

MANAGEMENT ACCOUNTANTS' ROLE IN SUSTAINABLE BUSINESS STRATEGY: A GUIDE TO REDUCING A CARBON FOOTPRINT



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ABOUT THE AUTHORS

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EXECUTIVE SUMMARY

The status quo for corporate sustainability has shifted and has initiated a new paradigm. CFOs and their teams of accounting and finance professionals are responding to their companies' boards and C-suite executives to act on sustainability in a way that enables decision making for performance and value. Although this reflects external drivers such as satisfying new demands by investors and regulators, it also reflects internal drivers related to strategy, innovation, and risk management. Attention to sustainable business demonstrates management's resilience in building sound relationships and securing commitment with a range of critical stakeholders such as consumers, commercial buyers, talented employees (particularly younger generations), and the public at large.

Although, to some, initiatives and projects that relate to the reduction of greenhouse gas (GHG) emissions are novel for accounting and finance professionals in business ("management accountants"), in fact, these highly trained professionals already have the core competencies to deliver. Although activities around reducing a business's carbon footprint may appear novel, in fact, management accountants can deliver enormous value in this emerging area by applying their competencies and skills in areas such as strategic planning, financial analysis, risk management, internal controls and reporting, implementing technology solutions, activity analysis, capital budgeting, and investor relations. Citing the profession's ethical underpinnings, accountancy organizations are publicly and enthusiastically producing new information to support this evolving role. Effective sustainable business action will require the trustworthiness and expertise that management accountants bring to the table.

Initiating a new organizational sustainability project to address a company's carbon footprint requires a mandate and the designation of responsibility from senior executive leadership, a strong project lead that includes the finance function, and the enterprise-wide know-how

of colleagues from a variety of business units, including operations, policy, risk management, and human resources. More specifically, these professionals, working collaboratively, can consider the "how to" of reducing GHG emissions by the initial development of an inventory that tracks sources of GHG emissions from the organization's activities along with the corresponding emissions factors, as demonstrated through the three case studies appended to this report. When initiating a carbon assessment project, an important consideration is the tools that will be used to gather, sort, analyze, and report information in a way that supports decision making and serves as a foundation for internal controls, oversight, and external assurance. In addition, one of the most important decisions an organization can make in undertaking its carbon assessment is defining "scopes" and "boundaries." These concepts are similar but not definitionally the same as used in mainstream financial accounting.

Following from collaborative global efforts, such as the annual United Nations Conference of Parties, policy makers are evaluating a variety of methods to impose the costs of emissions on organizations that are responsible for releasing them. By utilizing management accountants' expertise, an organization creates assessments, sets targets, and evaluates operational alternatives in a way that builds trust, creates value, and facilitates action. •



Part I: Drivers

1. Introduction: Preparing for an Economy in which GHG Emissions Carry a Cost

The status quo for corporate sustainability has shifted, and the accounting profession is preparing to deliver.

Just in the short time frame during which this IMA® (Institute of Management Accountants) Statement on Management Accounting (SMA) was authored, the United States experienced uncontrolled wildfires in the West, unprecedented rain in the Northeast from Hurricane Ida, and deadly flooding in the Midwest. Spring brought a deadly, frozen Texas, and portions of Louisiana remained without power for weeks. Outside the U.S., deadly floods ravaged Germany and the United Kingdom, Spaniards skied down the streets of central Madrid, and cyclones and dust storms plagued Asia and Australia. While the heat dome affected the Pacific Northwest in the U.S., Moscow saw a record-hot summer.

As summer turned to fall, all eyes turned to the United Nations Conference of Parties 26 (COP26) in Glasgow, Scotland, where governments aimed for global collaboration and commitment to reduce worldwide greenhouse gas (GHG) emissions. Concurrently, the Trustees of the International Financial Reporting Standards (IFRS) Foundation, the body that oversees the International Accounting Standards Board (IASB), announced a formal plan to establish an International Sustainability Standards Board (ISSB) that would function in parallel to the IASB. Elsewhere, securities regulators are moving ahead with new regulations, directives, and compliance oversight on climate-related disclosure, and many are looking to the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD) (see [Section 7, Sustainability and Climate Disclosure Guidelines](#)).

Weather events related to climate are costly in terms of human damage, with lives lost, families uprooted, and communities wrecked to rubble. They are also monetarily wasteful. The U.S. National Oceanic and Atmospheric Administration (NOAA), which tracks America's costliest storms, reported that during 2021, America sustained 20 major weather events, each of which resulted in losses that exceeded \$1 billion.¹ The losses from just a single storm, Hurricane Ida, are estimated to be as high as \$43 billion to \$64 billion, which includes not only physical damage but business disruption. Importantly, these losses are not fully insured. Insured losses are estimated to be around \$31 billion to \$44 billion, a good portion of these losses being sustained by businesses, communities, and individuals—which also can expect increased insurance premiums if they indeed can find continued coverage.²

NOAA's multidecade analysis and similar work by large reinsurers such as Munich Re show that the climate trend is accelerating.³ There are more events, occurring more frequently, that are resulting in losses of infrastructure, businesses, and private assets. Already bankrupting small towns, these events are harbingers of a range of similar exposure to the world's largest and most prosperous metropolitan areas.⁴

The overwhelming consensus of scientists, governments, insurers, institutional investors, suppliers, and consumers is that GHG emissions, most prominently carbon emissions, are translating into unnecessary waste and exposure to loss.

¹ NOAA National Centers for Environmental Information, "Billion-Dollar Weather and Climate Disasters," 2021, bit.ly/31f5rEr.

² Leslie Scism, "Ida Storm Damage Expected to Cost Insurers at Least \$31 Billion," *The Wall Street Journal*, September 22, 2021, on.wsj.com/3pi1nfk.

³ Munich Re, "Climate change: One of humanity's greatest challenges—Our approach," 2021, bit.ly/3E5OpaF.

⁴ Christopher Flavelle and Mike Belleme, "Climate Change Is Bankrupting America's Small Towns," *The New York Times*, September 4, 2021, nyti.ms/3d416H3.

Organizational Considerations for Decarbonizing

Today, governments and the private sector are confronting climate change with increasing urgency. As the world considers the costs of the status quo, the onus will fall increasingly on organizations to respond by measuring their GHG emissions, estimating the costs vs. establishing new strategies, and finding low- or zero-emission alternatives, even if only to respond to competitive business pressures. But business professionals involved in sustainability highlight new opportunities over the short, intermediate, and long term that come from managing risks and taking advantage of opportunities as the economy transitions.

World governments, global companies, and environmental leaders agree that pricing carbon emissions will be an increasingly crucial regulatory mechanism to combat climate change (see [Section 4, Estimating the Cost of Emissions](#)). As of late 2021, 64 jurisdictions around the world have put a price on carbon emissions, and these instruments cover 21.5% of worldwide emissions.⁵ The reach of these initiatives is rapidly expanding not only at national levels but also at regional levels, including in 12 U.S. states.⁶ In short, depending on sector, size, and geography, companies either are already paying for their emissions or should expect to do so in the near future.

Internal Drivers

Risk management: The recent COVID-19 pandemic has been instructive regarding the benefits of strong risk assessment and management practices. The disruptions to operations, supply chains, employees, and markets that have resulted from the pandemic provide perspective on the risks related to climate change.

Addressing an organization's carbon footprint also represents an essential step in corporate risk mitigation. Although large weather events (known as "physical risks") get headlines, climate risks are generally categorized in two forms. Along with physical risks are "transition risks," which refer to exposures associated with market forces and regulatory policies (including carbon pricing) as industries, customers, employees, and investors avoid transactions with businesses that are seen as inadequately responding to decarbonization trends. As noted in [Section 4, Estimating the Cost of Emissions](#), the threat of new regulatory constraints and limits on carbon emissions, such as through carbon taxes and emissions trading markets, forces organizations to become innovative to avoid these costs. These business responses, however, affect organizations of all sizes as they anticipate and act to respond to market effects of these regulatory changes. For example, given the announcement by major vehicle manufacturers to produce electric vehicles, downstream fossil-fuel distributors who fail to modify their business models may sustain asset impairment. In short, mitigating transition risks calls for adjusting strategies.

CFOs and their teams of accounting and finance professionals are responding to their companies' boards and C-suite executives to act on sustainability in a way that enables decision making for performance and value.

⁵ The World Bank, Carbon Pricing Dashboard, 2021, bit.ly/3lfcz5y; the United Nations Framework Convention on Climate Change (UNFCCC) reports slightly different figures on the reach of current governmental instruments on emissions. UNFCCC reports that such instruments cover 15% of global emissions and collectively generate more than \$53 billion in fees to government authorities (see UNFCCC, "About Carbon Pricing," 2021, bit.ly/3lfpvz). For current rules and regulations regarding GHG emissions, see [Appendix: Where Do I Find...](#)

⁶ Center for Climate and Energy Solutions, "U.S. State Carbon Pricing Policies," May 2021, bit.ly/3G1Bya6.



Resilience, efficiencies, and opportunities:

Bringing an organization’s attention to its GHG emissions footprint is considered an essential first step in assessing its risks, particularly with respect to transition risks. A corporate assessment and decarbonization initiative, therefore, is an investment in corporate resilience and a process by which organizations can begin to not only mitigate their risks but also move forward on new opportunities, including cost-saving operational efficiencies. Conducting a GHG emissions assessment by itself can reveal valuable new insights that were not previously considered regarding the use of resources such as energy, water, materials, and human talent. It can initiate steps toward reducing waste. In sum, enabling efficiency simultaneously helps decarbonize and save other valuable resources.

The cost of renewable electricity has decreased dramatically over the last decade (see Figure 1).⁷ For example, over the last 10 years, the cost of solar energy has decreased 89%. Businesses now have a variety of means to access renewable energy, such as working with local utilities, implementing offset programs, or purchasing certificates (see [Section 5, Decarbonization Action](#)). As a result, many companies are finding the switch to renewable resources a cost-effective and viable option. For organizations such as manufacturers, technology companies, and large retailers that are high electricity users, longer-term commitments can include owning or leasing energy infrastructure. Research has shown that companies, on average, can experience an internal rate of return of 27% or greater on their low-carbon investments.⁸

Companies are assessing the cost benefit of carbon-reduction initiatives and viewing them as long-term investments. For example, in 2020, Delta Air Lines announced a plan to invest \$1 billion over 10 years for a series of actions toward becoming a carbon-neutral carrier (see [Section 6, Strategies for Meeting Targets](#)). Many of these actions relate to physical assets, such as retiring and replacing older aircraft, improving flight operations, decreasing the use of fuel, and reducing cargo.⁹ Delta’s plan also includes enhanced stakeholder engagement, which brings value to the organization’s processes.

HOW DO I COMPUTE THE ROI OF A DECARBONIZATION PROJECT?

Today, there are many tools available for demonstrating the return on investment (ROI) of decarbonization initiatives. A management accounting and finance team can:

- Work with consulting teams.
- Utilize sophisticated financial analysis and planning platforms.
- Follow recommended methodologies developed by the sustainable business programs at major universities such as Cambridge and New York University.

