Microsoft

The Microsoft carbon fee: theory & practice

The what, why, and how of Microsoft's efforts to drive culture change

carbon fee™

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This guide presents both Microsoft's approach to building a simple carbon fee model and a five-step process to help you customize the model for maximum impact. It is designed for leaders who are interested in learning what our voluntary organizational carbon fee is, why it might be helpful in your organization, and how to implement this simple model—whether the goals are to reduce costs, align with the organization's code of ethics, help mitigate economic, social, and environmental risks from climate change, make a difference with citizenship projects, or drive innovation. These leaders include:

- CEOs, CFOs, and sustainability managers in the private sector
- Public officials
- Professors and students in areas such as environmental economics, environmental finance, and environmental law
- Members of non-governmental organizations (NGOs)

How to read this guide: People in different roles will likely want to focus on different sections of the guide: the "what" and "why" sections introduce the concept to business leaders, whereas the "how" section provides detailed guidance for those actually implementing the model.

Contents

Foreword

by Mindy S. Lubber, President, Ceres

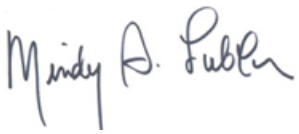
When it comes to mitigating risks associated with sustainability issues, the importance of having robust corporate policies that reflect a company's sustainability priorities cannot be overstated. Ceres works with companies across a wide range of industries to address environmental and social issues in their core business practices. We see time and again that the companies that integrate their sustainability goals across their entire business platform—rather than cloistering these strategies in an isolated department—are the ones best positioned to capitalize on changing economic, environmental, social and political conditions.

Microsoft's carbon fee model is doing just that: making the costs and consequences of climate risks and opportunities tangible to the broader company. For a company to choose to become carbon neutral is not novel, but Microsoft is taking an additional step by detailing the way to get there with a carbon fee. By disseminating the costs associated with its carbon neutral policy across the organization (based on which divisions are actually responsible for the carbon emissions), Microsoft has created a self-replenishing fund to subsidize green initiatives and offset any residual emissions.

Microsoft's model is based purely on consumption—there's nothing complicated to manage, no credits to track or trade. This simplicity is what makes the model transferable. It can be adapted easily to fit other corporations, nonprofit groups and government agencies. The basic formula is universal (carbon emissions multiplied by carbon price equals carbon fee); it's simply a matter of tweaking the model to fit an organization's structure, financial processes, and individual goals.

From my perspective, Microsoft's approach has the potential to influence organizational policy beyond the company's own walls. It can have an impact on each of four key areas that determine how sustainable a business is: governance, stakeholder engagement, disclosure and performance. Ceres' specific expectations of companies in these four areas are outlined in our *The 21st Century Corporation: Ceres Roadmap for Sustainability*.

In this paper, Microsoft provides the nuts and bolts of its own unique model, making the design, goals and process transparent so you can assess its viability for your own organization. Kudos to Microsoft for taking the lead here. I hope it helps you envision similar potential for your organization.



Mindy S. Lubber, President and CEO, Ceres
http://www.ceres.org

Executive summary

This guide presents what a carbon fee is, why to consider this model, and how to implement it to achieve your organization's objectives.

The carbon fee model that we implemented at Microsoft is a financial model that puts an incremental fee on the carbon emissions associated with our company's operations. There are three primary components to our carbon fee model:

1) Organizational carbon reduction policy
2) Price on carbon
3) Carbon fee fund investment strategy

The price on carbon is determined by the total cost of the carbon fee fund investment strategy, which is set to meet the organizational carbon reduction policy objectives.

Measuring carbon emissions can help align operational excellence across your organization: when analyzed effectively, carbon emissions can provide an unprecedented view into your operations. With the carbon fee model, Microsoft has taken steps to internalize the external cost of carbon pollution. By making the cost of carbon emissions felt across our organization, we realize direct operational benefits while contributing to a global transition to a low-carbon economy. The model helps us to drive culture change in support of efficiency, responsibility, and leadership.

Benefits of the carbon fee model to drive culture change

We designed our model to be simple and repeatable. This guide presents a five-step process to help you implement it within your organization:

1) Calculate your carbon impact
2) Establish a carbon reduction policy and develop an investment strategy
3) Determine your internal carbon price
4) Gain approval and establish governance and feedback loops
5) Administer the fee, communicate results, and evolve to increase impact

We hope this guide will provide you with the inspiration to take bold new steps for impact, as well as some ideas for how to establish a successful carbon fee model in your organization.

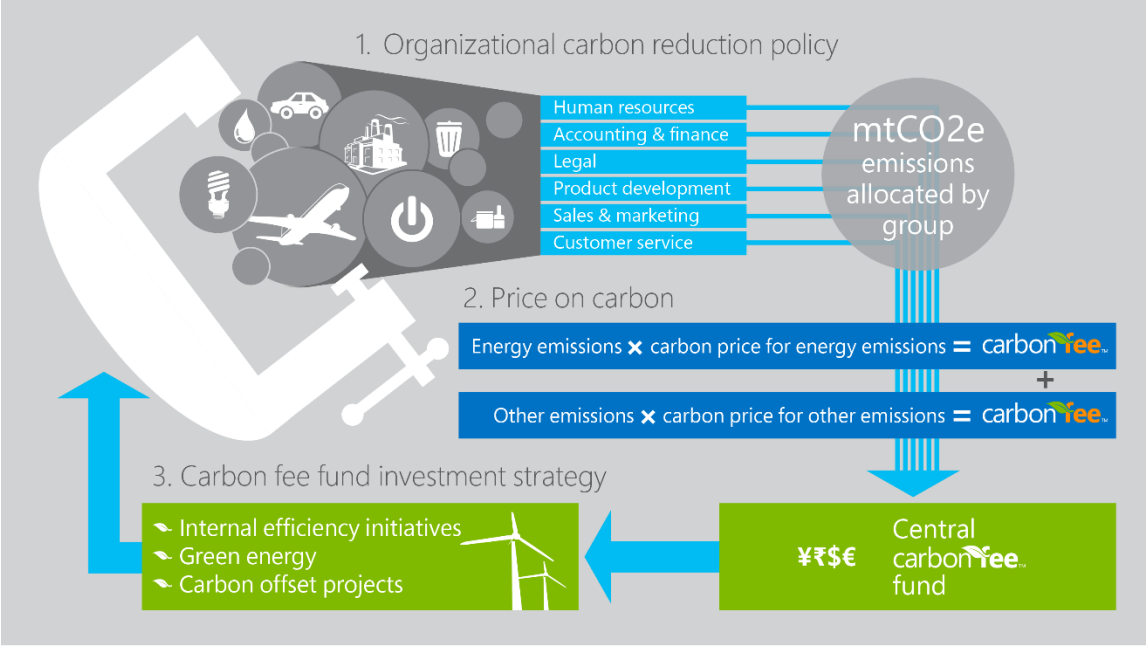
The "what":
three critical components

A carbon fee internalizes the external cost of carbon pollution into the financial structure of an organization. For example, at Microsoft, our internal cost for energy use includes not only the price we pay the utility for that energy, but also the price we pay to offset the carbon emissions associated with our energy use. For business air travel, our cost includes not only the price we pay the airline for the airplane ticket, but also the price we pay to offset the carbon emissions associated with the flight.

The associated fee is charged to those groups responsible for the resource consumption. There is no "grandfathering" (that is, a pre-specified level of "free" emissions) as you might get with a cap-and-trade scheme. Business groups face an immediate cost for every unit of carbon they produce.[1] In other words, the carbon fee makes environmental impact a line item in the business group managers' budgets across our organization based on the levels of resource consumption associated with generating carbon emissions. By doing so, the fee helps educate the business groups on carbon emissions and elevate efficiency and innovation within our business. By using a model in which groups are charged a fee based on their actual total usage (rather than putting a cap on usage or applying the fee to usage exceeding a pre-determined level), we keep the model simple to administer and make the cost of emissions overt.

