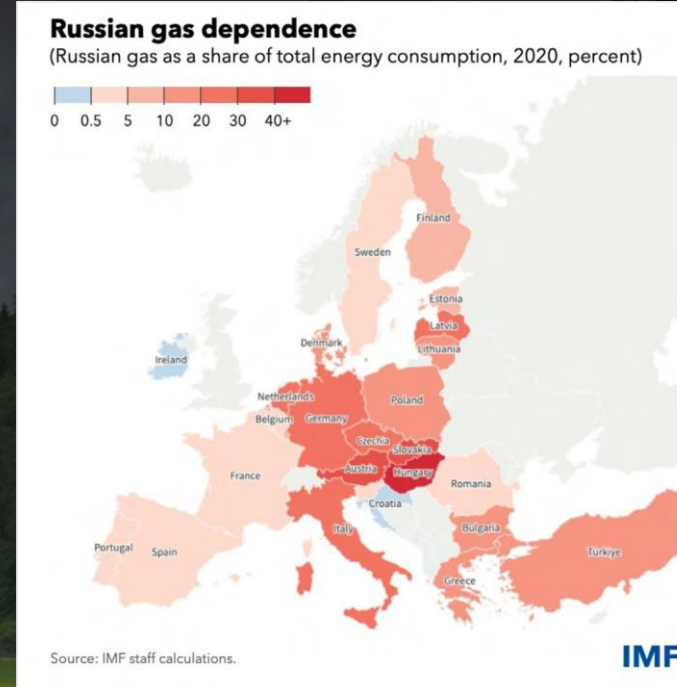
Source: <https://openknowledge.worldbank.org/handle/10986/37455>

Managing Financial Risks – Energy Price Volatility

🔍 Zoom in on Europe: gas dependency on Russia trigger an unprecedented energy crisis



Electricity spot prices increased more than x 4 in 1 year



Overall electricity demand 10%

A target for Member States to reduce overall electricity demand by at least 10%

Demand during peak hours 5%

An obligation for Member States to reduce demand during peak price hours by at least 5%

Member States will be **free to choose the measures** to achieve this demand reduction. In particular, they should consider economically efficient and market-based measures such as auctions or tender schemes for demand side response or electricity not consumed.

By reducing electricity demand by **5% at peak times**, we **reduce** gas use for power by around 4% over the winter and reduce pressure on prices