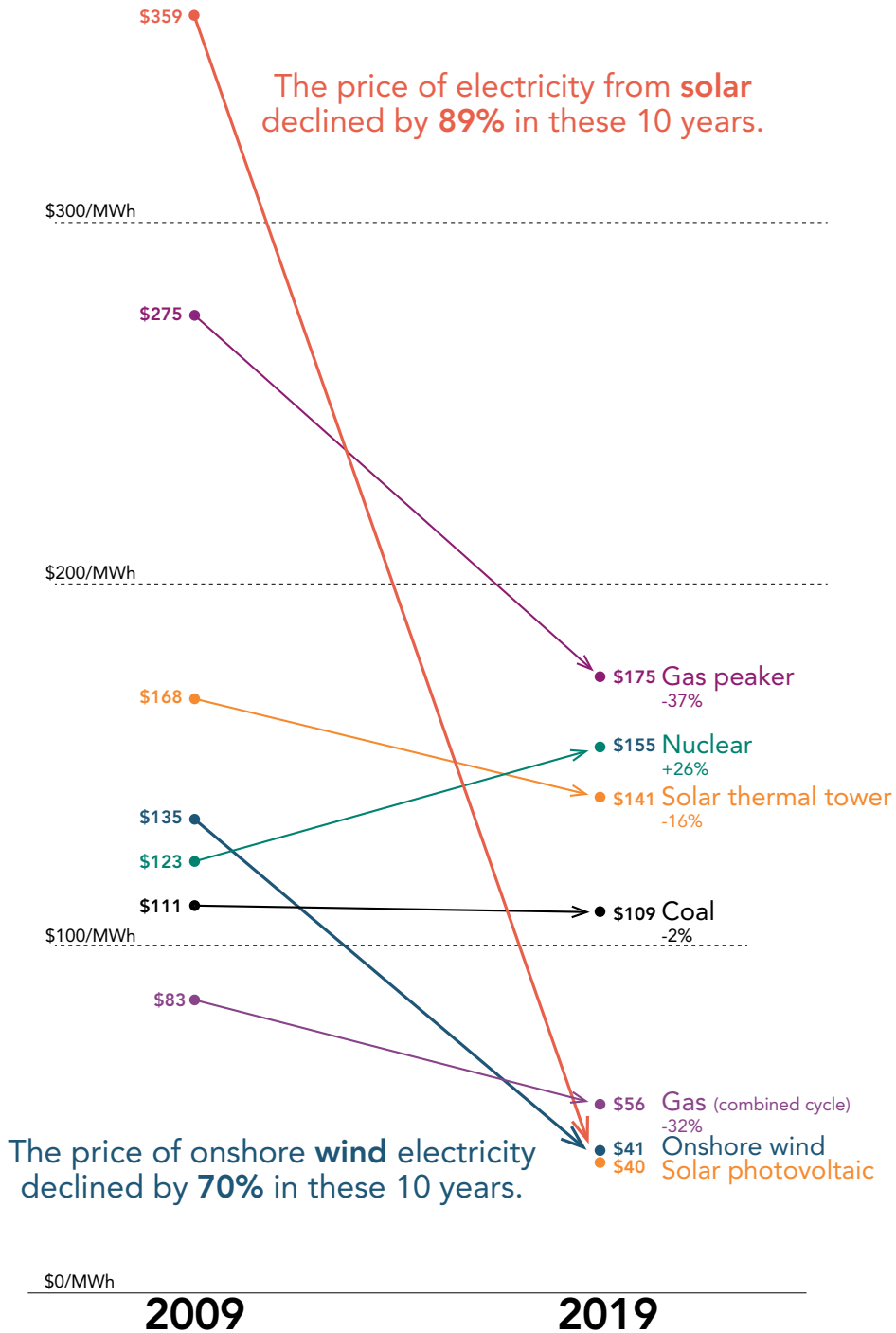
⁷ Silvio Marcacci, “Renewable Energy Prices Hit Record Lows: How Can Utilities Benefit From Unstoppable Solar And Wind?” *Forbes*, January 21, 2020, [bit.ly/3cZEurd](https://www.forbes.com/sites/silvio-marcacci/2020/01/21/renewable-energy-prices-hit-record-lows-how-can-utilities-benefit-from-unstoppable-solar-and-wind/).

⁸ Tensie Whelan and Carly Fink, “The Comprehensive Business Case for Sustainability,” *Harvard Business Review*, October 21, 2016, [bit.ly/3o5iJN2](https://hbr.org/2016/10/the-comprehensive-business-case-for-sustainability/).

⁹ Delta Air Lines, Inc., 2020 Form 10-K, [bit.ly/3xCNXhm](https://www.delta.com/content/delta/2020-form-10-k).

FIGURE 1: THE PRICE OF ELECTRICITY FROM NEW POWER PLANTS

Electricity prices are expressed in levelized costs of energy (LCOE). LCOE captures the cost of building the power plant itself as well as the ongoing costs for fuel and operating the power plant over its lifetime.



Data: Lazard Levelized Cost of Energy Analysis, Version 13.0
 ourworldindata.org—Research and data to make progress against the world's largest problems.

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Creating and preserving intangible value: Another benefit of decarbonization is the enhancement of intangible assets, such as employee engagement, customer loyalty, and investor commitment.¹⁰ Today, visibility as a responsible organization is crucial for recruiting and retaining young talent. By 2025, Millennials will constitute 75% of the workforce, and they overwhelmingly prefer working for companies with strong sustainability policies.¹¹ Investment in sustainability initiatives signals a sought-after corporate culture and strategy.

Measuring and reducing a company's carbon footprint by seeking low- or zero-emission alternatives represent a financial hedge against the impairment of valuable assets and operations as the market continues to reward investments that are less fossil fuel-dependent. It facilitates the preservation and building of trust-based relationships with stakeholders, including policy makers, which can translate into more secure, long-term cash flow expectations. Following a business-as-in-the-past scenario, companies will be increasingly exposed not only to the physical disruptions of climate change but also to the costs of emissions.

External Drivers

Customer demands: In any business, responding to customer or client preferences is paramount for creating trust and building relationships that affect an organization's ability to generate cash flows over the long term.

Large buyers with ambitious climate goals are increasingly accounting for the emissions within their supply chains, and small or midsize enterprises that lack emissions data and a demonstrable plan for reduction may find their dealmaking increasingly behind that of competitors who take action. For example, in 2020, corporate buyers representing \$4.3 trillion in annual procurement spend requested climate-related data regarding their suppliers from CDP (formerly the Carbon Disclosure Project, which houses the largest global database for company-reported GHG emissions).¹² Globally, consumers (particularly Millennials and younger market segments) are willing to pay more for sustainable brands.¹³

Investor demands and disclosure standards: As described in [Section 7, Sustainability and Climate Disclosure Guidelines](#), regulators around the globe are instituting a combination of means to respond to climate change dynamics. Many of these authorities are looking to the recommendations of the TCFD to structure additional rulemaking and generally accepted guidance. These disclosure requirements will very likely address not only physical risks but also transition risks with a decarbonization plan. There are critical disclosure implications to take into consideration in assessing (or failing to assess) decarbonization pathways. It is important for management accountants to apply professional judgment to develop assessments that consider assets' useful lives and impairment as the economy transitions.¹⁴

These regulatory movements, in part, are arising from the growing pressure for disclosure of environmental, social, and governance (ESG) data to satisfy the demands of the financial markets, including shareholders, lenders, insurers, rating agencies, and financial regulators. The largest institutional investors, such as BlackRock, Vanguard, and State Street, along with government employee pension funds around the world, are similarly pushing companies to measure and report on ESG. As tracked by the Sustainable Stock Exchanges Initiative, a United Nations-supported partnership, more

¹⁰ See Mary Adams and Nick A. Shepherd, *Unrecognized Intangible Assets: Identification, Management and Reporting*, IMA, 2010, bit.ly/2ZrIL4n.

¹¹ See, for example, Afdhel Aziz, "The Power Of Purpose: The Business Case For Purpose," *Forbes*, March 7, 2020, bit.ly/2ZGDkOk.

¹² CDP, *Transparency to Transformation: A Chain Reaction*, February 2021, bit.ly/3rb4Wpq.

¹³ Nielsen, *The Sustainability Imperative: New Insights on Consumer Expectations*, October 2015, bit.ly/3FTsyU4.

¹⁴ See "Corporate Reporting: Climate Change Information and the 2021 Reporting Cycle," IFAC, September 7, 2021, bit.ly/3EbnLNU.



than 25 global stock exchanges, including the London Stock Exchange and the Johannesburg Stock Exchange, have mandated ESG reporting as a listing rule.¹⁵

Similar trends are playing out for business loans, as sustainability-linked or sustainability-incentivized lending practices are on the rise, particularly outside the U.S. As financial services companies weigh the risk of investees with high GHG emissions in their portfolios, increasingly, organizations of all sizes can expect lenders, insurers, and asset managers to demand information on ESG performance, including plans and progress on reducing emissions, and many may provide financial incentives that lower the cost of capital for their investees.

Peer pressure: Today, at their fingertips, investors can access large amounts of corporate data—both conventional financial data and ESG data. Along with this data is a variety of ratings, rankings, and assessments. As environmental data becomes increasingly pivotal in investment decision making, companies are concerned about the effects of a poor ESG rating in comparison to their peers. An overwhelming number of studies examining the link between sustainability and financial performance have concluded that good ESG practices effectively lower the cost of capital.¹⁶ The research is demonstrates that investors view ESG ratings as an indication that management is paying attention to the most relevant risks within their businesses and responding with agility to deliver on changing stakeholder expectations.

Professional Ethics

Professional accountancy is defined by a set of ethical principles that promote responsibility, trust, and accountability. A professional accountant's clients and stakeholders depend on the profession to provide bias-free analysis to support decision making for current conditions and expected future conditions.

¹⁵ Sustainable Stock Exchanges Initiative, bit.ly/3llaKtp.

¹⁶ See Shari Helaine Littan, Kristine M. Brands, Cornelis T. van der Lugt, and Brad J. Monterio, *CFO As Value Creator: Finance Function Leadership in the Integrated Enterprise*, IMA, June 2020, bit.ly/2ZkHafD.

In “Climate Action in a Climate Emergency,” Kevin Dancey, CEO of the International Federation of Accountants (IFAC), of which IMA is a member organization, states:

Governments, non-profits, and businesses large and small can’t run without professional accountants. This puts the profession in a powerful position to influence all organizations’ approach to climate action. And for all organizations seeking to act, effective action will require the trust and expertise that professional accountants bring to the table.¹⁷

To stay relevant in the new paradigm, professional accountants must apply their competencies to meet the demand for actionable assessments.

2. Organizational Considerations in Initiating a Decarbonization Plan

When an organization begins to address its carbon footprint, its efforts are facilitated into beneficial action by considering internal structures and collaboration. This focuses on the management accountants’ competencies, senior leadership as champion, and the building of cross-functional teams.