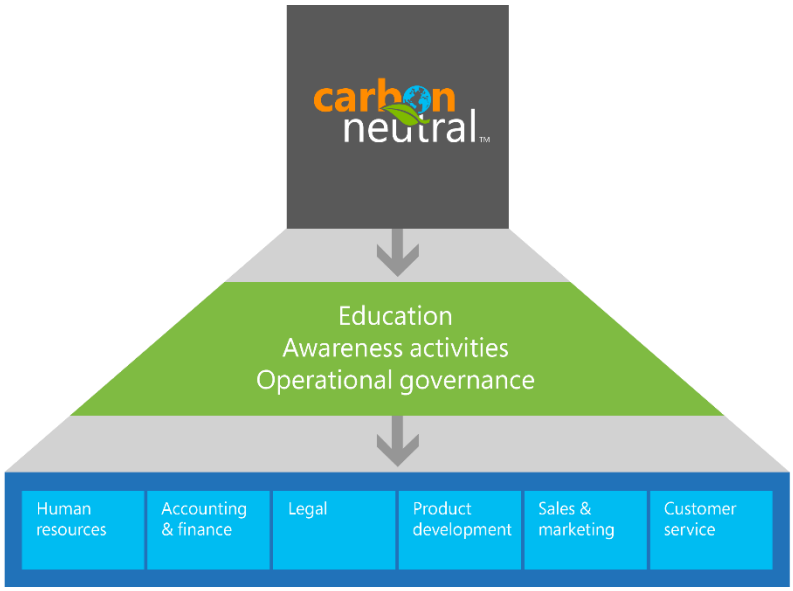
[1] "Carbon tax v cap-and-trade: which is better?", *The Guardian*, January 2013, http://www.theguardian.com/environment/2013/jan/31/carbon-tax-cap-and-trade?guni=Article:in%20body%20link

The three primary components of our carbon fee model



1) **Organizational carbon reduction policy.** In July 2012, we made a pledge to make our operations carbon neutral: to achieve net zero emissions for our data centers, software development labs, offices, and employee business air travel by using technology to increase efficiency and by investing in internal efficiency initiatives and green power, as well as carbon offset projects for our unavoidable carbon emissions. (To learn more about our carbon neutral policy, please see our white paper "Becoming carbon neutral: how Microsoft is striving to become leaner, greener, and more accountable.") We drive accountability for our carbon neutral pledge through the operational governance provided by our carbon fee model, as well as education and awareness activities about the model.

Driving accountability for our carbon neutral policy

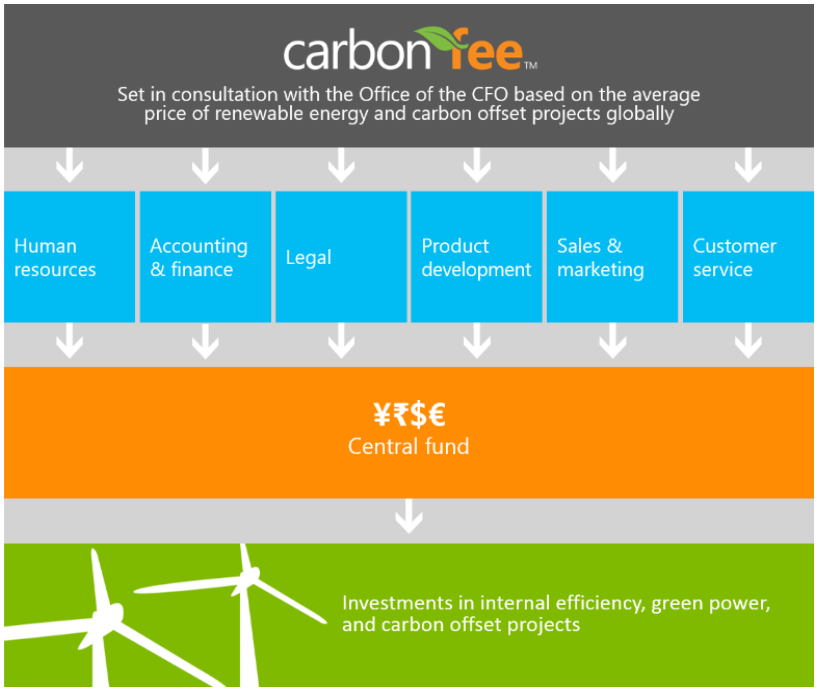


2) **Price on carbon.** As part of our carbon neutral pledge, we set an annual internal carbon price, which is determined by our total investment strategy to reduce and offset our carbon emissions.

We use this price—which reflects true cost economics for carbon—to calculate a carbon fee that allocates the cost of reducing and offsetting the carbon emissions from our data centers, software development labs, offices, and business air travel to the business groups responsible for consuming the resources. We determine the cost of the carbon fee by multiplying our inventory of carbon emissions by our internal carbon price per metric ton of carbon dioxide equivalent (mtCO2e). This carbon fee model is administered through our Environmental Sustainability team in partnership with the Corporate Finance department; in fiscal year 2013, we allocated the fee to 14 divisions in more than 100 countries.

3) **Carbon fee fund investment strategy.**
The fees that we collect through the carbon fee model go into a central fund used to subsidize investments that enable Microsoft to reduce emissions and be net carbon neutral.

Our carbon fee model



The "why":
benefits of the carbon fee model

- Is your organization interested in cost cutting?
- Is reducing environmental impact a priority for your organization?
- Is your organization looking for an opportunity to innovate to make a difference?

There are many reasons that your organization might consider implementing an internal carbon fee: the primary benefits include the opportunity drive efficiency and demonstrate responsibility and leadership. Whatever your motivators are, it is critical to align with your organization's existing goals and objectives.

Efficiency

A carbon fee can help drive behavior change to increase efficiency and reduce an organization's costs and carbon footprint. Quantifying carbon provides a standard measure—or a "level playing field"—across otherwise disparate groups to drive operational excellence. By measuring carbon emission rates (in metric tons of carbon dioxide equivalent, or mtCO2e), teams can then analyze the data to determine ways to be more efficient. Carbon is the unifying metric across emission-producing activities such as the use of energy in offices, data centers, and laboratories; business air travel; and employee commuting. It can even go beyond organizational boundaries and extend to external governance of suppliers and customers. It provides a unified view into consumption data from a wide variety of resources, such as electricity, natural gas, jet fuel, and gasoline, and aligns them with other costs, such as travel expenses.

> *"A carbon fee model is an excellent way to provide both the financial framework and the formal discipline to drive efficiency projects. By applying a financial cost to the carbon impact of operational practices, it provides justification to prioritize efficiency—and therefore cost reductions—across the organization."*
> – Lee Mills, Sr. Finance Manager, Microsoft Corporation

At Microsoft, our carbon fee model is the vehicle through which we raise funds to support our carbon neutral policy. We use the model to create a central fund for internal efficiency, green power, and carbon offset projects and to provide the financial justification for investments in internal efficiency initiatives going forward.

Responsibility

The carbon fee model drives responsible business decisions that help mitigate potential risks associated with an organization's environmental footprint. For example, for Microsoft, the fee helps us address risks related to the rising costs of energy.

The fee can also help align an organization's business activities with its code of ethics. While the fee makes good business sense, it also makes good "people" sense: for many of our employees, partners, customers, and investors, environmental considerations are important values. To be successful in the long run, our carbon fee model needs to take into account both economic and social motivators.[2] At Microsoft, one of our aims with the model was to drive culture change by raising internal awareness of the environmental implications of our business and establish a discipline at scale across the organization, guiding the energy and travel choices made both at corporate headquarters and through local subsidiaries. By making our carbon fee model organization-wide, we brought environmental considerations into business planning.

> *"In addition to the money raised and invested, a carbon fee advances the deployment of energy efficiency and green power by making these more cost-competitive with cheaper conventional energy sources. Specifically, the carbon fee provides a predictable cost to business decisions that enable 'additional' investment in green power and increased energy efficiency based on that knowledge."*
> – Dan Sobrinski P.E., WSP

There is also increasing external pressure for organizations (including Microsoft) to demonstrate responsibility by accounting for, reporting on, and reducing their carbon footprint. For example:

- Some organizations now need to comply with emissions mandates from governmental bodies around the world, including Australia, British Columbia (Canada), the United States (the US Environmental Protection Agency [EPA] greenhouse gas reporting program, plus regulations specific to California), Ireland, Japan, the United Kingdom (the Carbon Reduction Commitment [CRC] Energy Scheme, plus mandates for the London Stock Exchange), and the

[2] Simone Pulver, "Making sense of corporate environmentalism," *Organization & Environment* 20 (1), March 2007, http://oae.sagepub.com/content/20/1/44.abstract

European Union. These mandates range from increased reporting requirements to charges and limits on carbon emissions.