5% at peak times
➤
4% gas use for power

Electricity measures

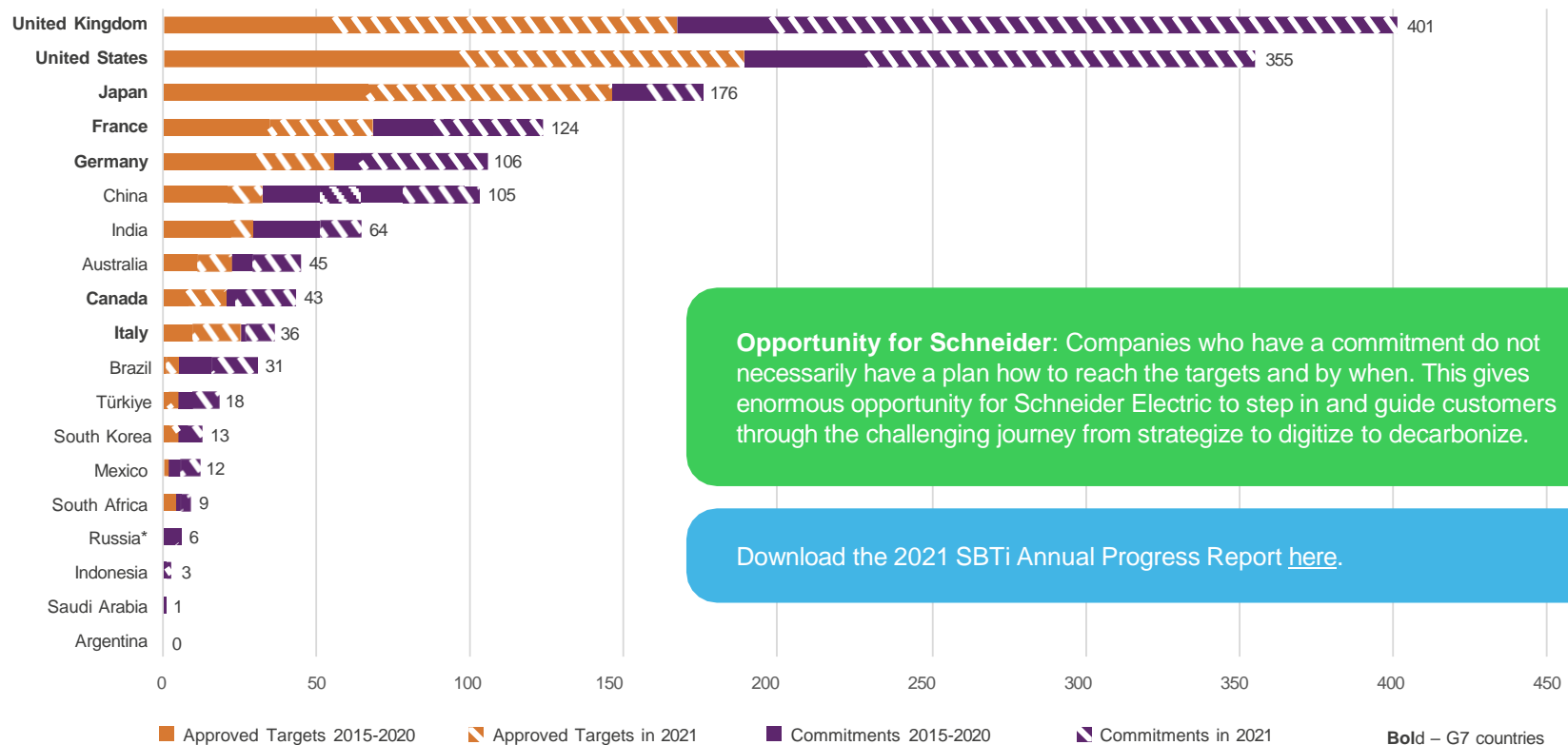
Implication on gas

Source: https://ec.europa.eu/commission/presscorner/detail/en/fs_22_5491

Response to Stakeholder Pressure

Record growth in # Science Based Targets initiative (SBTi) commitments and approved targets

SBTi: Country view of G20-based companies with approved targets and commitments as of Dec. 2021



Opportunity for Schneider: Companies who have a commitment do not necessarily have a plan how to reach the targets and by when. This gives enormous opportunity for Schneider Electric to step in and guide customers through the challenging journey from strategize to digitize to decarbonize.

Download the 2021 SBTi Annual Progress Report [here](#).



- The number of SBTi companies increased at a record pace in 2021 – three times faster than in 2020.
- More than 1,300 companies set and committed to science-based targets, at a rate of over 110 companies per month, compared with 35 companies per month in 2020.
- The rate of companies' target validation more than doubled, from 20 per month on average in 2020, to 49 in 2021, reflecting the initiative's increasing technical capacity and resources to meet demand. In 2022, the SBTi has continued to experience exponential growth.

Source: Sciencebasedtargets.org

Overcoming Operational Challenges Through Digitization



Facility management is no longer viewed just as a cost center: teams are now responsible for keeping energy and operational costs down, supporting sustainability goals, ensuring a healthy indoor environment, improving the occupant experience, and optimizing space utilization.”

Manish Kumar
Executive Vice President,
Digital Energy Division



Teams are expected to take on these responsibilities often without adequate resources (skilled labor or budgets) to do so. Inadequate staffing and dated software systems are some of the highest building operations pain points.