Management Accountants’ Role

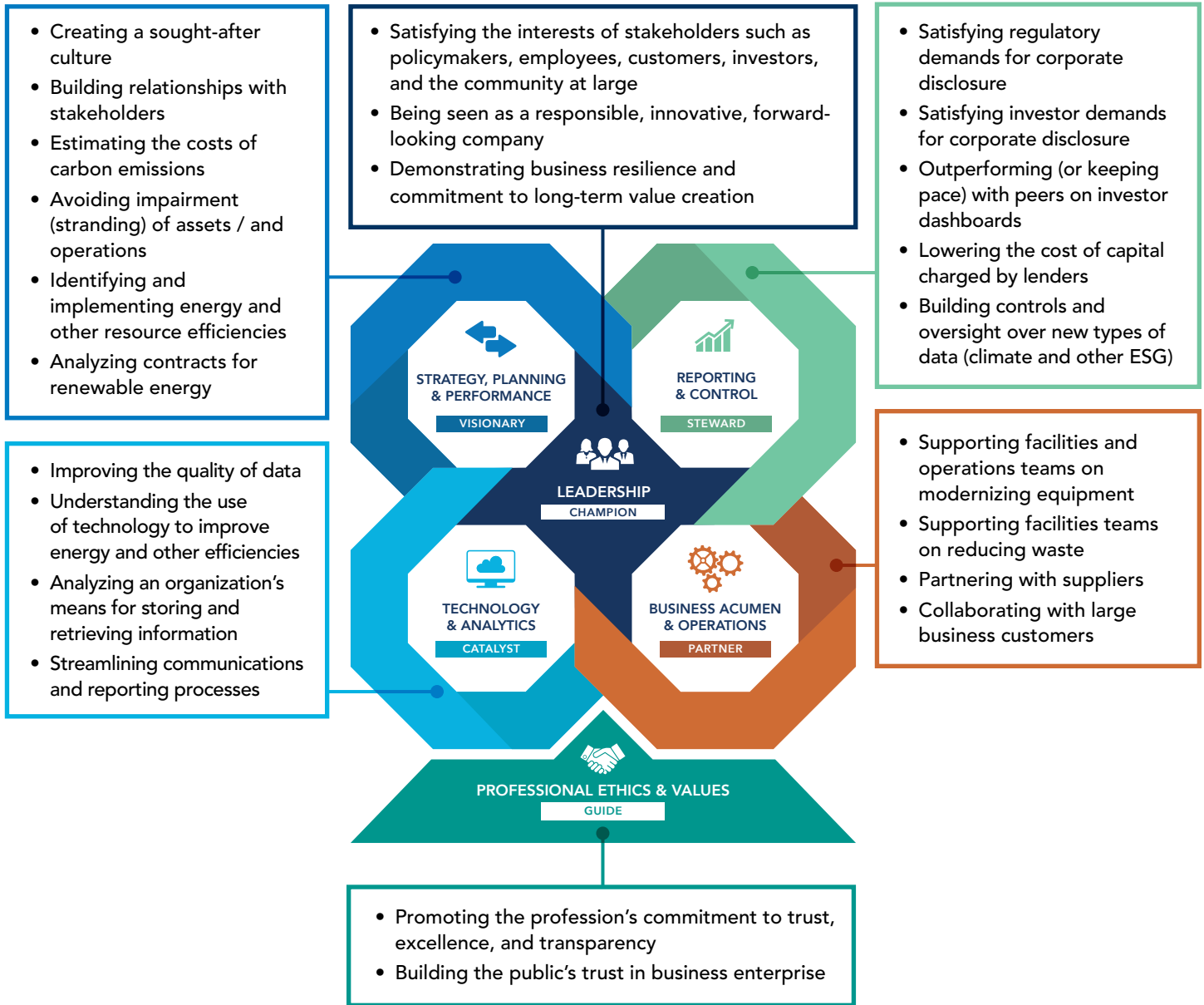
At many companies, the team with primary responsibilities for responding to demands related to sustainable business management and ESG reporting sit outside of the finance and accounting function. But senior executives report the tremendous value in having management accountants take the lead on these initiatives so that emissions assessments utilize the accounting and finance team’s expertise around gathering reliable data, evaluating alternatives, and making recommendations that align with an organization’s purpose, values, business model, strategic initiatives, and risk management. Many companies are implementing new data and processes around energy, emissions, and other sustainable business information. The management accounting team, with competencies in internal control and data quality, can provide necessary robust oversight to these data gathering and analysis processes.¹⁸ As organizations prepare for a world in which GHG emissions have a cost, management accountants are well positioned to lead information-based decision making across the enterprise.

To many in the business world, including management accountants, meeting emerging interest around climate risk and decarbonizing a business may initially seem outside of their primary responsibilities. In fact, management accountants have the requisite competencies to help their organizations meet changing regulatory and market demands. For example, management accountants have both breadth and depth of skills to satisfy regulatory and investor demands for information, build processes and technology solutions to gather new types of data, analyze projects that reduce waste and increase efficiency, and implement capital budgets for long-term investments in plant and equipment. These competencies, and how they apply to an organization’s initiatives to reduce its carbon footprint, are supported by the IMA Management Accounting Competency Framework body of knowledge.

¹⁷ Kevin Dancey, “Climate Action in a Climate Emergency,” IFAC, October 1, 2019, bit.ly/2ZzZIZu.

¹⁸ Robert H. Herz, Brad J. Monterio, and Jeffrey C. Thomson, *Leveraging the COSO Internal Control—Integrated Framework to Improve Confidence in Sustainability Performance Data*, IMA, September 2017, bit.ly/2vxJBff.

FIGURE 2: MANAGEMENT ACCOUNTANT COMPETENCIES IN ADDRESSING AN ORGANIZATION'S CARBON FOOTPRINT



Senior Leadership as Champion

Initiating a new organizational sustainability project to address a company's carbon footprint requires a mandate from senior executive leadership and the board of directors. One of the most important aspects of a successful plan is establishing with clarity the roles and responsibilities of senior leaders. For example, Salesforce's disclosures under TCFD guidelines describe direct engagement and oversight by its board of directors, as well as the detailed responsibilities of its CEO, COO, CFO, and chief impact officer.¹⁹

¹⁹ Salesforce, *Task Force on Climate-Related Financial Disclosures ("TCFD") Report*, October 2021, bit.ly/3d4ellt.

This mandate facilitates the development of new internal structures and partnerships. Organizations that have successfully established and integrated sustainability into their business models confirm that senior leadership, through words and actions, is the key catalyst. The CFO, in particular, is in a strong position to champion this transition by executing responsibilities for board interaction, enterprise risk management, and strategic initiatives.²⁰ The CFO is a critical link between the company C-suite and the accounting and finance function's day-to-day performance.

Project Lead and Cross-Functional Teams

Once senior leadership directs the initiation of a sustainable business initiative or project, the next step at most organizations is to form a cross-functional task force. Sustainable business initiatives, including the undertaking of an emissions assessment, require the perspective of professionals who sit in a variety of business units, including operations, policy, risk management, and human resources. Task force representation typically is driven by the organization's business model and industry.

An important step in initiating a sustainable business project is to designate an internal lead. Some organizations have a separate sustainable business team and designate the head or chief sustainability officer to head the task force. In others, cross-functional sustainable business project teams report to the CFO, chief risk officer, COO, senior investment officer, or someone with a similar senior leadership role. This partnering structure facilitates developing additional structures (ranging from informal to formal) that secure buy-in throughout the organization, aid in the collection of information, and provide analysis and reports that result in decision making that delivers on performance and value. Within this cross-departmental collaboration, the finance function is instrumental in helping gather the right data, developing tools of analysis, and communicating the financial risks and benefits of an organizational GHG assessment. •



²⁰ See Littan, et al., 2020; Delphine Gibassier, Diane-Laure Arjaliès, and Claire Garnier, *Sustainability CFO: The CFO of the Future?* IMA, August 2018, bit.ly/3phB5JS.

Part II: Practices

Beginning a decarbonization plan (See Part I)

- Consider internal and external drivers
- Get the team in place

Creating a GHG assessment

- Identify activities
- Measure emissions

Estimating the costs of emissions

- Source and estimate cost data

Meeting targeted reductions

- Set targets
- Prioritize action items

Reporting to external stakeholders

- TCFD gains general acceptance

3. Creating a GHG Assessment for Decision Making

Environmental imbalances from the accumulation of GHG are costly for individual businesses and for markets and economies collectively. To prepare for low or carbon-neutral operations, businesses, with the leadership of their management accounting teams, can perform a reliable GHG inventory that connects with the organization's business model and strategic planning. The assessment includes identifying activities that produce GHG, sourcing emissions factors, setting boundaries and scope, and gathering reliable data for analysis.

Understanding the Basics of GHG Emissions

The greenhouse effect is a phenomenon that effectively controls the Earth's temperatures and facilitates the existence of life. The natural presence of GHGs traps some of the heat emitted by the sun and holds it in the atmosphere. Before human activity arose, the Earth's processes by way of oceans, forests, and soils recycled GHG emissions in a sustainable, balanced way. But, as concluded by an overwhelming consensus of worldwide scientists, the quantity of GHGs released by human activities (referred to as "anthropogenic GHG emissions"), particularly since

the beginning of the Industrial Revolution, has become greater than the ability of natural ecosystems to recycle them fully.²¹ As a result, the unrecycled excess continues to build in the atmosphere. Eventually, these gases break down, but it takes centuries.

Carbon dioxide (CO₂) is the main cause of anthropogenic greenhouse effects. This colorless, odorless chemical compound accumulates in the atmosphere, but it does not break down, on average, for 125 years. Human activity produces other gases, such as methane (CH₄), nitrous oxide (N₂O), refrigerant gases (hydrofluorocarbons, perfluorocarbons, and chlorofluorocarbons), sulfur hexafluoride (SF₆), water vapor (H₂O), and ozone (O₃), that also have greenhouse effects. Scientists classify each of these GHGs by its respective global warming potential (GWP), a metric that translates each of these other gases into its CO₂ equivalent, which allows for quantification of each GHG's climate impact during a certain period.

²¹ For details of the science of climate change, refer to the Intergovernmental Panel on Climate Change (IPCC), www.ipcc.ch.

Global anthropogenic emissions come from energy generation, industry, building, transportation, agriculture, forestry, other land use, and waste disposal. Although estimates vary, the consensus of scientists is that human activity, over the last 170 years, has already led to 1.1°C of global warming.²² Although this increase appears small, with uneven warming distribution across the globe and some places warming to more than 2°C, this rise affects ecosystem balance so that people and businesses can no longer expect historical environmental patterns to persist. Changing conditions are creating significant new financial exposures for economies, markets, and individual businesses.

Inventory GHG Emissions

Before considering costs and evaluating alternatives, an entity must identify the sources of its emissions and quantify them. Carbon accounting is an informal term used to describe an assessment of an entity's GHG emissions.

The first step is to develop a *GHG inventory* that tracks sources of GHG emissions. The GHG Protocol, developed in partnership between the World Business Council for Sustainable Development and the World Resources Institute, is the source for much of the generally accepted methodology for conducting an organization's GHG inventory.²³

Unlike traditional accounting that adheres strictly to the concept of a legal entity, a GHG inventory may be performed either for:

- A designated entity during a given period (generally a year), or
- A product, based on an analysis of its climatic impact over its life cycle from design to end-of-life waste processing (see "Using a Life-Cycle Approach to Measure Emissions").

When beginning an ESG program, most companies take an entity-based approach. This is similar to conventional accounting. As they progress and aim to consider management decision making, companies may begin to include product life cycles that reflect upstream inputs and downstream customer use.

The basic carbon accounting equation is:

$$\text{Emissions released} = \text{activity data} \times \text{emissions factor}$$

This requires two data points: activity data and emissions factors.

Activity data: This refers to the *quantity* of an emission-generating activity undertaken, such as:

- Electricity used
- Fuel used
- Miles driven

USING A LIFE-CYCLE APPROACH TO MEASURE EMISSIONS

When beginning a sustainable business program, most companies take an entity-based approach, which is similar to conventional accounting.

As they progress, companies may begin to consider the life cycle of their products. This assessment addresses not only how the company creates a product or service but also how a customer uses it. For example, the production of a heating system or vehicle may have a low emissions footprint in comparison to how these products are used by customers over the products' useful lives. In addition, a full life-cycle approach considers how a customer disposes of the product. The disposal of many consumer products such as clothing and food, and their packaging, for example, continues to release GHG or causes other environmental concerns.

²² IPCC, "Climate change widespread, rapid, and intensifying—IPCC," 2021, [bit.ly/3r9NMIZ](https://www.ipcc.ch/report/ar6/wg2/).

²³ Greenhouse Gas Protocol, [bit.ly/3oa7jro](https://ghgprotocol.org/).

- Miles flown
- Units of output
- Agricultural herd size
- Number of refrigeration units
- Company spend (U.S. dollars) on activity

For example, as described in [Case Study 1: Midsize Consulting Firm](#) at the end of this report, a company would source the number of gallons of heating oil used for heating its building during the winter. Similarly, it would look to its utility bills to obtain the kilowatt-hours of electricity that it sourced as its activity data for the cooling of the facilities in the summer. It can also use flight miles from employee travel records as the activity data for business travel. Similarly, a manufacturing company uses miles driven as activity data for moving inventory via truck.

Emissions factors: Also known as the conversion factor, this refers to the quantity of GHGs emitted in relation to a particular activity.

Activity Data

Activity data is described as primary data or secondary data based on its source:

- Primary activity data is quantitative data gathered from a direct measurement or a calculation of an activity or a process. Examples include measuring natural gas or electricity usage from a submeter or utility bills.
- Secondary activity data is quantitative, but it is derived in whole or in part through an estimation process based on direct measurements and assumptions.