- Beyond public policy, marketplaces globally are also driving the adoption of voluntary organizational environmental policies and carbon reporting. One example is how the NASDAQ OMX Group Inc. and other exchanges affiliated with the Sustainable Stock Exchanges (SSE) are encouraging companies to measure and report on their energy use, carbon emissions, and other environmental, social, and corporate governance (ESG) data and goals.[3] Furthermore, CDP—an independent not-for-profit organization that publishes annual reports on organizational responses to climate change—has more than 722 investor signatories (institutional investors that support CDP and have full access to company responses), representing more than US$87 trillion in assets.[4]

Leadership

While we believe we have a responsibility to minimize our company's impact on the environment, we also have an opportunity to contribute to the greater good. A carbon fee model helps provide leadership in mitigating climate change. It can help drive innovation in the products and services that an organization develops. Furthermore, the carbon fee model (with the subsequent investment of the carbon fee funds) demonstrates how environmental considerations can be integrated into financial frameworks to

"Microsoft's carbon fee is an important expression of Microsoft's commitment to corporate citizenship and working responsibly within our own business. We appreciate the positive reception it's received from many of our stakeholders and colleagues in the field of corporate responsibility and hope that sharing our experience can help others adopt similar strategies in ways that work for their business."
– Steve Lippman, Director, Corporate Citizenship, Microsoft Corporation

[3] "Nasdaq joins four exchanges in sustainability effort," *Bloomberg*, June 19, 2012, http://www.bloomberg.com/news/2012-06-19/nasdaq-joins-four-exchanges-in-sustainability-effort.html
[4] "CDP investor initiatives," Carbon Disclosure Project (CDP), November 2013, https://www.cdproject.net/en-US/WhatWeDo/Pages/investors.aspx

evolve how carbon markets function.[5] The model can ultimately support the development of a low-carbon economy, jobs, education, healthcare, and other societal challenges.

At Microsoft, one of our goals with our carbon fee model was to demonstrate how internal organizational policy can help mitigate carbon impact. The carbon fee sets a foundation for thinking differently about our business activities. The fund that it produces enables us to invest in citizenship projects such as sustainable fuel supplies, agricultural training, and ecosystem protection. We are also working to deliver devices and services that accelerate the development of a low-carbon economy, such as using data management to drive energy efficiency (in buildings and data centers), developing mobile phone applications that bring carbon calculations to remote corners of the world, and balancing energy consumption loads with times when green power is plentiful.

"With its carbon fee, Microsoft is among the companies taking leadership in addressing climate-change related risks and opportunities. This carbon fee guide is an instrumental tool to help climate change officers globally drive the necessary innovative change to take similar steps in their organizations."
– Dan Kreeger, Executive Director,
Association of Climate Change Officers (ACCO)

[5] Simone Pulver, "Making sense of corporate environmentalism," *Organization & Environment* 20 (1), March 2007, http://oae.sagepub.com/content/20/1/44.abstract

The "how":

five steps to establishing an internal carbon fee

In this section, we outline the five steps that—based on Microsoft's experience—we believe are important when designing a carbon fee model:

step 1 Calculate your carbon impact	A. Complete a carbon emissions inventory B. Improve transparency using emission- and energy-tracking software
step 2 Establish a carbon reduction policy and develop an investment strategy	A. Identify your accountable stakeholders B. Establish an internal carbon reduction policy C. Define your carbon fee emissions boundary and allocation structure D. Develop your carbon fee fund investment strategy
step 3 Determine your internal carbon price	A. Set your carbon price B. Calculate projected costs by group
step 4 Gain approval and establish governance and feedback loops	A. Gain approval for your model B. Establish an internal cross-organizational committee to provide ongoing input and guidance
step 5 Administer the fee, communicate results, and evolve to increase impact	A. Allocate the carbon fee B. True up to actuals C. Communicate progress internally D. Report on your emissions performance externally E. Plan for the future

Note: The process of developing a carbon fee is iterative. Although these steps are presented in a general sequential order, you will likely step between them as you refine your model over time.

Step 1: Calculate your carbon impact

1A. Compete a carbon emissions inventory

A carbon emissions inventory is a prerequisite to establishing a carbon reduction policy and implementing a carbon fee model. It is a calculation of the carbon impact of your business activities, providing a benchmark on which to base reduction targets and a necessary input for the carbon fee model.

NOTE: For simplicity, throughout this guide we refer to "carbon emissions," a common name that means all greenhouse gas (GHG) emissions.

A foundational building block of a carbon emissions inventory is the development and ongoing maintenance of an inventory management plan (IMP). The purpose of an IMP is to "institutionalize a process for collecting, calculating, and maintaining" carbon data, typically in seven major sections:[6]

- **Organization information:** organization name, address, and inventory contact information
- **Boundary conditions:** organizational and operational boundary descriptions
- **Emissions quantification:** quantification methodologies and emission factors
- **Data management:** data sources, collection process, and quality assurance
- **Base year:** base year adjustments for structural and methodology changes
- **Management tools:** roles and responsibilities, training, and file maintenance
- **Auditing and verification:** auditing, management review, and corrective action

Carbon emissions from operations are measured in metric tons of carbon dioxide equivalent (mtCO2e); to quantify carbon emissions, multiply the organizational activities and use of resources—such as electricity consumption in kilowatt-hours (kWh) or commercial air travel in passenger-miles by class of travel—by appropriate emission factors.[7]

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[6] "GHG inventory," US EPA, October 8, 2013, http://www.epa.gov/climateleadership/inventory/index.html (also includes several IMP resources)

[7] Online listings of up-to-date emission factors are available from the GHG Protocol (Emission Factors from Cross-Sector Tools, http://www.ghgprotocol.org/calculation-tools/all-tools) and the US EPA (GHG Emission Factors Hub, http://www.epa.gov/climateleadership/inventory/ghg-emissions.html).

You need to have a reliable, accurate inventory of carbon emissions from across your organization to build a successful carbon fee model. There are many technical resources to help organizations quantify and report carbon emissions. For additional guidance on putting together an emissions inventory and best practices, please see the GHG Protocol (http://www.ghgprotocol.org) website. Third-party verification of your inventory helps ensure accuracy and maintain credibility.

Considerations

- **What activities (current and future) with associated carbon emissions will you track and manage with your carbon emissions inventory?** Put another way, what types of emissions will you inventory? As defined by the GHG Protocol, the operational boundaries of a carbon emissions inventory are broken down into three "scopes" (both direct and indirect) of emissions data, each further broken down into distinct emission sources:
  - **Scope 1.** Emissions that your organization produces *directly* (such as through the use of carbon-based fuels).
  - **Scope 2.** Emissions that your organization incurs *indirectly* through the purchase of electricity, heat, or steam.
  - **Scope 3.** Emissions that your organization incurs *indirectly* beyond Scope 2 emissions (for example, emissions related to your supply chain, waste disposal, business travel, and employee commuting).
- **How will you set the organizational boundary for your carbon emissions inventory?** Another key component of a carbon emissions inventory is the organizational boundary: the areas of the business from which you will consolidate and account for the carbon emissions. When setting an organizational boundary, organizations typically select one of three approaches (and then consistently apply the selected approach):
  - **Equity share.** Accounts for carbon emissions from operations proportional to the share of equity in the operation.
  - **Financial control.** Accounts for 100 percent of carbon emissions if the organization has the ability to direct the financial and operating policies of the operation with a view to gaining economic benefits from its activities.
  - **Operational control.** Accounts for 100 percent of carbon emissions if the organization has the full authority to introduce and implement its operating policies at the operation.

Sample calculations

Scope 1 natural gas emissions

Carbon emissions (Scope 1) associated with natural gas combustion for a specified time period (mtCO2e)	=	**Natural gas consumption** at each location for the specified time period (kWh)	×	**Natural gas emission factor** (mtCO2e/kWh)

Scope 2 electricity emissions

Carbon emissions (Scope 2) associated with electricity consumption for a specified time period (mtCO2e)	=	**Electricity consumption** at each location for the specified time period (kWh)	×	**Electricity emission factor** associated with the location and relevant time period (mtCO2e/kWh)

Scope 3 business air travel emissions

Carbon emissions (Scope 3) associated with commercial air travel for a specified time period (mtCO2e)	=	**Passenger-miles** traveled on commercial air flights (passenger-miles)	×	**Commercial air travel emission factor** associated with the flight distances and cabin class (mtCO2e/passenger-mile)

1B. Improve transparency using emission- and energy-tracking software

Technology plays a vital role in improving visibility into emission levels. Ideally, you will have meters and emission- and energy-tracking software that provide insight at a granular level (for example, at both a building and a group level) and that are available throughout the organization, so that each group can track its carbon emissions and measure the impact of any efficiency initiatives that it implements. If the level of granularity is not consistent across the organization, it is possible to bridge some gaps by applying algorithms. Access to up-to-date data makes it easier to integrate environmental footprint management into the rhythm of the business, including regular business reviews across the organization. It also provides greater transparency to the executives and business leaders responsible for making business decisions that will have an impact on the environment.

Considerations

- **What technology will you use to monitor and report on your emissions inventory?** A cloud-based emissions inventory solution (such as one based on the Windows Azure cloud platform) is ideal for providing up-to-date access to data across the organization.