The Global Building Management System Market was valued at USD 14.10 billion in 2021 and is expected to reach USD 51.73 billion by 2029, registering a CAGR of 15.53% during the forecast period of 2022-2029. Increase in demand for energy-efficient and eco-friendly buildings will further expand the market.¹

¹ <https://www.databridgemarketresearch.com/reports/global-building-management-system-market>

Building Operator Maintenance Pain Points

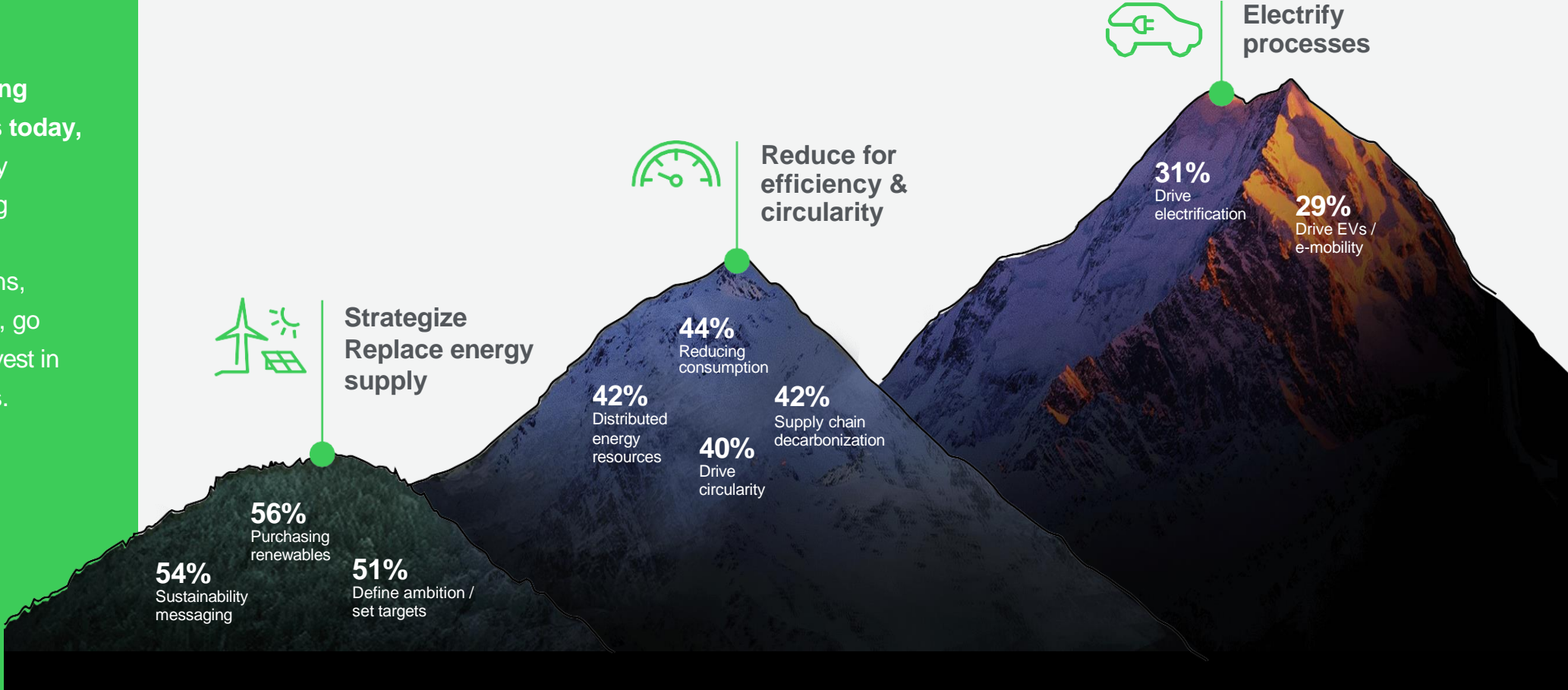
Targeted at Buyers – What are the primary pain points you face related to maintenance management in your building? (Select all that apply)



Source: CABA Artificial Intelligence and Predictive Maintenance in Buildings 2021 Report

What Decarbonization Activities are Customers Pursuing Most Today?