Primary data generally delivers more accurate information than secondary data. Yet primary data may be unavailable or prohibitively costly to accumulate, particularly if an organization is at the beginning of its sustainability journey. If an organization is using its GHG inventory for decision making (rather than external reporting, which would likely require more precision), well-documented approximation may produce information that is more than adequate for evaluating alternatives.²⁴ In practice, sustainable business management and reaping the benefits are an iterative, estimation-informed process.

There are practical challenges to gathering activity data within an organization. In some cases, the process is novel, and internal requests may need to be supported by senior management, the project team, the CFO, or other senior accounting and finance function team members. Some data requires the attention and guidance of facilities and production managers. Some will require instituting new systems to gather and determine the reliability of the necessary data on a regular basis.²⁵

Emissions Factors

Business activities produce GHG emissions. For example, owning a facility means heating it in cold weather and cooling it in hot weather. It may also mean producing inventory and moving it from place to place. Other businesses run data centers, require business travel, or necessitate employee commute by private vehicles.

Each of these activities creates GHG emissions, but the volume of emissions depends on numerous factors:

- An activity may produce not only CO₂ but also other GHGs such as methane or fluorocarbons.
- An activity, such as heating, cooling, production, or travel, produces different GHG amounts depending on how the activity is accomplished.

²⁴ See Kip Krumwiede, Lawrence Serven, and Robert Liou, *Overcoming FP&A's Biggest Challenge: Predicting the Future*, IMA, August 2021, bit.ly/3xIRwac.

²⁵ See Herz, et al., 2017.

- The emissions that an activity produces may differ based on geography and energy sourcing. For example, electricity produced in different regions will produce different GHG emissions.
- The emissions that an activity produces may change based on new practices or implementing new technology. In many cases, this is within the control of the organization. In other cases, the emissions that an activity produces are outside the organization's control. For example, a supplier may change its own production process, or a utility may upgrade or change its own sourcing to renewable alternatives.

To source emissions factors data, an organization can refer to many reliable databases, such as the U.S. Environmental Protection Agency (U.S. EPA), the U.K. Department for Environment, Food and Rural Affairs (DEFRA), and the International Energy Agency (IEA). (See [Appendix: Where Do I Find...](#)) These authorities collect and publish data on the emissions that result from the most common business activities. The emissions factors for many activities, such as business travel, do not depend on geography or other characteristics. Therefore, in conducting a GHG inventory, particularly for internal estimation, emissions factors may be sourced from other jurisdictions, such as DEFRA's website, that are updated regularly.

The sourcing of electricity, however, is geographically dependent. Certain markets integrate a far greater percentage of renewables into their energy mix than others. For international sourcing, the best emissions factors are available from IEA. Regardless, an organization will need to use care to note the units (such as gallons, liters, kilowatt-hours, metric million British thermal units, and revenue dollars) and convert its data, as necessary, to apply an appropriate emissions factor.

In addition, several commercial and not-for-profit organizations have developed software solutions to help companies perform GHG inventories, and these solutions often have accessible emissions factor data embedded or linked. To produce reliable analyses that support decision making (and eventually, external disclosure), documenting the source of all data is good accounting practice.

Emissions Boundaries and Scope

One of the most important decisions an organization can make in undertaking its carbon cost assessment is defining "boundaries" and "scope." These concepts are similar but not definitionally the same as used in mainstream financial accounting.

Boundaries: After decades of continued development, financial accounting has a workable definition of what an "entity" or "consolidated entity" means. Generally accepted standards under U.S. Generally Accepted Accounting Principles (U.S. GAAP) and IFRS establish which subsidiaries and affiliates must be

Following from collaborative global efforts, such as the annual UN Conference of Parties, policy makers are evaluating a variety of methods to impose the costs of emissions on organizations that are responsible for releasing them. By utilizing the management accountants' expertise, an organization creates assessments, sets targets, and evaluates operational alternatives in a way that builds trust, creates value, and facilitates action.

included in a consolidated report and how to consider minority equity investees. In the sustainable business or ESG arena, the term “boundaries” is used to describe this same determination: which entities, affiliates, and investees to include in an estimate or in an external report.

For carbon accounting purposes, with respect to boundaries, there are two generally accepted approaches: the control approach and the equity share approach.²⁶

- **Control approach:** Under a control approach, a company considers the GHG emissions from all operations over which it has control. It excludes entirely emissions that arise from operations in which the company has a financial stake but lacks control. Unless regulations require otherwise, in the case of emissions, control can be defined either in financial terms (a majority stake) or operational terms (the ability to introduce and implement operating policies within this operation). Unlike financial accounting, in the arena of emissions assessments, an operational control approach is recommended under the GHG Protocol and is by far the most common.²⁷
- **Equity share approach:** Under an equity share approach, an organization accounts for the GHG emissions from its operations according to its share of equity in various operations. If an entity owns 35% of the equity of another entity, it accounts for 35% of the investee’s emissions. In practice, this approach is applied less frequently than the control approach.

When issuing a report in accordance with regulatory mandated standards, such as U.S. GAAP and IFRS, an entity must follow stated guidelines on defining the boundaries of the reporting entity. As these authorities aim to connect financial reporting and sustainable business reporting (see [Section 7, Sustainability and Climate Disclosure Guidelines](#)), these guidelines may be harmonized, such as through the work of the proposed ISSB. But if a CFO is planning to use the emissions cost assessment for internal planning and risk management purposes, the relevant suborganizations to include are best based on those that are most exposed and could result in the largest transition-related impairment.

“Boundaries” also refer to the geographic regions to include in an assessment. Operating in different geographic regions has different transitions risks and requires somewhat varied responses for mitigation. In performing a GHG assessment, it is therefore important to consider the organization’s input sources, production process, and delivery methods—along with expectations and opportunities—at its key sites around the world.

Scope: Part of the rationale for defining the reporting entity, in both traditional accounting and ESG-related accounting, is to avoid double counting of activities by different organizations acting within the economy. For GHG emissions, to avoid double counting in the ecosystem, it has become generally accepted to utilize the three scopes established under the GHG Protocol (see Figure 3) as well as the International Organization for Standardization (ISO).²⁸

Scope 1 means direct GHG emissions from sources owned or controlled by the reporting organization.

Scope 2 means indirect emissions associated with production of energy (electricity, heat, or vapor) that is imported or bought from another organization.

Scope 3 means other indirect emissions that are a consequence of the activities of the reporting company but arise from sources owned or controlled by another company or entity. The latest version of the GHG Protocol defines 15 categories for Scope 3 (see Table 1).

²⁶ World Business Council for Sustainable Development and World Resources Institute, *The Greenhouse Gas Protocol: A Corporate Accounting and Reporting Standard*, March 2004, bit.ly/3xSf8VX.

²⁷ The reason for this is both regulatory and practical. First, many of the existing environmental regulations around the world have been developed based on the GHG Protocol and drafted to require boundaries based on operational control. Second, it is assumed that as a practical matter, operational control corresponds to the reporting entity’s ability to institute systems and gather data from an investee, affiliate, or related party.

²⁸ ISO, ISO/TR 14069:2013, “Greenhouse gases—Quantification and reporting of greenhouse gas emissions for organizations—Guidance for the application of ISO 14064-1,” bit.ly/3G4G1sf.

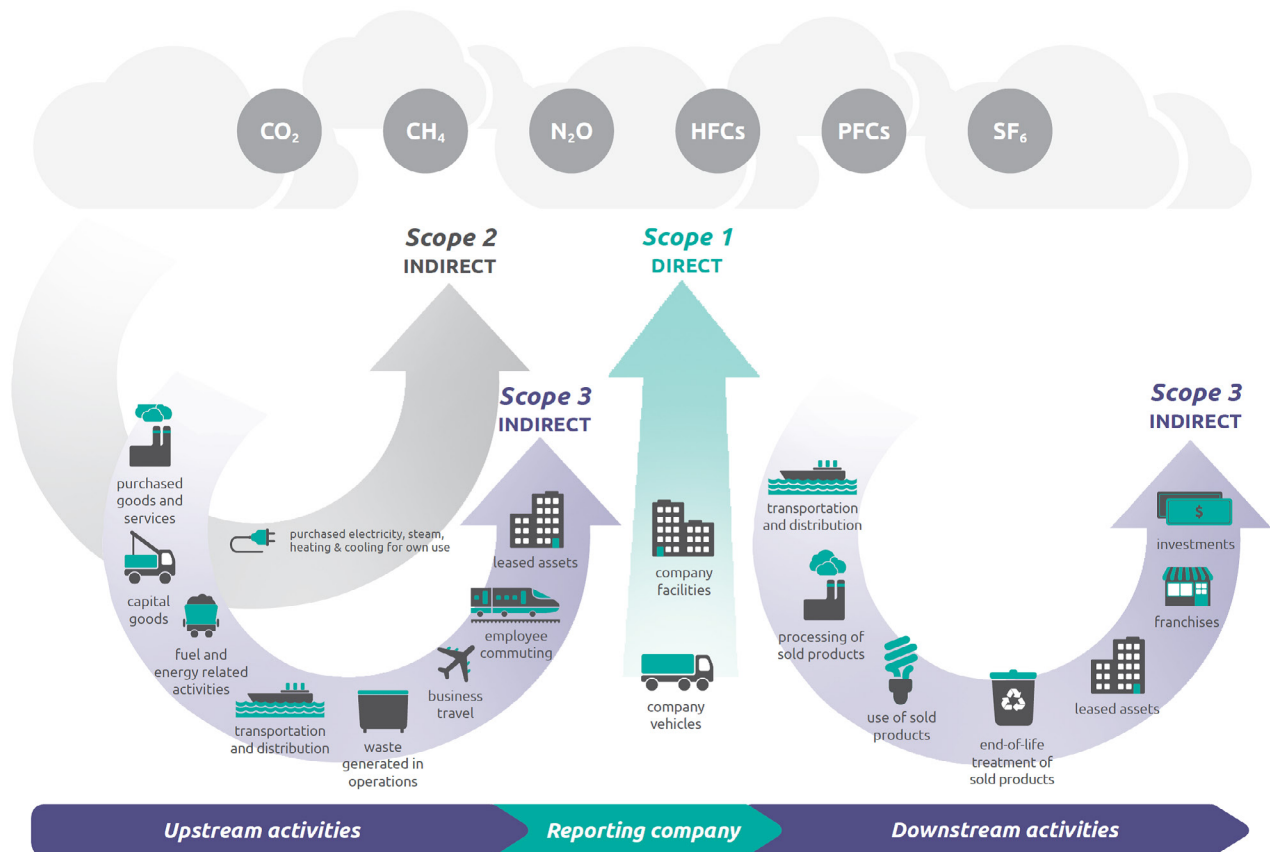
As applied, Scope 1 emissions result from the combustion of fossil fuels in owned or controlled boilers and furnaces and from refrigerants in cooling systems. They also result from the use of company-owned vehicles for the transportation of inventory, removal of waste, and movement of people from place to place in company vehicles. Scope 2 emissions physically occur at the facility where the electricity, steam, heating, or cooling is generated, but these energy sources are used up through the assessing organization's operations and activities.

Scope 3 emissions result from activities of other entities—individuals and businesses—that are part of the reporting entity's value chain. Scope 3 includes upstream emissions that occur in the supply

CASE STUDY 3: MULTINATIONAL TECHNOLOGY SOLUTIONS PROVIDER

Large technology companies that provide various types of sophisticated software solutions and access to media content use enormous amounts of energy. By assessing their carbon footprints, companies in this industry can discover and implement new efficiencies regarding their facilities, equipment, and energy sourcing as part of an effort to meet global company reduction targets.

FIGURE 3: OVERVIEW OF GHG PROTOCOL SCOPES AND EMISSIONS ACROSS THE VALUE CHAIN



Source: World Resources Institute and World Business Council for Sustainable Development, *Corporate Value Chain (Scope 3) Accounting and Reporting Standard*, bit.ly/3KRBIJA.

chain, such as from the extraction of materials or manufacture of purchased equipment. It also includes emissions from transporting customers and employees to the organization's premises for productive activities. Downstream emissions occur as a consequence of customers' use of an organization's products or services. The three scopes cover all potential sources of an organization's emissions.

