

# CLIMATE CHANGE: CHALLENGES AND OPPORTUNITIES FOR BUSINESS

PREPARING YOUR COMPANY  
FOR UPCOMING ENERGY POLICIES



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# EXECUTIVE SUMMARY

## ANALYZING YOUR ENERGY EMISSIONS

The topic of climate change has become a major driving force in government policy, popular discussion, and business. The debate over the science of climate change is quickly coming to a close and will soon be replaced by a new debate about policy alternatives. Policies are being written all over the world that will affect business in striking ways, through end-use efficiency standards, increased energy prices, and increased prices of raw materials and components through supply chain effects. The largest developments, through mandatory greenhouse gas reductions, as well as emissions reporting for businesses, have been focused in the European Union, though policy makers in the United States and elsewhere are moving quickly to catch up.

Although policies will affect various companies differently depending on location and type of business, most are likely to be affected in some way given the global nature of the climate problem and proposed solutions. The most important single action companies can take at this moment is to analyze and understand their direct and supply chain emissions of greenhouse gases. This is because increased costs related to climate policy will to some extent be passed on along supply chains. For makers of energy-consuming products, efficiency standards and use-phase emissions will become increasingly important as energy costs rise and new standards are written.

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# INTRODUCTION

## LEARNING ABOUT ENERGY POLICIES

Over the past few years, climate change has become a topic of great discussion in realms stretching from government to the business community to popular media. With the publication last year of the Intergovernmental Panel on Climate Change's "IPCC Fourth Assessment Report: Climate Change 2007,"<sup>1</sup> the debate over the science of climate change is quickly coming to a

rent impact on climate change and their plans for reducing these impacts. This has led to the construction and growth of voluntary registries where businesses report their greenhouse gas (GHG) emissions, or "carbon footprint." At the same time, businesses are striving to understand what mandatory GHG regulation means for their direct and supply chain production costs.

The connections between climate change and business operations are complex. Active consumers, business partners, and investors are demanding more information from businesses about their current impacts on climate change and their plans for reducing these impacts. At the same time, businesses are striving to understand what mandatory GHG regulation means for their direct and supply chain production costs.

close. And it is being replaced by a new debate about policy alternatives to deal with the problem. These policies are being constructed at an extremely fast pace at levels ranging from local to global.

The connections between climate change and business operations are complex, as the relationships span public relations and social responsibility, as well as the current and future costs of regulation. On the one hand, active consumers, business partners, and investors are demanding more information from businesses about their cur-

Action is occurring on many levels at varying speeds and may seem overwhelming at first glance. This document will attempt to provide a guide on what is happening in climate policy in different areas of the world and what these policies may mean for conducting business in these areas. It begins with a brief background on global GHG emissions, followed by a review of voluntary and mandatory climate policies in the regions that are moving quickly to form policies. Next is a discussion of what these voluntary and mandatory schemes will mean for businesses.

1. Intergovernmental Panel on Climate Change, "IPCC Fourth Assessment Report: Climate Change 2007," [www.ipcc.ch](http://www.ipcc.ch).

# BACKGROUND ON GLOBAL GREENHOUSE GAS EMISSIONS

## UNDERSTANDING EMISSIONS POLICIES AND LIMITS

GHG emissions include environmental emissions of all heat-trapping gases, such as carbon dioxide (CO<sub>2</sub>), methane (CH<sub>4</sub>), nitrous oxide (N<sub>2</sub>O), and several industrial gases like hydrofluorocarbons (HFCs). Generally, emissions of these gases are quantified as “global warming potentials,” measured in metric tons of carbon dioxide equivalent (CO<sub>2</sub>e). This metric combines the relative intensity of the effect that each of the gases has on global climate change. For instance, methane traps heat 21 times more effectively than carbon dioxide and is thus multiplied by 21 to obtain its carbon dioxide equivalent.