 Customers are taking steps to deliver results today, such as improving energy efficiency and purchasing renewables, but to reach net-zero carbon emissions, they must think long-term, go beyond efficiency and invest in next-generation solutions.



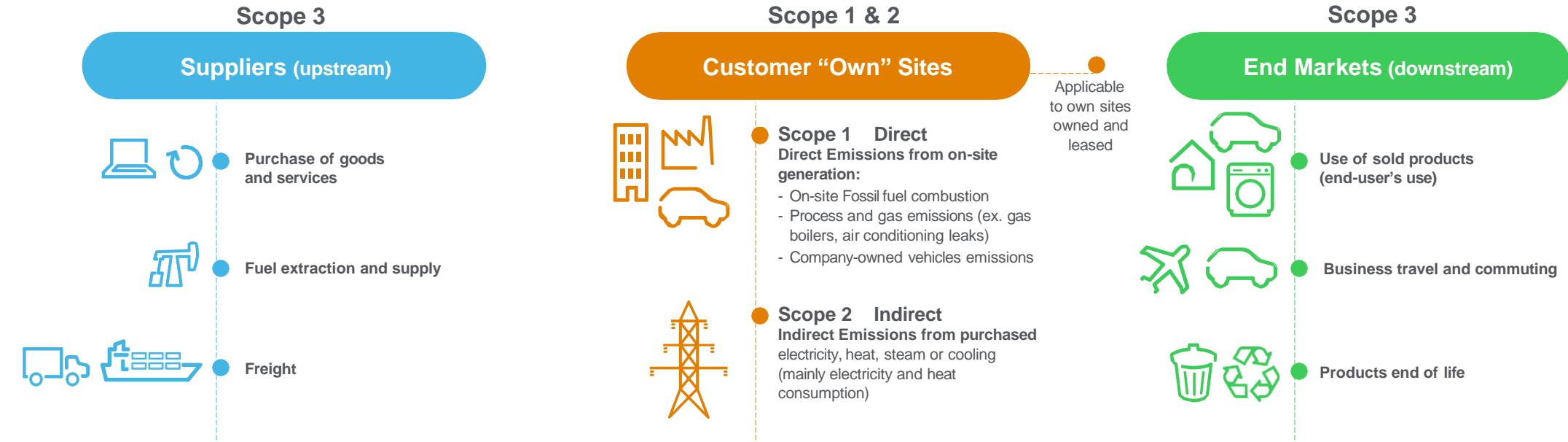
Based on 2022 CXO ESG Report, Out of 539 respondents

Schneider Helps Reduce the Carbon Footprint of Our Customers

Scope 1: EcoStruxure solutions designed to reduce energy consumption & to electrify the load

Scope 2: Implementation of Green Power Purchase Agreement (PPA) and on-site power generation

Scope 3: Our Green Premium products, circularity strategy offers, and supply chain PPA aggregation services



Learn more about Scope 3 vs. Scope 1 & 2 reduction commitments in the “Demystifying Scope 3 – Findings from Global Compact Denmark and SBTi Workshop” article [here](#).

The Path to Net-Zero Buildings

Strategize and Digitize steps are “pre-requisites” and enablers for the full decarbonization journey