Practical Considerations in Setting Boundaries and Scope

In making an emissions assessment, an organization must determine the boundaries and scope to apply. As noted, the boundaries may differ from the parameters used for mainstream, external financial reporting. Nevertheless, demands for material information (as defined for external reporting) may influence how an organization determines boundaries and scope.

If an organization is performing an internal analysis for decision making, it may consider other informational needs. That is, for the purpose of evaluating alternatives, many factors, including data access, informational tools, stakeholder demands, talent resources, and senior executive endorsement, along with external stakeholder demands, go into a determination of boundaries and scope. One important criterion from the management accounting standpoint is actionability.²⁹ This means that sustainable business information that an organization gathers and analyzes must have internal decision-relevance beyond external reporting to the equity markets.

Management may seek to understand its emissions and related business risks in a way that considers its most prominent or potentially problematic geographic sites. It is beneficial to consider factors like facility size, the energy intensity of operations, and the number of employees working from a particular facility to determine which sites are the most significant in assessing an overall carbon footprint.

As a practical matter, typically, many organizations begin conducting emissions assessments with Scope 1 and Scope 2. Scope 1 and Scope 2 emissions inventories are considered less challenging to perform than Scope 3 because Scope 1 and Scope 2 emissions result from activities that are under an organization's direct control or influence rather than from the activities of other actors. Typically, measuring Scope 1 is considered the easiest of the three with respect to collecting data, analyzing it, setting reduction targets, evaluating alternatives, and measuring progress. As for Scope 2, most

TABLE 1: SCOPE 3 CATEGORIES

1. Purchased goods and services
2. Capital goods
3. Fuel- and energy-related activities (not included in Scope 1 and Scope 2)
4. Upstream transportation and distribution
5. Waste generated in operations
6. Business travel
7. Employee commute
8. Upstream leased assets
9. Downstream transportation and distribution
10. Processing of sold products
11. Use of sold products
12. End-of-life treatment of sold products
13. Downstream leased assets
14. Franchises
15. Investments

CASE STUDY 1: MIDSIZE CONSULTING FIRM

Even small and medium-sized professional firms benefit from assessing and reducing carbon emissions by taking moderate steps. They can consider, for example, the upkeep and maintenance of the facilities that they own or manage (Scope 1) and their sourcing of renewable energy (Scope 2). They can also consider, if appropriate, business travel and employee commutes (Scope 3).

²⁹ IMA, "Statement of Position on Sustainable Business Information and Management," November 2021, bit.ly/3CSZB9T.

organizations have reliable data from external energy providers to begin their assessments.

Careful considerations go into a decision to begin to measure and monitor a category of Scope 3 emissions from among the 15 categories (see Table 1). Depending on the organization's business model, however, specific targeted areas of Scope 3 emissions may be beneficial to study even in a first-time assessment. Organizations usually consider both upstream and downstream activities along their value chain to identify those that are most energy-intensive, responsible for emissions, and ripe for instituting efficiencies.

Comparability and consistency: Although the terms "comparability" and "consistency" find definition in mainstream financial accounting, they are conceptually helpful in setting the boundaries and scope of a GHG assessment. Generally, consistency refers to the way an item is measured from period to period. In making initial assessments, it is beneficial to identify, consider, set, and document boundaries and scope so that future assessments are consistent.

Comparability generally refers to the similarity of information among companies that are competitors or operate in a similar industry or sector. In assessing GHG emissions, it is extremely helpful to look to other organizations with similar operations to consider which activities to include.

CASE STUDY 2: MIDDLE-MARKET MANUFACTURER

Manufacturing companies, particularly those that make inputs for global goods companies, often find that it is beneficial to consider Scope 1, Scope 2, and Scope 3 even with the first analysis. The production and delivery of raw materials represent emissions. The delivery and use of the product also create emissions. Although an emissions assessment for physical goods can be complex, the analysis typically reveals multiple opportunities to improve production efficiency and enhance engagement with suppliers and large customers (Scope 3).



Data Collection Tools

When initiating a carbon assessment project, an important consideration is the tools that will be used to gather, sort, analyze, and report information in a way that supports decision making and serves as a foundation for internal controls, oversight, and potentially external assurance.

Many organizations, even sophisticated organizations with presumably considerable resources, begin their assessment process with the basic tools of spreadsheets and email communications to gather information. Alternatively, commercial cloud-based software platforms with built-in communications tools are available to streamline the process of data collection, assessment, and reporting. These tools can help an organization implement its processes in a way that facilitates responsibility and accountability for producing reliable information that supports decision making based on the information. The management accounting team's competencies bring dependability to the process.



4. Estimating the Cost of Emissions

In order to reduce overall GHG emissions, policy makers have been evaluating and slowly implementing a variety of methods to impose costs on organizations that are responsible for releasing them. The various means for imposing costs on entities responsible for emissions, however, are varied and complex. Yet they all reflect the fact that releasing GHG results in costs that management accountants must consider in their planning, analysis, and strategy.

Carbon Pricing

Carbon pricing has become a widely recognized tool for governmental stakeholders in climate risk mitigation with the aspiration of fostering economic innovation.³⁰ For example, the World Bank and the International Monetary Fund (IMF) both advocate for carbon to be priced upward of \$50 per metric ton by 2030 in order to avert the worst impacts of climate change, and the United Nations Global Compact has suggested that companies consider using an internal carbon emissions price for management planning purposes of at least \$100 per ton.³¹ These mechanisms have a common objective: imposing a cost on emissions to deter continued, harmful release into the atmosphere that results in physical losses. It is likely that carbon pricing will significantly affect business in the coming decades.

Some of these methods of pricing carbon are direct. For example, a government may enact a direct emissions tax. Based on the data tracked by the World Bank, in 2021, 27 countries around the world, including Canada, South Africa, Japan, France, Germany, Spain, Argentina, Colombia, Chile, Ukraine, Finland, Poland, and Norway, imposed emissions taxes.³²

Other jurisdictions are using market-based mechanisms, sometimes in conjunction with direct emissions taxes. These emissions trading systems (ETS, also known commonly as “cap-and-trade”) function by imposing limits on the total amount of emissions that may be released within a jurisdiction as a whole by distributing, usually by auction, a limited number of rights to release a specific quantity of GHG. In an ETS, these permissions or emissions rights are resellable, and markets arise for trading. Conceptually, the objective is for organizations within an economy that are best able to make deep emissions cuts sell the right to release emissions to companies that face greater short-term challenges. An important reason for governments to utilize this mechanism is to provide flexibility to the system while the total GHG market cap shrinks over time.

There are a variety of other means by which authorities impose a cost on GHG emissions. In some cases, they can impose a direct limit on emissions or require entities to take specific actions such as installing new equipment to comply with targets. These actions create an implicit cost on the status quo and create incentives for organizations to take action.

³⁰ See, for example, The World Bank, “What Is Carbon Pricing?” 2021, bit.ly/3ljexHy; Carbon Pricing Leadership Coalition, “What Is Carbon Pricing?” 2021, bit.ly/3roSzH6.

³¹ Andrea Shalal, “Global carbon price floor would limit global warming—IMF staff,” Reuters, June 18, 2021, reut.rs/3ImTRP7; United Nations Global Compact, “Carbon Pricing,” bit.ly/319cGyn.

³² The World Bank, Carbon Pricing Dashboard, “Map & Data,” 2021, bit.ly/3rp6JJU. See [Appendix: Where Do I Find...](#) for informational sources to track current reporting requirements around the globe.

Pricing Emissions for Strategic Financial Planning and Analysis

Regardless of the direct taxes, trading prices, or implicit costs in existence today, as the climate crisis intensifies and global knowledge and commitment to mitigation evolve, it is expected that the designated price of emissions will fluctuate and increase. The 2021 United Nations COP26 in Glasgow resulted in new commitments by authorities around the world and a variety of means to make the cost of emissions tangible. Authorities will use these means to direct global reductions and forestall additional physical risks to nations, businesses, and communities.

For internal financial analysis and planning purposes, the task is to incorporate expected changes into financial planning and analysis to manage transition risks and identify opportunities. Management accountants can rely on their expertise and skills to evaluate and document assumptions about expected price changes and the effect on strategic alternatives. Importantly, the management accountant must consider not only how much the price will increase but how fast it will get there.

As the price of emissions increases, productive use of assets and operations become at risk. The management accountant also must evaluate how quickly competitors may innovate to avoid impairment, which can exacerbate a slow-moving organization's exposures. In addition, as stakeholders (particularly members of the younger generation of professionals who are now rising in their respective careers) observe the effects of business activities on the collective environment, they may lose trust in an organization and become less willing to engage in future transactions. These factors certainly create a challenge for management accountants, but evaluating assumptions is a challenge for which management accountants and finance professionals are uniquely qualified. The goal is not only to avoid transitional impairment and stranded assets but to showcase the competitive opportunities of a low- or zero-emission strategy.

How Do Management Accountants Operationalize Emissions Costs Internally?

Led by its management accountants and for purposes of internal assessments, an organization may utilize different means to operationalize how authorities and the market may impose costs on emissions. An organization, for example, may consider the following techniques.³³

- **Internal carbon fee system:** The goal of an internal carbon fee is to identify the operational units that are most responsible for the organization's overall emissions and to incentivize reductions. To do so, the organization charges business units internally for their respective shares of the costs of carbon emissions. The aggregated amounts are then awarded internally to projects for emissions reduction or other sustainable business initiatives.
- **Shadow price:** The organization estimates a price for decision making; evaluating the recoverability of GHG-intensive investments, assets, and operations; and evaluating alternatives. A shadow price is based on various assumptions; no actual transfer of funds occurs. Instead, the price on carbon is used to assist in evaluating an investment decision.
- **An implicit price:** This cost factor is based on how much a company spends in complying with government regulations such as new fuel efficiency standards. Given the number and varied nature of these programs, it is beneficial for management accountants to collaborate with other corporate professionals, such as members of the legal, public policy, sustainability, and operations teams.

Which Type of Pricing Is Best for Planning Purposes?

There are no generally accepted standards for calculating an internal carbon price, either for external reporting or for internal planning. Organizations may use different methodologies and refer to various

³³ Center for Climate and Energy Solutions, "Internal Carbon Pricing," bit.ly/3I0LAtE.

externally published sources to estimate the price of emissions. These sources include:

- Current or expected direct carbon emissions taxes.
- ETS prices.
- Implicit prices based on expenditures to comply with current and expected regulations.
- Implicit prices based on the lost opportunity costs relating to government incentive programs.
- Other implicit costs, such as a factor for intangible value for meeting (or alternatively, failing to consider) stakeholder expectations.

Is My Internal Cost of Carbon Reasonable?

Today, a broad range of carbon emissions prices are available to consider for planning and analysis purposes. The World Bank's Carbon Pricing Dashboard, for example, describes this diversity by noting an observed range from \$0.01 per ton of CO₂ to \$909 per ton.³⁴ The United Nations Global Compact has observed that avoiding 1.5°C to 2°C of warming translates into an internal carbon emissions price of at least \$100 per metric ton.³⁵

Based on its annual voluntary survey of more than 6,000 companies, in 2021, CDP reported narrower ranges:³⁶

- The median internal carbon price disclosed by companies in 2020 was \$25 per metric ton of carbon dioxide equivalent (CO₂e).
- Companies in Asia and Europe implemented the highest average price of \$28 per metric ton of CO₂e.