- **How will you help people across your organization to understand what contributes to emissions?** By empowering groups across your organization to visualize emission levels through effective dashboards, you can support and even encourage local efficiency initiatives. With training on how to use the technology, groups will be able to better understand the data and therefore their local impact on carbon emission levels.

Microsoft example: In early 2012, Microsoft selected a cloud-based emissions inventory solution, based on Microsoft platform technology, to manage our emissions data. This data management solution holds emissions data from more than 600 facilities across more than 100 countries and provides distributed visibility into our emissions inventory.

Step 2: Establish a carbon reduction policy and develop an investment strategy

2A. Identify your accountable stakeholders

The success of your model will depend on gaining the cooperation and buy-in of key stakeholders. Who are the people responsible for consuming the resources that emit carbon? Which groups' behavior do you need to change? These are the groups to focus on and get feedback and buy-in from from the start. You will need to have enough of the right people engaged to form a carbon reduction policy with visibility across the organization.

Considerations

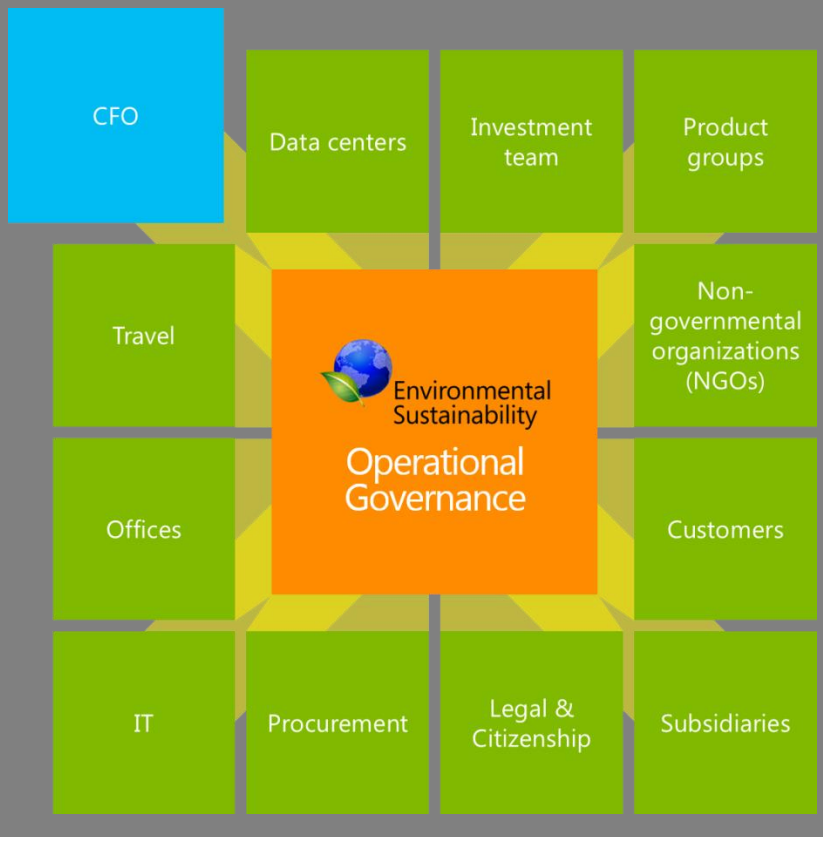
- **Who will be involved in initial design?** Who is best qualified to be the chief architect? The ideal candidate is the person with the broadest view and influence across the organization and who will be able to serve in the role long term. Should there be a core committee? Consider members of your sustainability team and representatives of those groups responsible for consuming the resources that the carbon fee will be based on. You may also consider including consultants to bring in expertise not fully represented internally. Consider having sufficient breadth to provide the necessary sustainability expertise plus familiarity with your organization, while keeping the core group efficient. Outside your core team, it may be valuable to consult with external groups—such as environmental organizations, government agencies, and industry associations—for their feedback and input on your plans.

- **Who will you want to approve the model for it to be successful?** At a minimum, the model will need the approval and participation of the finance officer of the organization. Including leaders from the organizational divisions that have some level of responsibility for and control over emissions in the approval process will help ensure the longevity of the model. Seeing the carbon fee in their profit & loss statements (P&Ls) will help give these business leaders the motivation to make changes to reduce costs and carbon emission levels.

Microsoft example: An important part of our approach at Microsoft was to identify the groups responsible for the consumption. Once they were identified, we then incorporated feedback from these key groups and the Office of the CFO into our carbon reduction strategy. Rather than having the carbon fee authorized solely by our CFO, we opted to gain support for the model from stakeholders across the organization, with the rationale that the more people invested in the model, the greater the organizational commitment to it in the long run.

We also regularly connect with external stakeholders and organizations that influence our approach. When setting our carbon neutral policy and designing our carbon fee model, we solicited and incorporated feedback from our customers and a variety of experts in the environmental sustainability field. We also maintain ongoing relationships and dialog with a number of non-governmental organizations (NGOs), such as CDP, Coalition for Environmentally Responsible Economies (Ceres), the Environmental Defense Fund (EDF), Greenpeace, the Natural Resources Defense Council (NRDC), the US Environmental Protection Agency (EPA), the World Resources Institute (WRI), and the World Wildlife Fund (WWF).

Microsoft's environmental sustainability footprint stakeholders: internal and external



2B. Establish an internal carbon reduction policy

A carbon reduction policy outlines what commitment the organization is making to reduce carbon (such as pledging carbon neutrality). Most organizations will establish one or more internal carbon

reduction targets in support of their carbon reduction policy. Defined carbon reduction targets will typically be a precursor to (and even a motivator for) a carbon fee model. Carbon reduction targets help ensure that the design and administration of your carbon fee align with organizational goals and provide a standard on which decisions regarding the carbon fee can be based.

To learn more about the value of policy in reducing environmental impact, please see our white paper "Corporate policies for carbon impact: how Microsoft uses corporate environmental policy to increase accountability."

Considerations

- **What will the scope of your carbon reduction policy be?** Will your organization be carbon neutral? If so, will it apply universally across the organization or be specific to certain groups or certain areas? How you define your carbon reduction policy will directly influence how you set your carbon fee emissions boundary (see step 2C below), so it is important to be clear about the scope at the outset.

- **Do you have any specific carbon reduction targets?** A carbon reduction target may be an absolute target (to reduce emissions by a specified amount within a specified timeframe) or an intensity target (for example, to reduce emissions per unit of revenue relative to a base year). Carbon reduction targets are particularly valuable if you plan to use your carbon fee to fund efficiency initiatives, as they provide a basis to guide investments in those initiatives. What are some immediate cost and carbon emission reductions that you can achieve to demonstrate success and generate momentum? Consider setting annual targets that reflect your strategy with the carbon fee model; for example, initially you may want to raise awareness of the carbon impact of certain activities to drive behavior change and then, once the model is well established, begin to introduce increasingly aggressive targets to reduce gross emissions. As you set out your carbon reduction targets, consider what is practical for your organization in the short term but plan ahead for what is attainable in the long term; for example, if you feel that carbon neutrality is possible ultimately but not today, what is your roadmap to getting to carbon neutrality?

Sample calculations

Net emissions

Net carbon emissions (mtCO2e)	=	**Gross carbon emissions** (mtCO2e)	–	**Reductions** external to the inventory organizational boundary, including qualifying green power purchases and carbon offsets

Notes:

Gross emissions refer to an organization's emissions **before** accounting for external reductions associated with carbon offsets and green power purchases.

Net emissions refer to an organization's emissions **after** accounting for external reductions associated with carbon offsets and green power purchases.

Microsoft example: Microsoft has established a corporate carbon neutral policy, meaning that we reduce our net emissions by 100 percent through investments in internal efficiency, green power, and carbon offset projects. Our subsidiaries are also establishing individual reduction targets.

2C. Define your carbon fee emissions boundary and allocation structure

Which operational areas will be your focus for reducing carbon emissions? An emissions boundary is either all or a subset of your emissions inventory; for example, you may choose to focus on a specific division, type of emission, or product line. By defining your carbon fee emissions boundary in alignment with existing organizational boundaries or groups, you will help simplify administration of the fee and minimize resistance from internal audiences (because the fee structure will already be familiar to them).

Considerations

- **Which specific emissions sources (Scope 1, Scope 2, Scope 3) captured by your emissions boundary will be covered by your carbon fee?** For instance, a company in the information technology sector may choose to focus on Scope 1 and Scope 2 emissions from their offices and data centers (as Microsoft has done). A consumer packaged goods company may choose to include the Scope 3 ground transportation category given their high dependence on the distribution of goods.

- **Will your carbon fee cover your entire organization or will you choose to focus (at least initially) on a specific group or area?** When you first implement your carbon fee, you may want to start with a small pilot group, with the intention to expand over time. For example, you could set your initial boundary as the energy consumption for your business offices.