Strategize

1. Create decarbonization roadmap



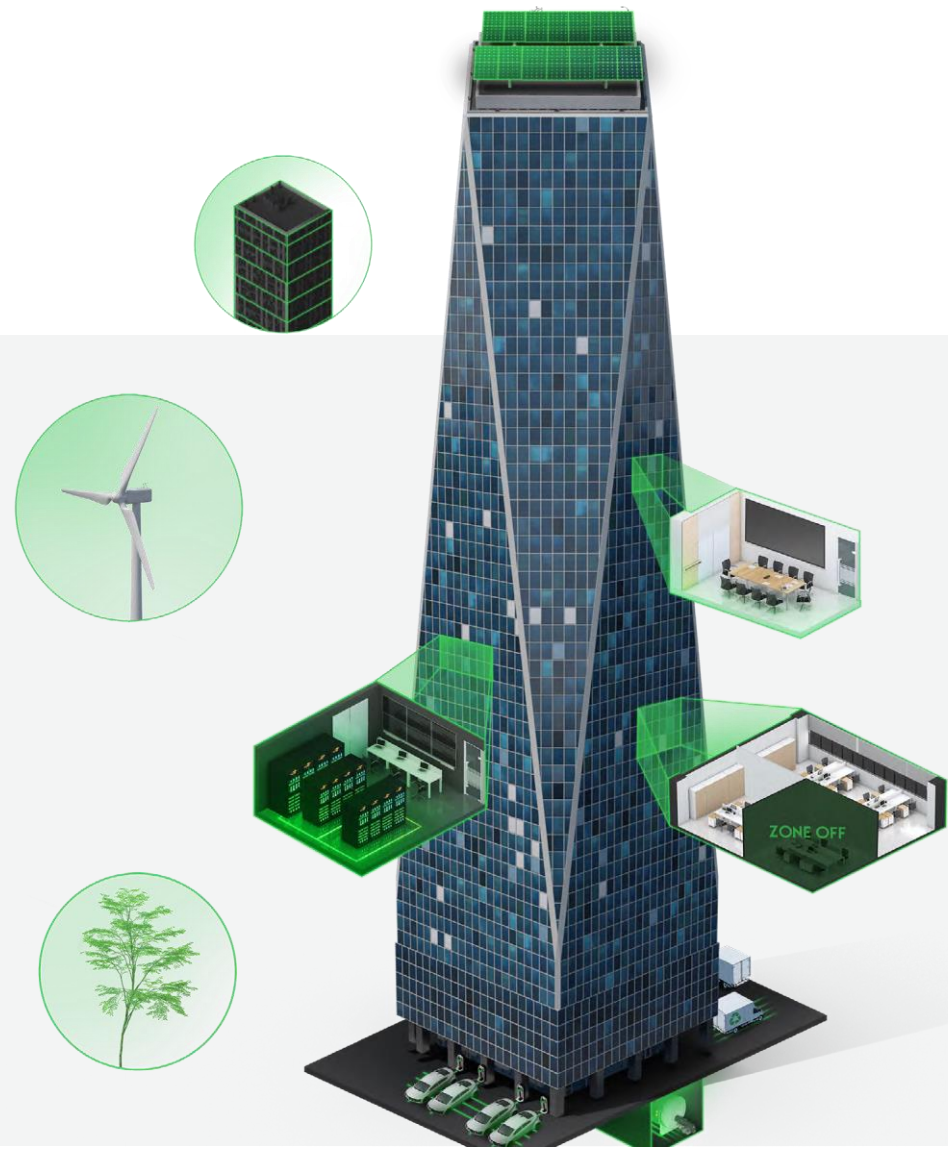
Digitize

2. Enable carbon tracking leveraging building information modeling (BIM) for new builds and major retrofits
3. Measure and monitor building energy and carbon with connected data



Decarbonize

4. Reduce energy consumption utilizing BMS for efficiency
5. Replace energy supply with offsite PPAs
6. Electrify transportation
7. Electrify and upgrade building infrastructure
8. Replace energy supply with onsite renewables and microgrids
9. Reduce embodied carbon through sustainable products
10. Offset unavoidable operational and embodied carbon emissions



Strategize

Define success



Measure enterprise baseline

Create decarbonization roadmap

Structure program and governance

Engage ecosystem

Communicate commitment

Understand where you are starting from, where you want to go, and how best to get there. With tools like Zeigo Activate you can:

- Establish a GHG emissions baseline (Scope 1 & 2)
- Create a decarbonization roadmap at the portfolio level or building level

Obtain the funding you need to move from strategy to action.

For decarbonization or sustainability program structuring, governance, corporate reporting, or Scope 3 and full value chain decarbonization offers, rely on the expertise within Schneider Electric's Sustainability Business.