GHG emissions result from a variety of activities: the most important is the burning of fossil fuels for energy, which releases CO<sub>2</sub>. However, many other activities including deforestation, use of landfills, agricultural processes, and industrial processes also release substantial greenhouse gases. Figure 1 shows an estimate of global GHG emissions in 2000 by gas and broad activity group. It is clear that energy use caused the majority of emissions in 2000, approximately 25 of the 40 billion metric tons of emissions. Clearly, agriculture is also a large source of emissions, and although industrial processes and waste are less prominent sources in aggregate, they may be important due to their low cost of abatement. For example, capturing emissions of methane from landfills and burning the gas to create energy has long been recognized as a negative-cost project in most circumstances. Policies to abate climate change tend

to focus on emissions coming from the energy sector. While there are several reasons for this, the most significant is likely data availability – emissions from the burning of fossil fuels can be estimated fairly easily using energy data.

directly. (Other programs that would not require measurement, such as best practices standards, may be put in place for agriculture.) In most cases, abating energy-related emissions will save money due to decreased energy

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In the future, these centralized “point source” emissions could be measured directly. In contrast, emissions from agriculture tend to be decentralized “nonpoint source” emissions that vary considerably in time and space and would be very difficult to measure

costs – a major factor for business. This is another reason why this subset of global GHG emissions should be a particular focus.

A crucial point of understanding is that not all energy sources are created

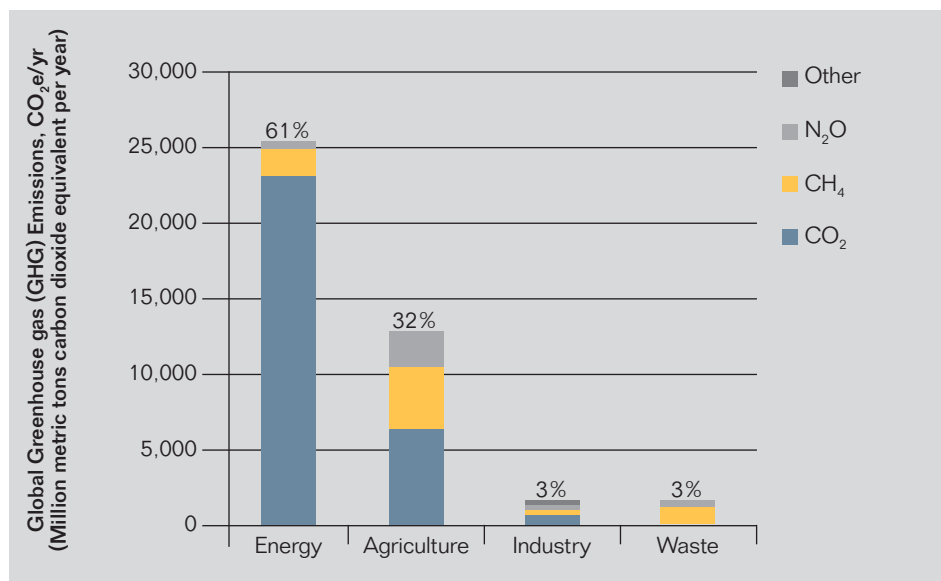


Figure 1: Global Greenhouse Gas Emissions by Sector<sup>2</sup>

2. Adapted from U.S. Environmental Protection Agency, 2006, “Global Mitigation of Non-CO<sub>2</sub> Greenhouse Gases,” EPA report number 430-R-06-005, [www.epa.gov](http://www.epa.gov).

equal – some release large amounts of greenhouse gases and some barely any. Thus, for a company (or country) to calculate its emissions, it must know both its energy consumption and the source of its energy. The following table illustrates this point by showing shares of world energy consumption and world CO<sub>2</sub> emissions by region. While China consumed only 14% of the world's energy in 2005, it was respon-

Around US\$37 billion worth of emissions credits already are traded annually.

sible for 19% of the world's CO<sub>2</sub> emissions that year due to its heavy use of coal, a very carbon-intensive energy source. Likewise, the European Union, with its less carbon-intensive energy mix, consumed 19% of the world's energy but only released 17% of the world's CO<sub>2</sub> emissions. The energy

sources used, as well as emissions, can vary widely from country to country. For instance, Norway's CO<sub>2</sub> share was less than half of its energy share due to its large reliance on hydropower. A similar situation exists in France, where a large reliance on nuclear power has supplanted risks from carbon-intensive electricity. Similar to countries, different companies can have higher or lower GHG emissions by consuming more or less energy or by using higher-carbon (that is, coal) or lower-carbon (that is, wind power) energy sources.