Estimation by Reference to an ETS

Many organizations estimate the price of emissions by reference to ETS prices, such as the EU ETS. In May 2021, carbon prices on the EU ETS rose to new all-time highs of more than €55 (75 USD). Other jurisdictions, including Canada, New Zealand, the United Kingdom, Germany, and Switzerland, have also instituted national trading systems.³⁷ In 2021, China's ETS initiated trading; closing price on its first day was 51.23 yuan (7.92 USD) per metric ton.³⁸

Although there is no comparable national trading system in the U.S., individual states have partnered to form mandatory, multijurisdictional trading markets. The participating jurisdictions in the Western Climate Initiative, Inc., the largest carbon market in the Americas, are California, Quebec, and Nova Scotia. In the Northeast, the Regional Greenhouse Gas Initiative (RGGI) currently covers 11 states: Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Virginia.

Although power companies are almost exclusively the participants in these trading markets, the rates reflect the costs imposed on these companies for the right to release emissions in creating and delivering power to their customers. Therefore, it is eminently reasonable for organizations in other

SAMPLE SPOT RATES

During Q3 2021, the observed spot prices, in U.S. dollars, on these major ETS were:

RGGI	\$9.30
EU ETS	\$74.00
China ETS	\$7.91
Western Climate Initiative	\$23.30

³⁴ The World Bank, Carbon Pricing Dashboard, 2021.

³⁵ United Nations Global Compact, "Carbon Pricing."

³⁶ CDP, *Putting a Price on Carbon: The state of internal carbon pricing by corporates globally*, April 2021, bit.ly/3KQWGD0.

³⁷ The World Bank, Carbon Pricing Dashboard, 2021.

³⁸ Reuters, "China's carbon trading scheme makes debut with 4.1 mln T in turnover," July 20, 2021, reut.rs/3ro8nK1.

sectors to reference these trading market prices in their planning assessments, particularly regarding Scope 1 and Scope 2 emissions.

Regardless of the current trading price (spot rate), in order to assess current and planned investments in a range of assets and operations, it is beneficial for management accountants to consider price trends and expectations. In aiming to counter the physical damage from climate change, authorities and market forces will continue to drive the cost of emissions, and management accountants will be developing sound analyses for risk management, innovation, and strategic plans that result in performance and value over the short, medium, and long term.

This includes developing pathways and means for reducing organizations' emissions or eliminating them altogether.

5. Decarbonization Actions

After conducting an initial GHG inventory and considering the costs of carbon emissions, an organization can begin to take steps to reduce its GHG emissions. This involves setting targets with an understanding of the terminology, such as "carbon neutral." It means identifying and implementing efficiencies and sourcing renewable energy. These action plans benefit greatly when management accountants contribute their expertise.

Setting GHG Emissions Goals and Tracking Progress

There are various actions a company can take to reduce or eliminate its emissions, referred to by the term "decarbonize." These include the following:

- Improving operational efficiencies through projects that reduce the amount of energy used.
- Reducing GHG emissions by changing the type of energy used.
- Purchasing offsets to alleviate the environmental effects.
- Working with suppliers to reduce the GHG emissions of inputs.
- Addressing the GHG emissions inherent in how business customers and consumers use a product.

For organizations that are starting out, the initial processes for measuring and reporting GHG emissions, estimating prices, and using this information for key decision making can appear daunting. The process of data collection can be extensive, but it is critical to setting emissions goals and targets. As described in [Section 3, Creating a GHG Assessment for Decision Making](#), this involves setting the boundaries and scope, identifying activities, and measuring the emissions released by these activities. Once completed, a well-done analysis reveals the activities that are most critical to operations and those that are responsible for the potentially costliest emissions.

Establishing a Baseline Assessment

In initiating its assessment process, an organization establishes a baseline. This initial measurement serves as a means for setting realistic targets and measuring progress over subsequent periods. As the organization implements initiatives, management can track progress, reassess its strategy, and plan subsequent steps, such as new projects or tactics to reduce additional sources of emissions.

In some instances, the management accountant uses judgment to consider adjustments to normalize the baseline year. For example, many companies had unusual results for 2020 that resulted from the COVID-19 pandemic and instituted new supply chains, production timelines, and delivery methods. In addition, many did not use their office facilities to the same extent as pre-pandemic operations, and, going forward, they may reinstitute in-person work on a hybrid basis. All of these factors affect operations and the means for reducing emissions. As with any set of adjustments, management

accountants can bring vigorous oversight to test the reasonableness so that subsequent decision making based on the analysis is meaningful. While it is always important to consider the legal aspects regarding external reporting of estimates, for management’s purposes of internal planning and assessment, normalization can be considered with greater flexibility than might be considered for external disclosure purposes.

Target Setting

GHG emissions targets vary based on sector and industry, geography, and competition. Targets are also based on management commitment and the veracity and thoroughness of an initial baseline assessment and subsequent updates. For example, certain energy-intensive industries such as construction, oil and gas, and mineral extraction rely heavily on science-based data to set targets for reducing GHG emissions.

Types of Targets

Establishing emission targets requires strategic thinking. There are different kinds of emissions targets that call for different types of measurement and activity (see Table 2).

TABLE 2: TYPES OF TARGETS

Absolute target

A target that aims to reduce emissions by a fixed percentage or amount.

Example: Company A plans to reduce emissions by 25% by 2030.

Intensity target

A target that aims to reduce emissions relative to a type of economic output such as revenue, number of employees, or square feet.

Example: Company B plans to reduce Scope 1 emissions by 20% per square foot.

Depending on an organization’s strategy, industry, and maturity on sustainable business initiatives, it typically sets a combination of absolute and intensity targets. Absolute targets can be beneficial because they are independent of an organization’s economic performance. But as an organization changes the nature or size of its operations, it becomes a practical challenge to meet absolute targets or the original targets can become less meaningful. Intensity targets fluctuate as other metrics change.

Setting Targets by Time Frame

Most sustainable business initiatives are developed to meet targets over the intermediate and long term. The timing of targeted reductions must align with an organization’s overall strategic planning and its goals of acting responsively to stakeholder expectations.

Working in tandem, the United Nations and national governments express global and national emissions reduction targets in terms of target date, such as 2025, 2030, and 2050. Similarly, organizations that are incorporating carbon pricing and GHG emissions reductions into their business strategies typically express reductions in terms of a target year.³⁹ After COP26 in Glasgow, it is expected that more companies will be announcing these commitments.

³⁹ See, for example, Science Based Targets initiative, bit.ly/3llmv2M.

Using External Resources

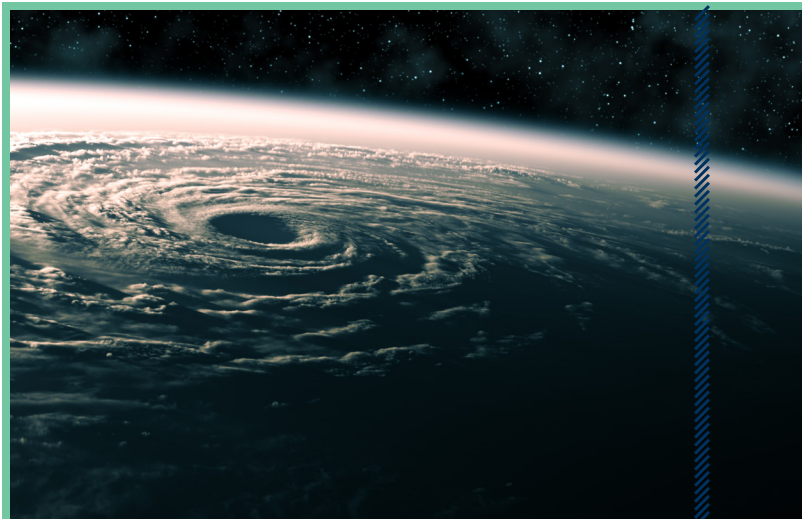
In setting targets, the management accountant, partnering with key members of other business units, can refer to both the internal assessment as well as external sources of information.

Science-based resources: The Science Based Targets initiative (SBTi) is a partnership between CDP, the United Nations Global Compact, the World Resources Institute, and the World Wide Fund for Nature.⁴⁰ The initiative provides technical assistance and suggests actionable practices to align entity targets with the latest climate science. In publishing its guidance, SBTi facilitates its core mission to keep global warming to 1.5°C. An entity can work directly with SBTi and follow its protocol, which enables the organization to label its targets as “science-based.”

Other resources for target setting, including the United Nations Global Compact’s Business Ambition for 1.5°C, RE100, CDP, and The Climate Pledge, enable companies to establish targets. In addition, there are external resources such as consulting groups that can help an organization with target setting.

Comparables: A competitor analysis is often a critical driver and source of data for setting targets. This data can be challenging to obtain because many organizations, even public companies, publicize selected accomplishments rather than comprehensive targets. Nevertheless, data is available from solutions providers, data aggregators, and rating agencies that are monitoring the publicly available information, largely by voluntary reporting means such as under the TCFD guidelines, the CDP survey, published ESG reports, and similar means.

Government-set targets: Today, it is rare for governments to impose specific emissions targets on businesses. At the local level, however, some authorities are aiming to influence emissions reductions through other types of regulations, such as building codes and purchasing guidelines. Other jurisdictions are working to create public-private initiatives, such as the New York City Carbon Challenge.⁴¹ These initiatives can be a good source of data, target-setting tools, government-based financial support, and business-to-business collaboration.



As the price of emissions increases, productive use of assets and operations become at risk. The management accountant also must evaluate how quickly competitors may innovate to avoid impairment, which can exacerbate a slow-moving organization’s exposures.

⁴⁰ *Ibid.*

⁴¹ NYC Mayor’s Office of Climate and Sustainability, “NYC Carbon Challenge,” 2021, on.nyc.gov/3rp6Z9V.

TABLE 3: TYPES OF COMMITMENTS

Carbon neutral

The organization offsets its carbon emissions by purchasing rights or certificates that reflect renewable energy production or other global systems (such as forestation) to offset the release of carbon into the atmosphere.

Net-zero carbon

The organization has reduced its carbon emissions to align with 1.5°C science-based targets. The organization has accomplished this through direct abatement to the largest extent possible and neutralization of remaining atmospheric GHG emissions through CO₂ removal.

Carbon negative

The organization has instituted activities that not only eliminate all carbon emissions but actually reduce the amount in the atmosphere through recapture. This goes past the balance of a net-zero goal and means that the organization removes more carbon from the atmosphere than it emits.

Climate neutral

The organization offsets all of its GHG emissions (CO₂ and other GHGs) by purchasing rights or certificates that reflect renewable energy production or other global systems (such as forestation) to offset the release of carbon into the atmosphere.

Labeling Ourselves: Do We Have to Get to “Zero”?

Seeking reputational benefits, many companies are aiming for targets to comply with terms such as “net zero” and “carbon neutral.” Although these (and similar) phrases are used informally and interchangeably, they have precise meanings (see Table 3).

In 2021, SBTi reported that more than 1,000 companies worldwide are setting emissions reduction targets and commitments to reductions to align with the global 1.5°C limit.⁴² The list of companies that are making these commitments, moreover, is not limited to only the largest internationals (see Table 4). It is a diverse list of companies by size, industry, and geography. Based on the SBTi information, the announced targets by such a diverse group represent significant movement.

Science can generate innovation. Aiming to achieve net zero through science-based targets is a worthwhile objective and represents an opportunity to secure relationships with committed stakeholders such as customers, business clients, employees, and policy makers. Achieving this requires commitment from an organization’s highest executive levels and board of directors along with acceptance of the strategy throughout the organization. These commitments can encourage an organization toward innovation, facilitate operational efficiencies, and build competitive advantage.

⁴² SBTi, “Companies Taking Action,” bit.ly/3d7FXLW.