Schneider Electric Offer:

[Sustainability Business Consulting Services](#)

Digitize

Insights to enable action



Monitor resource usage and emissions

Identify savings opportunities

Report and benchmark progress

Measure and monitor your operational carbon performance with connected data:

- Ongoing energy and carbon tracking, benchmarking, and reporting can be performed with tools like Resource Advisor
- Power Metering (PowerLogic PowerTag) and intelligent circuit breakers (MasterPacT MTZ) can be deployed for more granular insights, with easy to digest dashboards available in EcoStruxure Energy Hub, EcoStruxure Power, or PME
- The Advisor suite of products and EcoStruxure Building Advisor Carbon Insights dashboard can identify opportunities for improved operations

Enable embodied carbon tracking leveraging BIM for new build and major retrofit (RIB).

Decarbonize

Deliver savings



Reduce energy use

Electrify operations

Replace energy sources

Reducing energy use and cost is typically one of the first steps many customers take on their decarbonization journey, but they must go beyond efficiency to reach net-zero.

Reduce energy use and carbon across the building lifecycle:

- Reduce energy consumption utilizing EcoStruxure Building Operation, EcoStruxure Connected Room Solution, and Planon Integrated Workplace Management Solution for efficiency (reduces Scope 1 & 2)
- Reduce embodied carbon through purchasing better products– (addresses Scope 3)

Find the right solutions to **replace** your energy supply to reduce Scope 2 emissions:

- Procure renewable energy through the Sustainability Business, industry leader in offsite Power Purchase Agreements (PPAs)
- Install renewable energy onsite through Microgrids

Electrify major loads to reduce Scope 1 emissions and take advantage of efforts underway to decarbonize the grid:

- Electrify transportation – EV charging for workplace/retail charging, and fleet conversion
- Electrify and upgrade building infrastructure (and envelope) – rely on design partners for guidance on major renovations utilizing tools like ETAP and AED+

Offset unavoidable carbon emissions (Scope 1, 2, and/or 3) with the expertise of the Sustainability Business.

Ranking Decarbonization Steps

Step	Ease of Deployment	Carbon Impact	Outcome	
1 Create decarbonization roadmap	Easy	Enabler – must have, SE differentiator	Portfolio and building-level action plans to move from ambition to action	Prerequisite
2 Track embodied carbon	Medium	Enabler – nice to have	CO ₂ transparency – must have for total carbon footprint visibility	
3 Measure and monitor energy and carbon	Medium	Enabler – must have, SE differentiator	CO ₂ transparency – Visibility needed for reporting and insights, enables operational carbon reductions	High ROI short-mid term investment
4 Reduce energy and carbon through automation	Easy	Medium	15-30% reduction in operational carbon (10-20% total building carbon footprint reduction)	
5 Purchase offsite renewables	Easy	Medium-High, SE differentiator	Operational carbon savings (Scope 2), impact depends on scale purchased	
6 Electrify transportation	Easy-Medium	Low for most customers, exception for logistics or customers with fleets	Operational carbon (fleet – Scope 1) and Scope 3 (commute) savings, impact depends on scale purchased	Mid-Low ROI mid-long term investment
7 Upgrade building systems and electrical infrastructure	Difficult	Medium	30-60% reduction in operational carbon (20-40% total building carbon footprint reduction)	
8 Install onsite renewables	Medium	Medium, SE differentiator	Operational carbon savings (Scope 2), impact depends on scale and site applicability	
9 Limit embodied carbon	Easy-Medium	Low for most customers, exception developers	Scope 3 reduction, scale of impact depends on level of investment in major retrofits/new construction across a portfolio	
10 Offset residual carbon emissions	Easy	High	Scope 1 and 3 reduction, impact depends on scale purchased	Low-No ROI short term investment

A Changemaker for Sustainability

For 15 years, sustainability has been at the core of Schneider Electric's transformation journey. The Group is now a world corporation leader in sustainability and a key enabler for all stakeholders in its ecosystem to accelerate their own energy efficiency and sustainability transition. With this experience, comes a strong belief that what makes Schneider Electric stand out today and tomorrow is that it is an impact company.