Given this background, the following sections discuss the current state of climate policy in several regions of the world.

**Global Primary Energy Use and CO<sub>2</sub> Emissions from Fossil Fuels in 2005<sup>3</sup>**

	% Energy	% CO <sub>2</sub> Emissions
United States	22%	21%
China	14%	19%
EU	19%	17%
Canada/Latin America	10%	8%
Russia/Eurasia	10%	9%
East Asia/Australia	17%	17%
Africa/Middle East	8%	9%

3. Data adapted from Energy Information Administration, *International Energy Annual 2005*, [www.eia.doe.gov/iea/wecbtu.html](http://www.eia.doe.gov/iea/wecbtu.html).

# CLIMATE POLICIES IN THE EUROPEAN UNION

## LEADING THE CHARGE WITH A GHG TRADING SYSTEM

The European Union has led the charge against climate change ever since the United States rejected ratification of the Kyoto Protocol in 1997. As a group signatory and a ratified party to the Kyoto Protocol (member countries are also signatories), the EU has accepted both mandatory emissions reductions under the protocol and taken leadership in voluntary schemes.

The EU's climate policy is rooted in the Kyoto Protocol of the United Nations Framework Convention on Climate Change, which dates back to 1992. The countries of EU-15 joined Kyoto as a group, or "bubble." This means that each of its member countries has different emissions targets in order to achieve a mandatory EU-wide reduction of 8% below the baseline 1990 level of CO<sub>2</sub> emissions by 2012. These targets allow for emissions growth in some member countries and call for large cuts in other member countries. For example, Spain is allowed to grow by 36% between 1990 and 2012, while Germany has accepted a 21% cut by 2012. By 2000 it was clear that many EU countries were not on target to meet the requirements, and the European Union Greenhouse Gas Emission Trading Scheme (EU-ETS) was adopted in 2003 to court CO<sub>2</sub> emissions cuts more aggressively. With the EU expansion in 2004, the new accession (the former Eastern bloc and Union of Soviet Socialist Republics) countries widened the scope of potential emissions reductions for the EU-ETS while leaving the bubble target largely unchanged.

EU-ETS, the largest GHG trading system in the world, has now entered its second phase, going from 2008 to 2012 in accordance with the first compliance period of the Kyoto Protocol. Currently, EU-ETS represents about 40% of the region's CO<sub>2</sub> emissions and covers some 12,000 installations, mostly in the following sectors:

- Energy (combustion installations with a rated thermal input exceeding 20 MW, including energy producers and large manufacturing facilities)
- Iron and steel
- Nonmetallic minerals (cement clinker, glass, and ceramic bricks)
- Pulp and paper
- Aviation (starting in 2011) and, potentially, international shipping

Around US\$37 billion worth of emissions credits already are traded annually. However, the trial period from 2005 to 2007 revealed several weaknesses in the way EU-ETS had been planned and negotiated, especially in relation to national action plans. These plans allowed the different member states of the EU to distribute their allowances in completely different ways, including overallocation of allowances by some countries. This led to a competitive advantage of one country's economy over another's in some sectors.

The current phase is addressing some of the shortcomings of phase one. Due to these concerns, in January 2008 the EU released a draft of guidelines for the third trading period of the EU-ETS, as well as goals for non-ETS sectors, to commence in 2013. These guidelines call for radical changes in European climate policy in moving away

from free allocation of emissions permits to permit auctioning and harmonizing the distribution of permits for each country at the EU level. The guidelines include formerly excluded sectors, such as **transport** and **building energy use** (for example, at corporate headquarters), and create mandatory renewable energy targets for each country that averages 20% renewable energy use by 2020. Overall, the guidelines aggressively call for a 20% emissions reduction below 1990 levels by 2020. This limit will be cut further to 30% below 1990 levels if other countries, such as the United States and major developing nations, join the international framework. Although the European Commission may eventually back off from some of its original goals, the debate still goes on. The implications of these large changes are discussed in the sections that follow.