Microsoft example: At Microsoft, our carbon fee emissions boundary includes Scope 1 and Scope 2 emissions (primarily energy use) from our data centers, offices, and software development labs and Scope 3 emissions from business air travel.

In fiscal year 2013, we allocated emissions from these sources to the 14 business groups across our organization (for more information on this, please see step 3B). The following equation is an example of how we allocate emissions from our offices:

Allocation of office Scope 2 electricity emissions to business groups

Business group carbon emissions (Scope 2) associated with electricity consumption for a specified time period (mtCO2e)	=	**Carbon emissions** (Scope 2) associated with electricity consumption for a specified time period (mtCO2e)	×	**Business group allocation percentage** associated with the office location based on the ratio of the business group's employee count

2D. Develop your carbon fee fund investment strategy

How will you invest the funds collected from the carbon fee? Your carbon fee fund investment strategy will form the basis for your environmental initiatives portfolio. This will be the selection of investments that you plan to make using the carbon fee fund to meet your carbon reduction targets. Your strategy will guide selection decisions by prioritizing criteria that will have an impact on the cost of your investments and therefore on your internal carbon price.

Typical components of a carbon fee fund investment strategy include:

- **Internal initiatives.** If you plan to reduce your gross emissions, then you will likely invest in internal efficiency and onsite green power initiatives to achieve these reductions. Initiatives could include, for example, implementing collaboration technology to reduce air travel; addressing energy efficiency within buildings using technology that identifies opportunities to reduce plug load, repair blowers, and replace lighting; deploying rooftop solar photovoltaic systems; and reducing energy consumption from your technology (such as with cloud computing).

- **Green power purchases.** Green power purchases are used to offset the emissions associated with electricity consumption. Much like a Certificate of Deposit represents proof that you have money on deposit in a bank, a qualifying green power certificate represents proof that green power was produced and placed on the power grid. The owner of the green power certificate has the right to claim that renewable generation and all associated attributes. In the United States, the primary vehicle used for green power purchases is a

renewable energy certificate (REC). When you purchase a REC, you effectively purchase the "environmental, social, and other nonpower attributes of renewable electricity generation"[8] without actually purchasing the underlying power.[9] RECs in the United States can be obtained either from the market or through a long-term power purchase agreement (PPA) from a specific green power project. Outside of the United States, green power generation can be supported through carbon offsets, described below. Some common and important features that you may want to consider when making a US-based green power purchase include:[10]

- **Eligibility** refers to whether a REC meets minimum standards for quality and availability.[11] Generally accepted eligible resources include solar photovoltaic, wind, geothermal, hydropower (certified by the Low Impact Hydro Institute or certain other hydropower resources), and eligible biomass.

- **Vintage** refers to the year that the green power is generated. Carbon accounting specifies that the green power purchases be generated in the reporting inventory year that the green power will be credited.

- **Additionality** is based on a performance threshold where the level of performance is assessed to be significantly better than average compared with recently undertaken practices or activities in a relevant geographic area.

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[8] Renewable energy certificates (RECs), US EPA, October 2, 2013, http://www.epa.gov/greenpower/gpmarket/rec.htm

[9] Thirty states require utilities to buy a certain percentage of their power from renewable energy. RECs are used to demonstrate that these legal obligations have been met. RECs are also available for organizations to purchase on a voluntary basis, and thousands of businesses and households purchase billions of kWh annually. RECs are recognized by the US EPA Green Power partnership (http://www.epa.gov/grnpower) as a valid way to support renewable energy, and the vast majority of members of the partnership purchase RECs.

[10] The GHG Protocol is currently in the final stages of publishing guidance for green power purchases and Scope 2 emissions accounting. The US EPA has published guidance (http://www.epa.gov/climateleadership/documents/greenpower_guidance.pdf) that outlines several key contractual requirements.

[11] *Eligible* purchases cannot be included in an undifferentiated power product (for example, standard electricity service or utility system mix); should include a contractual attestation ensuring no double sale of the avoided carbon emissions claim; and cannot be resold and are, in effect, retired once a claim is made based on the purchase. *Ineligible* purchases include those from US facilities that have been mandated by a US local, state or federal government agency; mandated specifically by a US renewable portfolio standard (RPS); or required under any other legal agreement.

- **Carbon offsets.** A carbon offset is a credit for negating the impact of emitting a ton of carbon dioxide by financing a project that absorbs or avoids the release of carbon emissions elsewhere. Among the reasons for buying carbon offsets is the original intention of the Kyoto protocol: for developed nations to invest funds in ways that help emerging nations to accelerate sustainable development in a low-carbon economy. Carbon offsets not only create a market for reducing carbon but also provide a new way for social, economic, and environmental progress to occur in harmony. For example, projects that finance the planting and preservation of trees also support the creation of jobs, which in turn supports education and healthcare. Credible carbon offsets have several common features:

    - **Certification regime** is the organizational body used to certify and register carbon offsets. In the voluntary non-compliance markets, a variety of industry standards exist including the Voluntary Carbon Standard (VCS) and the CDM Gold Standard.

    - **Vintage** is the year in which the carbon reduction takes place.

    - **Source** is the technology or program type. Examples include green power, biomass, industrial energy efficiency, and methane destruction.

Consideration

- **How will you allocate your carbon fee fund?** For example, what percentage will be put to energy efficiency and onsite green power initiatives? To US green power purchases and global carbon offset project investments? Other investments? These decisions in general will reflect the location and type of emissions that you are trying to avoid or offset (such as electricity or air miles) and your overall reduction policy.

Microsoft example: To meet our carbon neutral policy, we are working to reduce our gross emissions through internal efficiency initiatives and the use of green power. To offset the remaining carbon emissions from operations, we use the funds collected through our carbon fee model to purchase carbon offsets to produce a net-zero carbon footprint.

- For the purchase of green power, we prioritize three things:

    - **Credibility**—Is the project well managed and funded?

    - **Verifiability**—Does the project offer certified and independent verification for claims and retirement? For example, does a green power project conform to the GHG Protocol Power Accounting Guidelines?

    - **Additionality**—Will the project lead to net-new emissions reductions?

Microsoft is also being proactive in investing in carbon offset projects, supporting both carbon reduction and sustainable economies through more than 20 credible projects in geographies such as Brazil, Cambodia, Ghana, Guatemala, India, Indonesia, Kenya, Madagascar, Mexico, Peru, and

Turkey. To learn more about how Microsoft prioritizes investments in carbon offset projects, please see the Microsoft Green blog post "Microsoft's carbon offset strategy: making a difference one project at a time."

Step 3: Determine your internal carbon price

3A. Set your carbon price

How you plan to use the funds collected through your carbon fee will determine what your carbon price should be. In simple terms, you can calculate your carbon price by dividing the total cost of your environmental initiatives portfolio (see step 2D above) by the emissions within your carbon fee emissions boundary. In reality, many organizations will develop two (or more) internal prices on carbon: one to reflect the price of green power to avoid emissions associated with electricity usage and the other to reflect the cost to invest in carbon offset projects to offset remaining unavoidable emissions. The total cost also includes investments in internal efficiency initiatives and other elements included in your investment strategy.

Consideration

- **How much money will you set aside for additional investments?** How much you set aside must be balanced by the need initially to (1) focus on education and building awareness by starting simply and (2) keep the carbon price low so as not to shock the system. This is a long-term strategy, and the investments can increase—with a corresponding increase in the carbon price (and therefore fee)—over time as the benefits of the program are better understood within your organization.

Sample calculations

Cost of environmental initiatives portfolio

Cost of environmental initiatives portfolio ($)	=	**Cost of internal initiatives** ($)	+	**Cost of green power purchases** ($)	+	**Cost of carbon offsets** ($)

Notes:

The **cost of internal initiatives** is the total cost required to drive XX emissions and $ reduction.

The **cost of green power purchases** is calculated as follows:

> Total emissions (step 1A) ÷ carbon emission factor of the green power × price per green power unit

The **cost of carbon offsets** is calculated as follows:

> Total emissions (step 1A) ÷ # of carbon offsets × price per carbon offset

Internal carbon price

Internal carbon price (per mtCO2e)	=	**Cost of environmental initiatives portfolio** ($; from above)	÷	**Total emissions** (mtCO2e; from step 1A)

3B. Calculate projected costs by group

By allocating the carbon fee to the groups that consume the resources (and are therefore responsible for the emissions), you can help drive education, awareness, and accountability. You can determine each group's carbon fee liability using your emissions inventory. The allocation may be a combination of precise direct costs and general costs that are apportioned to each group based on key attributes, such as headcount.