“Companies need to have a net positive mindset where they can benefit from solving the world's problems instead of creating them. This restorative mindset is aligned with Schneider Electric's impact company model that can be a true driver for change.

Bertrand Piccard
Chairman of the Solar Impulse Foundation



An Impact company seeks to address the needs of all stakeholders in its ecosystem, from employees to supply chain partners, customers, as well as local communities and institutions.

To deliver sustainability in its entire value chain, it must combine a solid profitability with leading practice on all Environmental, Social and Governance dimensions.

It means that an impact company has inherently aligned and integrated its purpose and its business mission to ensure its corporate value delivers on sustainability needs and ambitions.

Watch Schneider's [Impact Company Model video](#).

Customer Story – United Therapeutics

One of the largest net-zero commercial buildings in the U.S.

The Challenge:

- Provide a smart building with the ability to produce more energy than it consumes.
- Integrate multiple vendors, including solar, lighting, and window/shade, into a single front end
- Provide analytics depicting the building's energy utilization, including the validation of net-zero status

The Solution:

- **Digitize:**
Power Monitoring Expert for power meter and BTU meter monitoring
- **Reduce energy use:**
EcoStruxure for Buildings (EcoStruxure Building Operation) to ensure smart energy usage.
Further smart integration of operable window and lighting control, and plant optimization software. Minimized cooling energy with electrochromic glass, Earth labyrinth cooling, and chilled beam cooling
- **Electrify and replace energy source:**
Incorporation of cutting-edge technology, including photovoltaic energy harvesting and geothermal heat recovery

The Outcome:

- Complete building integration using EcoStruxure for Buildings to allow for all smart connections within the building to be localized to a single source of truth to validate & maintain net zero status
- Energy Dashboard to explore the building's energy systems, predictive models and history to drive sustainable change and awareness with occupants
- When in ventilation mode, the entire building consumes as much energy as a typical American suburban home.
- **Certified LEED Platinum**



“We had this really clear mission to minimize our impact on the environment. Schneider was one of the early partners we brought to the team to help us do that. Without that focus on building controls and system integration, I do not think we would have achieved our goal of building a net-zero energy building.”

Thomas Kaufman
Senior Director, Corporate Real Estate,
United Therapeutics Corporation

 Watch the video:
[Unisphere by United Therapeutics](#)

Customer Story – Citycon

New, multi-use city center and shopping mall in Finland

The Challenge:

- Minimize operational and energy costs
- Partner with an integrated solution provide for both building automation system and smart energy system
- Achieve “Zero Energy Building” status and LEED Gold Excellence certification
- Be the most environmentally responsible and eco- friendly urban center in Europe

The Solution:

- **Strategize:** SE became a digital technology and sustainability partner for the entire lifecycle, and helped secure EU stimulus funding for microgrid SaaS.
- **Digitize:** Jointly created digital user interface for Building Management System and Microgrid

The Outcome:

- **15% savings reduction in energy use**
- CO₂ reduction: 335k tCO₂/year
- Onsite storage capacity 1500kWh
- Payback period for Smart Energy Systems by Schneider Electric: Approximately 4 years



We are aiming to be zero carbon in terms of energy use. It's one huge ecosystem, with integrated intelligent energy management. The entire Lippu Laiva centre utilizes renewable energy, such as geothermal and solar. The common goal of Schneider Electric and us is to ensure that future generations can breathe clean air.”

Risto Seppo
Property Development Director, Citycon



Learn more:
[Europe's Most Environmentally Responsible City Center \(video\)](#)

[Citycon Use Case eBrochure](#)

Get more insight on this story. Reach out to [Ellen Tartantur](#), Marketing Manager, MicroGrid & Prosumer.

Customer Story – Aspiria

Building a campus of the future today, in Kansas (US)

The Challenge:

Maintain low energy costs, identify and prevent energy waste, and maximize operational efficiency

The Solution:

Aspiria is an innovation campus of world-class workplaces, facilities, and public spaces. Implemented by C&C Group, a master-level BMS EcoXpert partner, it aimed to improve the comfort, quality, and cost of its campus.