In addition to these efforts in mandatory regulation, the EU and EU members have also moved forward with several voluntary schemes for the reporting and labeling of greenhouse gases. There is considerable uncertainty in such numbers, however, and the Department for Environment, Food, and Rural Affairs in the United Kingdom is looking into this issue. In conjunction with other entities, it is developing standards for companies to approximate the greenhouse gases emitted throughout the entire life cycle of goods production. That includes production stages from the extraction of raw materials through all processing stages, packaging, and delivery. Similar efforts can be seen in several other EU member countries.



# CLIMATE POLICIES IN THE UNITED STATES

## REGIONAL MEASURES AND FUTURE LEGISLATION

While somewhat slower to develop its own climate change agenda, the United States (especially in specific U.S. states) is rapidly catching up to its European counterparts in terms of climate policy. Currently, no national mandatory cap and trade system exists; however, several bills pending in Congress could put such a system in place. It is widely expected, given the pending

EU-ETS, only would regulate large emitters in certain industries and would not include energy use in commercial buildings directly. However, efficiency standards are included in the bill for new buildings and major appliances. Most permits would be given away for free at first (only 22% would be auctioned in the first year, 2012), though the auctioned percentage would increase each

Canada to develop multisector cap and trade programs

- Western Climate Initiative, a collaboration of 10 western states and provinces on a goal-based system for GHG emissions reduction.

Some individual states, notably California, have more ambitious goals than those in their regional agreement. California, for instance, already has mandatory reporting for facilities with emissions greater than 25,000 metric tons CO<sub>2</sub>e per year and will institute a cap and trade system starting in 2012 to reduce emissions to the 1990 level by 2020.

Progress is also being made on the national level toward mandatory GHG emissions reporting after a provision in the 2007 Omnibus spending bill required the EPA to develop standards for reporting. Although the standard has not been developed yet (a draft is due in late summer 2008), it probably will be similar to that of registries set up by the EU-ETS and California reporting standards. Most likely, it will have a reporting threshold that falls between the EU's 10,000 metric tons CO<sub>2</sub>e per year and California's 25,000 metric tons CO<sub>2</sub>e per year. Thus, again, it is highly possible that most light industry and commercial buildings will not be required to report. A voluntary scheme, the Climate Registry, which started with the California Climate Action Registry, already is collecting emissions data from businesses and hopes to inform the mandatory reporting standard once it becomes available.

Climate change represents an enormous opportunity for businesses with efficient processes and energy utilization to use these factors to their advantage by reducing costs and gaining brand recognition with ecoconscious consumers.

legislation and current presidential candidates' opinions, that a cap and trade system will be implemented some time in the next administration starting in 2009.

The leading bill focusing on this issue in the U.S. Congress is the Lieberman-Warner bill, America's Climate Security Act (ACSA). Despite the defeat of ACSA by a vote in the U.S. Senate in early June 2008, the bill's proponents have claimed it will return to debate in the next congressional session. ACSA would create a cap and trade system similar to EU-ETS. It would require any facility within the utilities or industrial sectors emitting more than 10,000 metric tons CO<sub>2</sub>e per year of greenhouse gases to submit permits to the U.S. Environmental Protection Agency (EPA) equal to the facility's annual emissions. This limit, similar to that of

year until it stabilizes at 73% in 2036. This percentage is critical because freely allocated permits are less likely to raise costs for energy-intensive industries or the purchasers of energy-intensive products.