Considerations

- **At what level of the organization will you allocate the carbon fee?** The ideal level at which to allocate the fee is a balance between ensuring that the groups responsible for the carbon emissions feel the financial impact of the fee (thereby making climate change a consideration in business decisions) and keeping the administrative burden manageable.

- **Are there any existing chargeback systems that you can take advantage of within your organization?** Ideally, you will be able to work with the finance team within your

organization to identify and take advantage of existing chargeback models (rather than creating new ones) to make the process of charging the carbon fee as simple as possible.

Are the projected costs reasonable? This step provides an opportunity to assess whether your business can realistically finance your carbon fee fund investment strategy. Can each group's P&L support the projected carbon fee that it will be charged? To provide examples for discussions across the organization, you may want to calculate projected costs over time per group for 1–20 years. The primary growth drivers will be consumption levels and the cost of carbon. We recommend taking a conservative view of projected future emission levels, as even with a conservative approach the results may be surprising to many.

Sample calculations

	Building energy consumption			Air travel		
	Emissions (mtCO2e)	Carbon price ($/mtCO2e)	Carbon fee ($)	Emissions (mtCO2e)	Carbon price ($/mtCO2e)	Carbon fee ($)
Group 1						
Group 2						
Group 3						
Etc.						

	Projected carbon emissions over time (mtCO2e)							
	2013	2014	2015	2016	2017	2018	2019	2020
Group 1								
Group 2								
Group 3								
Etc.								

	Projected carbon price over time ($/mtCO2e)							
	2013	2014	2015	2016	2017	2018	2019	2020
Electricity emissions								
Business air travel emissions								
Etc.								

	Projected carbon fees over time ($) (carbon emissions * carbon price)							
	2013	2014	2015	2016	2017	2018	2019	2020
Group 1								
Group 2								
Group 3								
Etc.								

Microsoft example: Microsoft allocates carbon fee charges to business groups as follows, using existing chargeback systems:

- Business air travel: Per employee, grouped by division
- Energy – data centers: Energy usage reports by data center, grouped by division IT capacity (kW)
- Energy – offices: Energy usage by office, grouped by division headcount
- Energy – labs: Energy usage reports by lab, grouped by division IT capacity (kW)

In fiscal year 2013, we allocated our carbon fee to 14 business groups internally.

Microsoft's carbon fee allocation

Step 4. Gain approval and establish governance and feedback loops

4A. Gain approval for your model

Once the design is complete, the key to gaining the approval of leadership is both to have the support of key stakeholders from the parts of the organization where the carbon fee will have the most impact (as previously discussed in step 2A) and to demonstrate the value that a carbon fee will offer your organization.

> *"The key success factor in the adoption of a carbon fee model across a company is to tailor the messaging and value proposition around relevant business metrics."*
> – Ken Machtley, Murdoch Services

Considerations

- **When should you socialize the carbon fee model with leaders across your company?** Your company's fiscal cycle is likely a controlling point on when you can implement the fee. Ideally, you will have approval for the model before budgets are set for the upcoming fiscal year. By preparing a work-back schedule for designing and implementing the model, you can determine the appropriate amount of time required before the start of the fiscal year to gain approval. If you have a regularly scheduled business review with leadership about your sustainability strategy and results around that time, this may be the ideal time to present the carbon fee model.

- **How should you gain buy-in from stakeholders for the carbon fee model?** The key to selling the carbon fee model concept is to show how it supports your organization's priorities as well as the priorities of each stakeholder that you are talking with. Using messaging tailored to their focus areas and responsibilities will help them see the carbon fee as a solution rather than just a new cost. We also recommend including examples of the projected cost impact to groups over time (based on step 3B) and the percentage it represents of the group's overall operational costs. Highlight the potential of the model to help both quantitative and qualitative elements:

    - Mitigate risks to revenue and margin by driving efficiency, reducing costs, establishing leadership, improving competitive positioning, and enhancing your brand.

    - Support citizenship commitments by investing in a sustainable economy, job creation, youth, and education and mitigating societal challenges.

- **What materials should you develop to help you gain approval?** How are other big initiatives sold within your organization? Look for best practices from other successful projects. These may include a short presentation, document, video, or site that highlights essential information such as how the carbon fee aligns with your organization's priorities,

who has been involved, and a high-level view of how the model will work. Ideally your materials should be easy for the stakeholders to share with others, so they can socialize the idea within their department or division.

4B. Establish an internal cross-organizational committee to provide ongoing input and guidance

A cross-organizational committee chartered with governance across the organization can help ensure that you maximize impact over time. This governance committee is important for ongoing approval of the carbon fee fund investment strategy, general input and feedback, and keeping leaders from across the organization aware of successes and challenges for ongoing support.

Considerations

- **Which key leaders should participate in a cross-organizational committee to support progress with the carbon fee and carbon reduction policy?** Members of the committee should represent your key organizational units, including finance, and others affected by the carbon fee. It is also important to include members from the groups that can support expanded efforts to drive carbon reduction, such as efficiency initiatives and investments in green power and carbon offset projects.

- **How often should the cross-organizational committee meet?** One approach is to have a monthly "task force" meeting to review progress with carbon reduction efforts and potential investment opportunities. For each task force member, an executive sponsor could participate in a bi-annual "steering committee" meeting to have cross-organizational discussions around the progress of the efforts.

Microsoft example: At Microsoft, we set up a cross-organizational Carbon Neutral Council, which provides support on an ongoing basis for how to reduce carbon emissions and best use the funds to meet organizational priorities. This council has a task force that meets monthly to discuss progress, celebrate wins, and brainstorm solutions along with a steering committee that meets periodically for updates. Through this council, significant cross-company collaboration and brainstorming have not only increased awareness of our carbon neutral policy but also generated new internal efficiency and green power projects.

Step 5: Administer the fee, communicate results, and evolve to increase impact

5A. Allocate the carbon fee

When you allocate the fee, you will need to determine the appropriate cycle to charge the organizational divisions for the projected emissions. If you were able to identify an existing chargeback model to use in conjunction with the finance team during step 3B, then the actual process of allocating the carbon fee should be relatively straightforward. For maximum transparency, include the carbon fee charge as an extra line item on each group's P&L and include the projected amount in the budget targeting process.

Consideration

- **Will you charge the carbon fee during the year that the emissions and carbon costs are incurred or one year in arrears?** If you charge the fee one year in arrears, you can base the charges on the actual costs incurred. If you charge the fee in the year that the emissions and costs are incurred, you will need to base the charges partially on projections and may require true-ups after the close of the fiscal year. One advantage of the latter approach, however, is that you gain a real-time cost driver for business decision making.

Microsoft example: At Microsoft, we charge organizational divisions their carbon fee quarterly; these divisions must then pay their allotted fee from their own budgets through an internal transfer into the Carbon Neutral Fee fund, which is used to invest in green initiatives. The fee that each group is charged at the end of each quarter reflects projected emissions based on historical performance and projected growth rates from the primary consumers.

5B. True up to actuals

Having a monthly or quarterly status update to true up actual emissions and costs with the projections being used as the basis for the carbon fee charges provides a mid-year opportunity to make calibrations where necessary to ensure that the internal organizational carbon reduction policy is met.

Consideration

- **Will you need to true up the carbon fees after the close of the fiscal year?** As discussed in step 5A, if you allocate the carbon fee in the same year that the emissions and costs are incurred, then you will need to base the charges partly on projections. In most organizations, final emissions and carbon cost information—necessary to complete the true-up of projections to final—will not be available until at least three months following the close of the fiscal year.

Microsoft example: At Microsoft, we true up the carbon fee costs with the actual costs after the close of the fiscal year. The true-ups are based on actual verified emissions and carbon reduction costs.

5C. Communicate progress internally

By communicating your progress with the carbon fee and investments internally, you can make sure your stakeholders know that the money they are putting in is having an impact. You can also help keep your goals for the carbon fee—whether to reduce costs or meet citizenship commitments—top of mind. Providing visibility into emissions data and performance can provide the incentive needed to drive internal initiatives and more responsible decision making.

Consideration

- **Will you publish regular updates on your organization's emissions performance and sustainability investments?** At a minimum, whoever is leading the carbon fee process should communicate back to stakeholders to show the value that the program is providing to the company. For broader impact, you could also share updates with your employees at large. You may even want to extend this communication out to your supply chain partners, particularly if this will have some influence on operational decisions. If you have an existing communications rhythm around your sustainability activities, you may wish to include updates related to the carbon fee. You will probably want to share updates annually, and preferably quarterly if your goal is to drive behavior change (such as reducing energy use or air travel).