- **Reduce for efficiency:** Schneider and C&C Group provided sustainability, efficiency, and reliability by modernizing the existing BMS system to EcoStruxure Building Operation and utilizing EcoStruxure Building Advisor and EcoStruxure Power Monitoring Expert.

The Outcome:

- **Less than 2-year ROI**
- **16% reduction in annual energy consumption**
- 36% reduction in carbon footprint
- \$1.5 million annual energy cost savings
- From 2019 to 2022: \$700k annual labor cost savings
- 0% downtime for any major building equipment



EcoXpert Success Perspective:

[C&C Group Connects Profitability and Operational Efficiency with EcoStruxure | Schneider Electric](#)

Customer Success Perspective:

[Building a Campus of the Future with EcoStruxure Solutions for Aspiria | Schneider Electric](#)

Get more insight on this story. Reach out to [Ewa Zazel](#), Offer Marketing Program Owner.

Schneider Electric Story – Technopole

Existing office space in Grenoble, France gets a major update to meet sustainability targets

The Challenge:

- No sustainability credentials
- Difficult to add new technology and no data visibility
- Unattractive old buildings spread over different sites

The Solution:

- **Digitize:**
Data-driven design and build via BIM modeling and energy simulation
- **Reduce for efficiency:**
Space and meeting room management to increase safety and efficiency

The Outcome:

- **Achieved net-zero carbon operation and highest LEED certification in France**
- 43kWh per sqm per year (Target 45kWh)
- Platinum LEED in Operations certified (91 points)
- Platinum LEED Design Build + Construction (83 points)



Get more insight on this story. Reach out to [Pascal Positello](#), Director of IntenCity and Technopole sites.

Read the case study:
[Technopole – Grenoble](#)

Schneider Electric Story – IntenCity

Net-zero building sets the bar high for sustainability

The Challenge:

- Be the most efficient building in the world

The Solution:

- **Electrify and replace energy sources:**
All electric and microgrid ready, with green energy sources onsite: 4000m² photovoltaic, 2 wind turbines, 300kW battery storage
- **Digitize:**
Data driven design and build via BIM modeling and energy simulation. Real-time communication supporting energy monitoring, security, flexible workspace management and occupant services

The Outcome:

- Net-zero carbon emissions
- **37kWh per sqm per year – 10X more efficient than existing European buildings**
- Platinum LEED in progress: 103 points
- 970MWh from onsite renewable energy sources – enough to power 200 homes
- Space and meeting room management to increase safety and efficiency
- Real-time occupancy-adjusted energy consumption



Watch the video:
[IntenCity - Grenoble, France](#)

Read the case study:
[IntenCity – Grenoble](#)

Get more insight on this story. Reach out to [Pascal Positello](#), Director of IntenCity and Technopole sites.

Schneider Electric Story – Le Hive

A successful journey to a net-zero building

The Challenge:

Soon after beginning a new lease, the Schneider Electric facility team identified that the HVAC system in their new 35,000 m² Paris headquarters was wasting energy. They wanted to reduce energy and achieve a payback within the lease period, reduce CO₂, improve power reliability, and improve productivity while complying with cybersecurity standards and supporting sustainability certifications. The work also needed to be carried out in a way that was non-disruptive to occupants and visitors.

The Solution:

- **Reduce through efficiency:**
An intelligent network of connected products and software was used to focus first on actions that would bring quick payback. These included: automated adjustment of ambient temperature, management of cold and hot production, and integration with the EcoStruxure Building Operation system to have better visibility into HVAC operations and optimize performance.
- **Replace energy sources:**
Efforts focused integrating renewable energy sources like geothermal or photovoltaic.

The Outcome:

- Achieved a 50% reduction in energy consumption, becoming three times more energy efficient within only a couple of years.
- Reduced CO₂ emissions by 76%
- **The building also gained LEED and BREAM certifications.**



Learn more:
[The Hive Case Study](#)

Get more insight on this story. Reach out to [Caroline Denoux](#), Global Marketing Communication Manager.



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