In the absence of a coherent national policy, California and other states have stepped up to create regional agreements regulating GHG emissions in subsets of the United States. These agreements cover almost every region of the country and include the:

- Regional Greenhouse Gas Initiative, a cooperative effort to reduce CO<sub>2</sub> emissions from power plants in 10 northeastern states by developing caps and trading programs
- Midwestern Greenhouse Gas Accord, an initiative of seven midwestern states and provinces of

# CLIMATE POLICIES IN OTHER COUNTRIES

## TAKING STEPS IN CANADA, BRAZIL, AND THE PACIFIC RIM

For the most part, other countries have been slower than EU member countries to move on the climate change issue. However, some progress has been made in many smaller countries. Japan has shown its effort toward a long-term

Some developing and middle-income countries are also beginning to initiate climate policies. Brazil has instituted a voluntary reporting system similar to the Climate Registry for domestic businesses. Over the past few years,

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climate change bill with a recent announcement from Prime Minister Yasuo Fukuda that Japan will develop an emissions trading system later this year. The announced system would help to cut emissions by 60% to 80% by 2050, in addition to strengthening existing policies on energy efficiency in buildings and GHG emissions reporting. Ontario and Quebec, two of the most populous provinces of Canada, recently announced a bilateral emissions trade system, expected to commence around 2010, similar to the regional arrangements set up in various U.S. states. British Columbia, another Canadian province, has instituted a CAD 10-per-metric ton carbon tax on nearly all fuels. Quebec and British Columbia have now joined the regional trading system soon to be implemented by the Western Climate Initiative.

China has implemented several policies aimed at increasing energy efficiency and security, including raising regulated energy prices, increasing export tariffs on energy-intensive goods, and mandating efficiency standards in several sectors. The Asia-Pacific Partnership on Clean Development and Climate has brought together several of the world's leading emitters along the Pacific Rim to cooperate on technology development and transfer. These countries include China, India, Australia, the United States, Japan, South Korea, and Canada.

# CHALLENGES AND OPPORTUNITIES FOR BUSINESS

## RESPONDING TO THE COMMUNITY, COMPLYING WITH THE LAW

The business community already is being affected by these policies and will surely be impacted more in the future by the proposed changes to EU climate policies and proposed mandatory reductions in the United States and elsewhere. Leading multinational companies already are pursuing GHG accounting analyses as part of short-term and long-term planning, and many other companies are starting similar programs. With policy moving quickly in large markets like Europe, the United States, and possibly the entire globe, it is increasingly prudent for companies to understand how they will be affected by different climate change policies. While full understanding will require detailed analysis and will be company-specific, some general principles are available, and this section attempts to delineate actions companies can take to understand and reduce their risk.

Understanding the effects of the different policies is far from simple even in the face of certain regulation; regulatory uncertainty makes the situation even more confusing. Effects will come from many sources, including direct cost increases such as energy costs, indirect cost increases due to suppliers' direct costs, and consumer and investor perception of companies and their products. Not all of the effects will be negative. For example, climate change represents an enormous opportunity for businesses with efficient processes and energy utilization to use these factors to their advantage by reducing costs and gaining brand recognition with ecoconscious consumers.

As mentioned in prior sections, the impacts of mandatory GHG emissions reporting will be felt in only a few industries, since most current standards only require reporting when facilities exceed a fairly large amount of emissions per year. Those limits are 10,000 metric tons in the EU and 25,000 metric tons in California. Because these limits are high, only very large consumers of energy will be required to report. However, these limits may come down, and both the EU Climate Action proposal and ACSA in the United States may require other sectors, such as commercial buildings, to take part in emissions reduction in other ways.

Further, even when not required by law, businesses will continue to be pressured by consumers and investors to report their emissions to central databases through voluntary projects such as the Carbon Disclosure Project and the Climate Registry. Reporting to these projects will include more advanced estimates of emissions including carbon embodied in purchased electricity, transportation fuels consumed in vehicle fleets, and so on. Several tools already are built to assist companies and organizations in calculating their emissions from different activities. But for companies to truly understand how climate policies will affect them, they must look far beyond emissions at their own facilities.