Microsoft example: We manage our emissions inventory using a solution for energy and carbon management built on the Microsoft cloud platform. The solution enables groups from across the company to view emissions data based on group-specific access parameters; on initial rollout, we restricted each group's view to data that was immediately actionable by them. For example, our data center team has a global view of data center emissions data, whereas our subsidiary facilities teams can access data for facilities in their specific geographical region. By giving them access to just the data that is relevant to their part of the organization (and not the broader organization), we help eliminate distractions and keep the groups focused on opportunities to drive emissions-reducing initiatives within their areas.

Our chief environmental strategist also sends a periodic email update to all employees detailing our sustainability accomplishments (such as emissions performance, carbon fee fund investments, and internal initiatives).

5D. Report on your emissions performance externally

Whether or not the impact on external perceptions of your company was a motivating factor in your decision to implement a carbon fee, there will be several opportunities for you to highlight your strategy and achievements. These range from formal reporting systems—including third-party

surveys—to marketing and public relations (PR) activities. Participating in performance surveys (for example, CDP, *Newsweek* ratings, and the Dow Jones Sustainability Index [DJSI]), publishing white papers and press releases, and undertaking speaking engagements can help your organization communicate your efforts to be environmentally responsible to customers, partners, investors, and other external organizations (as well as employees).

Considerations

- **How will your third-party sustainability reporting (such as for CDP and DSJI) be impacted by the investments you make with your carbon fee fund?** If you are investing some or all of your carbon fee fund into green power to reduce your net emissions, it will be important to understand how third-party surveys request that you account for these purchases in your emissions inventory. For example, contractual and location-based accounting methods are likely to emerge from the soon-to-be-published World Resources Institute (WRI) Scope 2 accounting guidance. Contractual accounting approaches will factor green power reductions into emissions, whereas location-based accounting approaches will be based on a "physical" approach and will not factor in green power reductions. Therefore, you may be required to report emissions data as gross emissions (location-based approach) or net emissions (contractual approach); different programs are likely to specify that organizations report their performance based on one or both of these approaches.

- **How will your carbon fee investments affect third-party verification of your emissions?** If you currently have your emissions inventory verified by a third party (to support voluntary or regulatory reporting efforts), how you invest your carbon fee funds to reduce your net emissions may have an impact on the scope or results of verification. If your investments do not come with their own verification, that portion of your emissions may be excluded from your verification statement or may require additional effort to verify.

- **What opportunities do you have to enhance your organization's public reports?** If sustainability plays a role in any of your organization's standard reports, you may wish to highlight your carbon fee fund investments. For example, in your annual report you could discuss your investment strategy, and in your citizenship report you could focus on the impact of those investments.

- **How can the carbon fee model align with your corporate priorities?** If you have an overall sustainability or citizenship PR plan, your carbon fee strategy may be a valuable supporting point. There are numerous other opportunities to highlight your sustainability efforts through the carbon fee and associated investments. For example, you could add information to your organizational website; publish press releases to announce and provide updates on your strategy; pursue joint marketing opportunities with the organizations that you are investing with (such as for carbon offset projects and power purchase agreements [PPAs]); and participate in speaking engagements.

Microsoft example: Microsoft has reported into CDP for several years; in the year after we implemented our carbon fee model, we were able to demonstrate an 81.9 percent reduction in net emissions from emission reduction activities—earning us a place on the Carbon Performance Leadership Index (CPLI) in 2013. We were able to achieve this reduction through efficiency measures and our investment in green power using our carbon fee fund. Our green power investments also earned Microsoft an EPA "Partner of the Year" Green Power Purchaser Award in both 2012 and 2013.

5E. Plan for the future

With your model up and running, your investments made, and your progress reported, it's time to step back and reassess. What's working? What's not working? Perhaps you started by implementing the carbon fee model in a pilot area, or you kept your investment strategy conservative. This is your opportunity to refine and evolve your approach for maximum value for your organization.

Considerations

- **When is the best time to evolve your carbon fee model?** It's a worthwhile exercise to revisit the design and administration of your carbon fee at least annually. However, as with when you were seeking approval initially (in step 4A), you'll want to leave enough time to implement any changes before the next fiscal year. If you allowed six months to design, socialize, and implement your model initially, you may want to allow the same amount of time for the refinement process.

- **Are you achieving your goals with your carbon fee model and investment strategy? Are there opportunities to improve?** Some good questions to ask yourself include:

    - Is your emissions-tracking system meeting your requirements? Does it support the level of reporting and access you require for transparency across your organization?
    - Can you get more ambitious with your annual carbon reduction targets?
    - Can or should you expand your carbon emissions fee boundary?
    - What new investments do you want to consider? Is your investment portfolio achieving the goals you set out? If not, what might change? This is also a good time to consider how changes in reporting standards may influence where you invest (for example, can you use carbon offsets to offset emissions from energy consumption? If you invest in a power purchase agreement, will this have an impact on how you do your reporting?).
    - Do you want to increase your carbon price to raise more funds for investments or internal efficiency projects?

- What has the response been around your organization to the fee? Are you doing enough internal communications to keep everyone informed and supportive?

- **How well is the administration of the fee working?** Once you have been through a few cycles of allocating the carbon fee to groups within your organization, you will be in a position to identify if there are any opportunities to simplify or automate how you manage the fee from an operational perspective. This is also a good time to reassess if your cross-organizational committee is working well (for example, the process for reviewing investment proposals and the frequency of meetings).

Microsoft example: A year on from when we implemented our carbon fee, we have kept our internal price on carbon flat and we have kept the core design and administration of our model the same. However, we are constantly reevaluating our investment strategy. We started by purchasing US market RECs and carbon offsets, and we are now expanding our portfolio to include internal efficiency investments, longer term green power PPAs, onsite green power projects, and other investments.

Conclusion

At Microsoft, we believe that we have a responsibility to address the environmental impact of the growing energy demands from our operations, services, and devices. At the same time, we have an opportunity to demonstrate how the use of our technology can help accelerate the transition to a low-carbon economy.

Our carbon fee model supports a culture of innovation and efficiency at Microsoft. We are taking the initiative in promoting the efficient use of resources and purchasing green power, and we hope to set an example by driving accountability through our internal carbon pricing and carbon fee model.

Realistically, it would not be possible for us to adopt this model if it did not benefit the overall productivity and profitability of our company. The growth of our business, however, must also incorporate the greater needs of society. Increasing our efficiency and performance in a resource-constrained world across all of our operations is an important part of our efforts to be a better, more socially minded corporate citizen.

We designed our simple, repeatable model with the hope of helping private and public organizations to meet their goals to drive efficiency and demonstrate responsibility and leadership in their response to climate change. Putting a price on carbon enables organizations to take a concrete, measurable approach while driving culture change by inspiring a new level of awareness and dialogue. It encourages everyone to get involved to drive action.

Through internal policies and targeted initiatives at Microsoft, we:

- Are establishing carbon reduction targets in more than 15 subsidiaries.
- Have implemented technology-enabled energy efficiency projects that cut costs and carbon emissions by 6–10 percent across 15 million square feet of office space at the Microsoft Redmond campus.
- Are investing in 20+ internal energy efficiency projects around the world.
- Have purchased green power at a scale that led to Microsoft receiving the US EPA's Green Power Partnership as the number two purchaser in the United States.
- Are establishing long-term power purchase agreements for over 100 megawatts of green power.
- Are purchasing carbon credits from 20 projects in 14 countries to support the development of a low-carbon economy in emerging nations.

We hope that the guidance and resources in this paper will set an example of what is possible and that our approach will inspire other organizations to take similar measures and help reduce global emissions.

The role of technology in accelerating the transition to a low-carbon economy

One of the criteria that we use to guide our carbon fee investments is a focus on opportunities to use technology to accelerate the transition to a low-carbon economy. We believe that to minimize climate change in the long term, the world needs to make this transition—and technology will play a critical role.

Some examples of how technology has the potential to make a difference include:

- **Internet access in remote areas.** We are deploying a pilot project with the Kenyan Ministry of Information and Communications and Kenyan Internet service provider Indigo Telecom Ltd to deliver low-cost, high-speed wireless broadband in rural areas currently lacking even basic electricity—creating new opportunities for commerce, education, healthcare, and delivery of government services across Kenya. The project is the first deployment of solar-powered stations together with TV white spaces, a technology partially developed by Microsoft Research.

- **Biodiversity threat mapping.** To better understand and support biodiversity, through a partnership with The International Union for Conservation of Nature (IUCN) and with support from our own Microsoft Research Connections organization (a division of Microsoft Research dedicated to worldwide collaborative research) we are creating a web-based mapping application. The application links species ranges, conservation status, and protected areas and allows experts to map out threat information and discover threat information compiled by other experts.