TABLE 4: SAMPLE LIST OF COMPANIES WITH ANNOUNCED EMISSIONS REDUCTION TARGETS

Company	Industry Sector	Location	Targets
BP	Oil and gas	United Kingdom	<ul style="list-style-type: none"> • Net zero by 2050 or sooner • 50% reduction in GHG intensity of products by 2030 • 50% reduction in methane intensity of operations by 2030
Moody's	Professional services	United States	<ul style="list-style-type: none"> • 50% Scope 1 and Scope 2 emissions reduction (2019 base year; consistent with reductions to keep warming to 1.5°C) • 15% Scope 3 emissions reduction from fuel- and energy-related activities, business travel, and employee commuting by 2025 (2019 base year) • 60% of its suppliers by spend covering purchased goods and services and capital goods will have science-based targets by 2025.
Heineken N.V.	Food and beverages	Netherlands	<ul style="list-style-type: none"> • Carbon-neutral operations by 2030 and carbon-neutral supply chain by 2040 • 30% reduction in supply chain emissions by 2030 • 100% sourcing of renewable electricity by 2030
Cushman & Wakefield	Real estate	North America	<ul style="list-style-type: none"> • Net zero by 2050 or sooner • 50% absolute reduction in Scope 1 and Scope 2 emissions by 2030 • 70% of suppliers to set science-based targets by 2025
Delta Air Lines	Aviation	North America	<ul style="list-style-type: none"> • Carbon-neutral operations as of 2020 • Net zero by 2050 or sooner • 10% integration of sustainable aviation fuel by 2030

6. Strategies for Meeting Targets

An organization has countless means to reduce its GHG emissions in ways that build resilience. These means include (1) implementing operational efficiencies, (2) working with energy suppliers, and (3) collaborating with both upstream and downstream partners in the supply chain.

Implementing Operational Efficiencies

Significant emissions reduction targets can be accomplished through operational changes that enhance energy efficiency. Performing an emissions assessment can reveal potential savings by acquiring more energy-efficient equipment for heating, cooling, inventory production, and transportation or by encouraging more energy- or resource-efficient behavior. As technology and talent resources improve in tandem, emissions reduction activities are limitless. They include:

- Turning off lights and equipment when not in use.
- Installing equipment (such as thermometers) to facilitate accurate measurements and plan production.
- Installing efficient and energy-saving equipment and appliances. Numerous options exist for even moderate improvements such as unit air conditioners, refrigerators, office equipment, lighting fixtures, and appliances. For example, Energy Star-certified products meet established guidelines by the U.S. EPA and the U.S. Department of Energy for energy efficiency.
- Improving production methods.
- Conducting basic equipment and facilities maintenance and repairs.
- Improving the insulation of facilities.
- Modernizing heating and cooling systems.
- Changing the order or timing of deliveries.
- Changing the layout of production facilities.
- Modernizing transportation fleets.
- Building electric vehicle charging stations in company-owned or company-managed parking lots.

Today, government resources are available for small businesses and property owners. For example, in the U.S., the Department of Energy reports that commercial buildings and homes represent 40% of the nation's energy consumption and that poorly insulated facilities result in 10% to 20% of energy spend wasted to drafts, air leaks around openings, and outdated heating and cooling systems.⁴³ Additional resources on energy efficiency are available for small businesses from the Small Business Administration.⁴⁴ In addition, many utilities and energy providers have instituted business customer programs to facilitate and guide an organization's emissions reduction program. An energy study can provide information and ideas for reducing energy usage, which is, at the same time, an effective means for reducing emissions.

Working with Energy Suppliers

To reduce GHG emissions, an organization can not only reduce energy usage but also change the nature of its sourced energy. For many organizations, particularly small to midsize organizations, this means working with energy suppliers or intermediaries (brokers).

Arrangements with energy suppliers range from straightforward to complex, but all represent a means toward achieving company-level and system-wide progress. Management accountants bring valuable capabilities in assessing the strategic, financial, operational, and reputational costs and benefits from these arrangements now and in the near future, as it is expected that local and national governments will continue to implement financial incentives for decarbonizing.

The International Renewable Energy Agency (IRENA) is an intergovernmental organization that supports nations' sustainable energy transitions. With input from CDP, IRENA's 2018 publication *Corporate Sourcing of Renewables: Market and Industry Trends* provides helpful explanations of the various types of emissions reduction programs that organizations may evaluate for their needs.⁴⁵

Before detailing the procurement options for renewable electricity, it is helpful to understand how certain types of energy are labeled as "renewable." Electricity (that is, "electrons") is a homogeneous product. Once delivered to the grid, it is not possible to distinguish among generating sources. The fundamental means of identifying electricity as from a renewable source are energy attribute certificates (EACs). As electricity producers deliver units of renewable electricity to the grid to be used by a buyer,

⁴³ U.S. Department of Energy, Office of Energy Efficiency & Renewable Energy, "Why Energy Efficiency Upgrades," [bit.ly/3lpYN5L](https://www.eere.energy.gov/buildings/publications_and_reports/why_energy_efficiency_upgrades/).

⁴⁴ U.S. Small Business Administration, "Easy Energy Efficiency Improvements," [bit.ly/3E9p27G](https://www.sba.gov/easy-energy-efficiency-improvements/).

⁴⁵ IRENA, *Corporate Sourcing of Renewables: Market and Industry Trends—REmade Index 2018, 2018*, [bit.ly/3phHQv9](https://www.irena.org/publications/2018/04/Corporate-Sourcing-of-Renewables-Market-and-Industry-Trends-REmade-Index-2018-2018/).

the producer makes auditable, contractual promises (representations and warranties) of the electricity's source that are represented by a certificate.

An electricity buyer can buy the renewable energy directly from a producer, but it can also buy the EAC separately ("unbundled") from the actual electrons. By doing so, the buyer neutralizes the emissions associated with their consumption of electricity. Globally, EACs are known by different names, depending on the regional scheme in operation. For example, in North America, EACs are generally referred to as "renewable energy certificates" (RECs). In all instances, an EAC represents 1 megawatt-hour (MWh) of renewable electricity being added to the power grid.

Putting this into practice, there are four main methods to procuring renewable electricity:

INVESTMENT COMMITMENT

1. Unbundled EACs:

These certificates allow an entity to purchase the green aspects of generated power separately from the power itself. That is, the renewable energy producer sells the electricity to the grid and separately sells certification that the energy is from specified, renewable sources.

2. Bundled renewable power (contract with supplier; sometimes referred to as a green tariff):

An energy utility delivers both the physical electricity and the associated EACs to a buyer.

3. Power purchase agreements (PPAs):

These are contractual arrangements with an energy producer, utility, or broker. Under these arrangements, the purchasing entity agrees to buy a specified amount of renewable energy (or the output of a specific power-generating asset) at an agreed-upon price for a specified time. A *sleeved PPA* is similar to the purchase of renewable energy from a supplier or utility, but it does so with a commitment. Under a *virtual PPA*, the renewable energy producer sells output—electrons—to the market at the spot rate, and the contracting, purchasing entity (known as the "off taker") pays the difference between the market price and the agreed-upon contractual price (strike price).

4. Leasing or purchasing renewable generation equipment:

Rather than purchase renewable energy from a third-party source, some organizations are purchasing and installing equipment, such as solar panels, on their own premises. Other organizations with smaller physical space but great energy needs, such as Google, are acquiring off-site assets. Alternatively, an entity may lease the equipment under an arrangement with a utility or power company. Once operational, these systems allow the organization to negate some of the equipment costs by selling excess energy to the grid.



Power purchase agreements can be beneficial for technology companies and cloud-based solutions providers that need to store and deliver large amounts of data for their clients (see Case Study 3: Multinational Technology Solutions Provider).

Financial Reporting of Various Power Arrangements

Although this SMA addresses the evaluation of alternatives for management decision making, it is important to analyze any potential contract or arrangement under U.S. GAAP or IFRS for external reporting purposes. The nature of the contract and its terms may satisfy the criteria for accounting as an investment contract or derivative instrument.⁴⁶

Investing in Global Carbon Reductions by Sourcing Offsets

Technically, an offset is a means by which an organization invests in a certified emissions reduction, occurring elsewhere, representing one metric ton of CO₂. Generally, offsets are nongovernmental contractual arrangements that facilitate corporate decarbonization through the funding of projects that are designed to reduce existing CO₂ emissions or to remove existing atmospheric CO₂. Examples are investments in projects that engage in reforestation, the capture of methane gas from landfills, or the distribution of environmentally friendly technology in markets previously lacking access to it. A wide variety of alternative programs are available, and they can be a means for taking initial steps. Offset programs can be an effective part of an organization's first steps toward taking action; they should not replace an organization's efforts to decarbonize its operations and supply chain but are a means of supporting carbon reductions while getting the organization's accounting function used to the idea of paying a price for carbon emissions.

Some experts urge using care in selecting an offset program because the positive effects of some programs may be imprecise and speculative. Sound programs are typically accredited by standards such as Verra and Gold Standard, which verify the tangible and permanent reductions in GHG emissions of the projects they evaluate. As management accountants understand, a reporting organization that utilizes an offset program should clearly document the nature of the arrangement and any reliance on external verification with respect to how the project reduces emissions. In addition, the organization may need to disclose to stakeholders (such as business-to-business customers) that may be relying on the reporting organization's representations on how it is using the offset program.

Collaborating with Both Upstream and Downstream Partners in the Supply Chain

As explained in [Section 3, Creating a GHG Assessment for Decision Making](#), regarding scope, a company's own operations address only part of its emissions footprint. An organization, through its transactions and activities, influences the release of GHG emissions by parties with whom the organization has a relationship, such as customers, suppliers, and employees. For example, suppliers release GHG emissions in producing inventory and packaging, consumers release emissions by coming to shop at a retail store, delivery companies release emissions in bringing goods to customers, and technology companies produce GHG emissions in the creation, storage, and delivery of information.

Each of these sources of Scope 3 emissions represents an opportunity to build valuable engagement and reduce emissions embedded in the transactions. Working together, suppliers and customers can agree on meaningful indicators, share data, and find efficiencies.

⁴⁶ See, for example, World Business Council for Sustainable Development, *IFRS accounting outline for Power Purchase Agreements*, January 29, 2018, bit.ly/3Ebqpm5.



More companies are expected to screen suppliers based on ESG criteria as they become responsible for their sourcing. Planning ahead strategically, organizations that are reluctant or unwilling to consider changes to meet their stakeholders' expectations may very well, increasingly, find themselves at a disadvantage to competitors who are delivering more sustainable products and services. The tangible and intangible costs of GHG emissions, which are real, cannot be overlooked by organizations that aim not only to survive but also to thrive in the new paradigm. The markets, driven by a range of stakeholders who want to avoid being the last to hold brown assets, are developing strategies to become less fossil fuel-dependent. Management accountants can apply their skills to help lead their organizations in a way that seizes the opportunities.

7. Sustainability and Climate Disclosure Guidelines

Although an in-depth discussion of the external reporting of climate-related information is outside the scope of this SMA, it is important for the management accountant to understand and monitor regulatory and standard-setting trends (see [Appendix: Where Do I Find...](#) for informational sources to track current reporting requirements around the globe).

As noted, in November 2021 and in connection with COP26, the IFRS Foundation announced the formation of a new ISSB. The anticipated structure and framework will incorporate the foundational work of the TCFD. This task force was established by the Financial Stability Board to address the possibility of systemic financial failures, similar to the banking crisis in 2008-2009, that could result from unaddressed risks. Many professionals view the TCFD recommendations as generally accepted or best practices on disclosure. These guidelines set out 11 specific disclosure items in four categories: governance, strategy, risk management, and metrics and targets.

At the same time, the European Commission and its supporting bodies, such as the European Financial Reporting Advisory Group, are proposing new mandatory corporate sustainability reporting to further the implementation of the EU Sustainable Finance Disclosure Regulation and the Taxonomy Regulation.⁴⁷ The U.S. Securities & Exchange Commission (SEC) has announced that it will initiate new oversight of filings such as Form 10-K for disclosure of climate-related risk in accordance with its 2010 interpretation, "Commission Guidance Regarding Disclosure Related to Climate Change," and it is looking at TCFD in anticipation of additional rulemaking.⁴⁸ These disclosure requirements will very likely address not only physical risks but also transition risks to be addressed with a decarbonization plan.

⁴⁷ See European Commission, "Sustainable Finance," bit.ly/35DJVsK.