- **Forest preservation and education.** One of the carbon offset projects that Microsoft invests in is the Kasigau Corridor REDD+ Project by Wildlife Works. We are exploring various Microsoft technologies to optimize their work in the areas of threatened forest protection, at-risk biodiversity conservation, and sustainable community development in their REDD+ (Reducing Emissions from Deforestation and Degradation) projects in Kenya and the Democratic Republic of Congo. In forest and carbon monitoring, Microsoft and Wildlife Works are exploring a vision for improved on-the-ground technologies that include GPS handheld devices for carbon monitors to navigate to specific forest plot sites; cloud services to offer an enhanced ability to share and increase security for carbon stock information; and tablets to optimize operations at field offices, laboratories, and community outreach. Smartphones and tablets to capture and share data could also assist the biodiversity monitoring team in tracking movement and expansion, as well as potential threats to local biodiversity. In education, new systems for broadcasting high-speed Internet are being explored, as well as equipment implementation and upgrades.

- **Green power expansion and optimization.** Microsoft is working with energy companies around the world to help them to use IT—and in particular the power of modern data centers and cloud computing—to develop and operate new green power projects as well as optimize their current energy generation and transmission assets. Specifically, technology can provide rich

project reporting with "dashboards" and detailed drill-down capabilities, as well as monitoring and optimization of real-time capacity, wind speed, faults, market price data, and financial performance impacts.

- **Cloud computing.** We have redesigned our business around cloud computing, providing organizations of all sizes and types with the option to take advantage of the efficiencies enabled by large-scale, centralized data center operations. When organizations move business applications to the cloud, their energy use and carbon footprint per user reduce by at least 30 percent. To learn more, please see the Cloud computing and sustainability white paper.

- **Carbon trading.** An organization taking advantage of the cloud is the Carbon Trade Exchange (CTX), The CTX Trading Platform, hosted on the Microsoft cloud, provides real-time trading and instantaneous clearing and settlement mechanisms for environmental units—such as carbon credits, renewable energy certificates (RECs), and water allocation rights—making it easier for businesses of all sizes to invest in sustainable, clean-tech, and energy-efficient projects around the world in support of a more efficient and low-carbon economy.

- **Emissions inventory management.** Having good data is crucial to measuring a carbon footprint and managing a carbon fee, and technology plays an important role in tracking and analyzing that data. Internally, we initially managed our emissions inventory using the Microsoft Office platform (specifically Microsoft Excel and Microsoft SharePoint). In 2012 we moved to carbon management software by Envizi, built on the Microsoft cloud platform.

- **Data center efficiency.** IT solutions are increasingly hosted in the cloud. As a result, the energy consumption from data centers represents a potentially significant source of emissions and are a prime target for improved efficiency. We are investing in our data centers to reduce the energy they consume. For example, Microsoft is using air- and water-side economizers to improve cooling efficiency, as well as more efficient custom LED lighting.

- **Building efficiency.** Together with our worldwide partner network, we are helping cities reduce their carbon footprint and address climate change by using technology to make buildings smarter and more efficient. Through CityNext, we hope to help cities take advantage of technology solutions—ranging from cloud computing to mobile devices to big data—to operate buildings more efficiently. For example, we are funding a pilot on our own Redmond campus where we have already saved more than $1.5 million in energy costs through this technology, and we expect to achieve energy savings of 6–10 percent per year, with an implementation payback in less than 18 months.

Our resources

Carbon offsets

The CarbonNeutral Company

http://www.carbonneutral.com

Mark LaCroix, Executive Vice President Business Development (Mark.LaCroix@carbonneutral.com, Tel: 616-682-4881)

The CarbonNeutral Company is a world-leading provider of carbon reduction and carbon offset solutions. It works with more than 350 companies in 34 countries to develop offset-inclusive carbon reduction programs, and since 1997 it has purchased carbon credits from over 250 projects around the world. Through its offices in London and New York, The CarbonNeutral Company's global team combines experience working in international business-to-business (B2B) corporations, carbon markets and trading, carbon project development, engineering, marketing communications, and consulting. Executives are on the board of the Climate Markets Investors Association and involved in the strategic work of the International Carbon Reduction and Offset Alliance (ICROA), and the company is a signatory to the UN Global Compact. CarbonNeutral is the registered trademark of The CarbonNeutral Company and is the global standard to certify that businesses have measured and reduced their CO2 emissions to net zero for their company, products, operations or services.

Emissions tracking technology

Envizi

Robin Baker (robin.baker@envizi.com)

Envizi, a Microsoft cloud services partner, provides distributed data collection and reporting for carbon emissions inventory management. Envizi is a global provider whose technology is built on the Microsoft cloud platform. Envizi takes advantage of the efficiencies enabled by cloud computing to deliver scalable solutions to multinational clients (such as Microsoft).

Emissions inventory management, emissions technology implementation, and carbon fee administration

WSP USA

Daniel Sobrinski P.E., Senior Project Director (Daniel.sobrinski@wspgroup.com)

WSP provides support with energy management, carbon emissions inventory management, and carbon fee administration. WSP Sustainability & Energy consultants work with clients to shape strategic and sustainable approaches to improving business performance and reporting in a carbon-

conscious economy. WSP Sustainability & Energy engagements help organizations to quantify and report their carbon emissions and to identify, evaluate, and implement cost-effective means to achieve carbon reductions.

Messaging and reporting consulting

Murdoch Services

Ken Machtley, Messaging & Reporting Strategy Consultant (v-kenmac@microsoft.com)

Murdoch Services is a consultancy that specializes in marketing strategy and corporate storytelling. It was part of the team responsible for accelerating the adoption of the carbon fee at Microsoft and helps the Environmental Sustainability team share its experiences and accomplishments through external reporting, white papers, presentations, and other communications. The Murdoch Services team also works on a number of strategic cross-company projects at Microsoft that help shape perceptions across customers, partners, and employees and drive results for the business.

Renewable Energy Certificates (RECs)

Sterling Planet

Robert A. Maddox, Chief Sustainability Officer (bmaddox@sterlingplanet.com, Tel: 203-266-7973)

Sterling Planet provides REC investing services.

Green power power purchase agreements (PPAs)

Altenex

http://altenex.com

Chris Hayes, Managing Partner (chris.hayes@altenex.com, Tel: 617-517-3209)

Altenex is an energy management network that helps companies source clean energy for their power portfolios. It helps Microsoft identify and evaluate cost-effective clean energy projects.

About the author

Tamara ("TJ") DiCaprio is responsible for reducing the global environmental operational footprint at Microsoft. TJ joined the Microsoft Environmental Sustainability group in 2010 and since that time has worked closely with the Environmental Sustainability, Citizenship, and Finance teams to develop an internal carbon footprint strategy, establish an internal governance model, and shape internal corporate carbon reduction policy direction. She was the chief architect behind the development and implementation of Microsoft's carbon neutral policy and carbon fee model. TJ was recognized by the US Congress and received the 2013 EPA Individual Climate Leadership Award for her work in establishing bold mitigation efforts to climate change at Microsoft.

TJ is passionate about finding novel ways to drive accountability for environmental sustainability. She works closely with both government and non-governmental organizations such as the Association of Climate Change Officers (ACCO), Bill and Melinda Gates Foundation, CDP, Environmental Defense Fund (EDF), Environmental Protection Agency (EPA), United Nations Framework Convention on Climate Change (UNFCC), World Bank, World Resources Institute (WRI), and World Wildlife Fund (WWF) to gain input and solicit feedback on her work as well as share best practices. TJ is on the board of directors for ACCO and co-chair of ACCO's Women's Climate Collaborative to help promote the development of the profession.

To provide feedback or comments on this paper or share your own experiences with voluntary organizational carbon fees, please contact TJ at tjdicap@microsoft.com and follow her on Twitter @TJDiCaprio.

Additional contributors

Ken Machtley, Managing Consultant of Murdoch Services, was a key partner in developing Microsoft's carbon neutral policy and carbon fee model. Ken and his colleagues Sarah Carson and Claudia Richey have co-authored white papers with the Microsoft Environmental Sustainability team and coordinate the investor, water, and supply chain responses for CDP. The Murdoch Services team led the qualitative effort and project management for Microsoft when Microsoft was recognized as a CDP disclosure leader in 2012 and a performance leader in 2013. Contact Ken (ken.machtley@murdochservices.com) to discuss how his team can help you with your own sustainability initiatives.

Dan Sobrinski P.E., Senior Project Director with the Sustainability and Energy practice within WSP, is a subject matter expert in Microsoft's carbon management initiatives. Dan was a key stakeholder in developing and implementing Microsoft's carbon emissions inventory data management system, carbon fee model, carbon reduction strategy, and CDP response. Contact Dan (dan.sobrinski@wspgroup.com) to discuss how WSP can help with your sustainability and energy programs.