⁴⁸ See SEC, Release No. 33-9106, "Commission Guidance Regarding Disclosure Related to Climate Change," February 8, 2010, bit.ly/3EcNEMK; Gary Gensler, "Prepared Remarks Before the Principles for Responsible Investment 'Climate and Global Financial Markets' Webinar," SEC, July 28, 2021, bit.ly/3E7kIpA.

The movement toward more regulatory-based reporting, particularly regarding transition risks, is a response, in part, from a hodgepodge of fragmented, voluntary reporting standards. Currently, many companies release their ESG information directly to the public. Other data are submitted pursuant to regular surveys, such as CDP's, and commercial rating companies, such as Sustainalytics and RobecoSAM.

Many practitioners foresee a growing demand for assurance of the accuracy of publicly reported emissions information. Today, organizations in some industries already obtain assurance for emissions information that is largely produced for government reports. Regardless of the reporting standards that an organization uses to report on its emissions, it will be critical that the organization institute accounting systems with effective controls and oversight to ensure data quality, reliability, and representational faithfulness. This requires the expertise and skills of management accounting teams to develop, implement, and oversee the control environment and help enhance confidence in emissions assessments. This builds system-wide trust in the profession and represents the foundation of meaningful action. •



CONCLUSION

Responding to stakeholder demands and to preserve the value in stakeholder relationships, organizations are integrating sustainable business initiatives. Governments around the globe are making commitments to GHG emissions reductions, and a critical part of their response is imposing a cost on emissions.

Organizations are developing plans to decarbonize their operations with the dual goals of avoiding stranded asset losses and managing transition risks as economies transition to low or zero emissions.

Management accountants have the competencies to develop decarbonization plans that align with a business's purpose, values, business model, and strategy. Developing these plans includes meaningful senior management action to initiate a mandate, which leads to the formation of a multidisciplinary task force to create a GHG inventory of the emissions intensity of the organization's various activities. This inventory requires the organization to consider boundaries and scope, which may differ from the entity defined for financial reporting purposes. Once the GHG inventory is performed, the organization may estimate an internal price on emissions to evaluate the sources of its most potentially costly emissions and to prioritize means for reduction. Once a baseline is established, the organization can set targets for reduction and take a series of actions, including increasing production efficiency and accessing renewable sources of electricity. Purchasing renewable energy can include acquiring certificates unbundled from the actual purchase of electricity.

In addition, securities regulators are looking to institute new ESG external

Measuring and reducing a company's carbon footprint by seeking low- or zero-emission alternatives represent a financial hedge against the impairment of valuable assets and operations as the market continues to reward investments that are less fossil fuel-dependent. It facilitates the preservation and building of trust-based relationships with stakeholders, including policy makers, which can translate into more secure, long-term cash flow expectations.

reporting requirements. Many of these regulators are considering the recommendations of the TCFD as part of their requirements. Creating a reliable decarbonization plan enables organizations subject to these new reporting requirements to prepare for external reporting demands. In addition, it is expected that decarbonization plans will increasingly create a competitive advantage for all companies and a disadvantage for delayed innovation. •

APPENDIX: WHERE DO I FIND...

<p>Current rules and regulations regarding GHG emissions and other ESG matters?</p>	<ul style="list-style-type: none"> • The World Bank, Carbon Pricing Dashboard: bit.ly/31fczSy • World Business Council for Sustainable Development's Reporting Exchange (registration required): bit.ly/3DgrjwQ • Carrots & Sticks: bit.ly/3o8cWWT • U.S. State Carbon Pricing Policies: bit.ly/3D9x1jX
<p>Securities listing requirements regarding ESG?</p>	<p>Sustainable Stock Exchanges Initiative, ESG Disclosure: bit.ly/3G1hhkL</p>
<p>Emissions factors data?</p>	<ul style="list-style-type: none"> • U.S. EPA's GHG Emission Factors Hub: bit.ly/3rwt0Ui • U.K. Department for Environment, Food and Rural Affairs, Greenhouse gas reporting: conversion factors 2021: bit.ly/3rkut05 • International Energy Agency, Data and statistics: bit.ly/3xFISWW
<p>Carbon emissions prices?</p>	<ul style="list-style-type: none"> • The World Bank, Carbon Pricing Dashboard: bit.ly/31fczSy • For RGGI: bit.ly/3Db4UAW • For EU ETS: bit.ly/31glXVg • For Western Climate Initiative: bit.ly/3dIT4cR • For China ETS: bit.ly/3xDDm66
<p>Benchmarking/targets?</p>	<ul style="list-style-type: none"> • Science Based Targets initiative: bit.ly/3lImv2M • United Nations Global Compact, Business Ambition for 1.5°C: bit.ly/3E5vl6R • RE100: bit.ly/3G1z8YL • CDP: bit.ly/3xEk2FL • The Climate Pledge: bit.ly/318v7TT

CASE STUDY 1:

Midsize Consulting Firm

Nathaniel LLC (fictional) is a consulting firm with 160 employees. Its main office is in a five-story, privately owned, 45-year-old building with an oil-burning furnace system. These premises are about 25 miles (40 kilometers) outside of a major city. The building has a 140-space parking lot. The firm seeks to preserve and enhance its relationships with clients, particularly those in Europe that are responding to an emerging culture of corporate responsibility. The CFO has concerns, moreover, about preserving the value of the company's largest tangible asset, its commercial real estate headquarters. In addition, employees have been suggesting that the firm take steps to become a sustainable business leader, and the firm has significant competition in attracting and retaining talent.

The firm's senior managing partner approves the formation of a task force led by the organization's CFO to assess the firm's GHG emissions. The CFO leads a project team that includes members of her accounting team, the facilities department, and selected consultants from the talent pool to conduct a GHG inventory. From the initial inventory, the firm will consider alternatives to reduce its emissions footprint.

The firm's first-ever GHG inventory covers Scope 1 and Scope 2 emissions. These emissions are from maintaining the building (primarily its heating and cooling system) and the parking lot. The activity data comes directly from utility bills. The corresponding emissions factors are accessed from published government resources (see [Appendix: Where Do I Find...](#)).

To institute an emissions reduction plan, the task force makes several recommendations:

- Improve the building's insulation.
- Modernize its heating system.
- Install technology to improve the monitoring of building usage and temperature.
- Source renewable energy through either the local utility or independent suppliers.
- Compensate for its remaining emissions by purchasing offsets from an accredited project (currently priced at approximately \$3.13 per ton).

To get the company familiar with considering the cost on emissions, for the initial years, the CFO plans to use an internal carbon price of \$3 per ton, which is the global average carbon price. For planning purposes, this reference price will be increased over the next few years to a targeted \$50 per ton by 2030. The CFO and the task force use this rate to consider the cost benefit of projects.

Once the team gets familiar with performing a GHG inventory, for years 2 and 3, it plans to address emissions related to business travel, including flights, rail, rental cars, and taxis and privately hired rides (Scope 3, Category 6). This category is relatively easy to track. The company has reliable activity data from its travel expense reimbursement system, and emissions factors can be readily sourced from government data.

In addition, the firm is concerned about Scope 3, Category 7 emissions from employees' commutes to headquarters in private vehicles. It plans to investigate programs with vehicle distributors to (1) provide an employee discount on electric vehicles and (2) work with its state and local governments for funding the addition of electric charging stations to its parking lot.⁴⁹ As part of its planning for the parking lot, Nathaniel will consider using more environmentally friendly cement and adding additional greenspace. •

⁴⁹ See U.S. Department of Energy, Energy Efficiency & Renewable Energy, Alternative Fuels Data Center, "Workplace Charging for Plug-In Electric Vehicles," bit.ly/3xFLUuf.

CASE STUDY 2: Middle-Market Manufacturer

At its leased 30,000-square-foot facility, Gary Industries (fictional) makes specialized packaging and cardboard cartons. Gary's primary customers are producers of nondurable consumer goods such as health and wellness products, food and beverages, cleaning products, and clothing. When completed, the lots are delivered or shipped to customer fulfillment facilities.

Many of Gary's customers sell to big-box retailers and e-commerce companies that are public companies with concerns about competition, customer loyalty, and reputational risks. Several customers have indicated that in the near future, they will want Gary to provide carbon footprint information because they access capital from the public financial markets and operate in jurisdictions that are becoming subject to new ESG reporting regulations. Moreover, these customers are brand-dependent, and they are keenly concerned about reputational risks.

Given its operations, Gary considers all three scopes in its emissions assessment, which reveals that Gary has numerous alternatives for potential efficiencies that concurrently reduce emissions, including the following items:

- Transportation of finished goods on company-owned vehicles (Scope 1): Gary's delivery of finished products to its buyers' fulfillment centers on Gary's own company vehicles represents the source of emissions that are directly within the company's control. Gary's prioritizing the acquisition of fuel-efficient vehicles (and access to government programs to do so) can reduce fuel and maintenance costs and reduce emissions at the same time.
- Sourcing renewable electricity (Scope 2): After considering alternative means for accessing renewable energy, Gary decides to work with a broker to purchase renewable

energy certificates. This will allow Gary flexibility that coincides with its energy use, which peaks at certain times of year.

- Purchased goods and services (Scope 3, Category 1): In Gary's case, the total weight of purchased cardboard, coatings, and plastic films reflects significant carbon emissions from their production. The GHG emissions of recycled cardboard boxes are estimated at almost one-third lower than virgin-source cardboard boxes.
- Capital goods (Scope 3, Category 2): This reflects the emissions from the production, transportation, and installation of Gary's main pieces of equipment of the assembly lines and technology-based production systems.
- End-of-life treatment of sold products (Scope 3, Category 12): Although made primarily of natural materials, as it breaks down in landfills, cardboard continues to release carbon. Recycling by the ultimate recipient helps eliminate these emissions that are part of Gary's Scope 3 inventory.

In Gary's case, including Scope 3 emissions is an effective strategy to collaborate and secure enhanced relationships with customers and its own suppliers to reduce GHG emissions in the value chain. Attention to emissions throughout its operations reveals unexplored operational efficiencies. •



CASE STUDY 3: Multinational Technology Solutions Provider

ParkerDawn International (fictional), a century-old international technology company with approximately 200,000 employees worldwide, is performing internal research to support an announcement that commits the company to GHG emissions reduction targets.

Over the last two years, the chief sustainability officer has performed an initial assessment to determine the subsidiaries, divisions, and geographic regions that are most responsible for contributing to the company's overall carbon footprint. This initial exercise helped ParkerDawn set the boundaries of its GHG assessment. As part of its next step, it has assigned the CFO or COO of each of these suborganizations to an internal task force. Each task force member must reassess these initial emissions inventories performed in prior years and develop targets and means for reduction. Ultimately, ParkerDawn plans to consolidate and report emissions data at the parent-company level but drive emissions reduction plans at the division level.

FP&A Solutions (fictional), a division of ParkerDawn, sells licenses (software as a service) to its cloud-based finance and accounting software and storage solutions. Because the division's business model requires access to and retrievability of large amounts of data, it is highly dependent on energy use, and its CFO has been assigned to the task force. After consideration of alternatives with his technology and facilities team, the CFO contributes the following recommendations on behalf of the FP&A Solutions division:

- Review data center locations and develop a



- strategy to identify and relocate data centers based on the regional emissions intensity of the electricity grid and the local climate. For example, putting data centers in cooler regions can result in reduced air-conditioning load.
- Optimize the layout and cabinet configuration of equipment to reduce energy usage in keeping the equipment cool.
- Devise innovative solutions related to its HVAC, building design and operations, design of cabinets, and airflow.
- Pursue renewable electricity for the running of the data centers.
 - In the short term, purchase energy attribute certificates to support claims related to renewable energy use; and
 - For the longer term, in order to secure renewable energy with minimal price fluctuation, consider investment through a PPA. In this case, a virtual PPA would likely work well so that energy consumption needs can be met through a single, renewable, off-site installation of physical equipment, and FP&A Solutions can source all of its renewable energy needs from a single large provider. •



For more information, please visit [imanet.org/thought_leadership](https://www.imanet.org/thought_leadership).