Calculating a company's emissions is usually done in so-called tiers or scopes, and knowing how emissions occur across these different tiers is

crucial to understanding how climate policies will affect a given company. Mandatory GHG emissions reporting is usually done at the so-called tier-one level, where only emissions taking place at the facility of interest are counted, although California also will require reporting of purchased energy. The Climate Registry and Carbon Disclosure Project both prefer reporting at tier-one and tier-two levels, where tier two accounts for emissions embodied in purchased electricity, heat, and steam. Tier-three methods, which are optional in all reporting schemes, account for emissions occurring at suppliers' facilities and are also known as "life-cycle" or "supply chain" emissions. Figure 2 shows examples of emissions in each of these tiers or scopes.

4. The Greenhouse Gas Protocol Initiative, "Calculation Tools," [www.ghgprotocol.org/calculation-tools](http://www.ghgprotocol.org/calculation-tools).

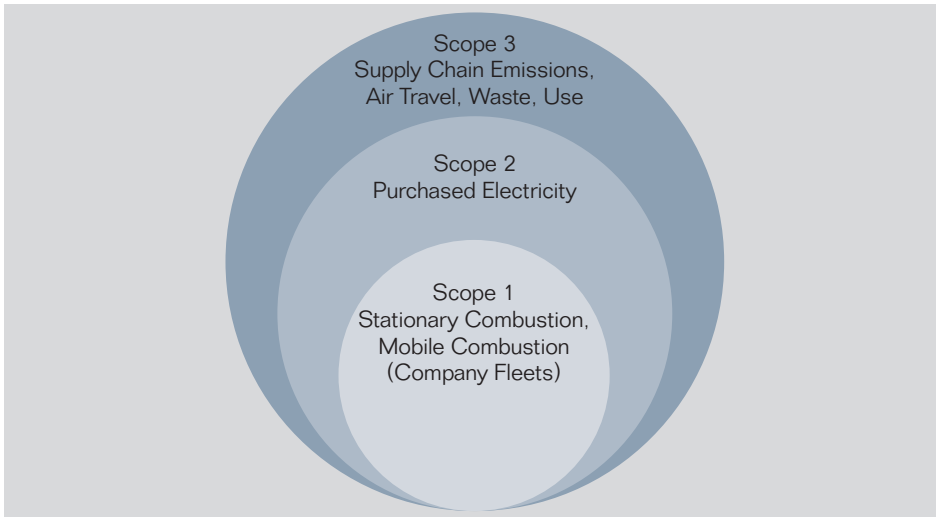


Figure 2: Scopes of Emissions for GHG Reporting at the Company Level <sup>5</sup>

These definitions are instructive in helping companies understand emissions all along the supply chain throughout the entire product life cycle including use, disposal, and recycling. The definitions also can help companies comprehend how climate policies affect their business. Whether or not a company or facility will be required by the relevant government to report their emissions, they still will be affected by mandatory GHG emissions regulation in a number of ways. They will feel the impact of increased supply chain costs, efficiency standards, and consumer and investor demand to buy from or own “green” companies. For example, consider an automobile manufacturer whose production facility falls below the relevant cutoff to report emissions to its government. First, climate policies in different countries will mandate efficiencies for the cars the company makes. Second, if the company is considered to be green, it could see

increased brand loyalty. Finally, in terms of emissions, despite a lack of reporting or direct regulation, this manufacturer will face potentially significant price increases. These could be higher costs of purchased energy and components whose producers face increases in the price of energy or directly regulated goods like steel, aluminum, and glass.

Clearly, it is not enough simply to understand a business’s direct emissions or even its tier-two emissions including electricity purchases. Minimizing emissions from suppliers and product use is important to the competitiveness of a company and its climate policies. Some companies that already have strived for energy efficiency and have sought like-minded suppliers will face a relatively low risk from climate policies and may gain an advantage over their competitors. The opposite will be true for those companies who lag behind in reducing their total climate impacts.

Not all GHG emissions in a company’s supply chain will incur increased costs. Some emissions will occur in unregulated industries, in industries with free allocation of emissions permits, or at facilities smaller than the reporting threshold. However, understanding the total supply chain emissions of a company will still be a good first approximation of the “carbon risk” the company faces. Also, it will allow a company to target the most effective ways to reduce this risk no matter where the risk occurs in its supply chain. Putting together direct energy use and emissions, supply chain emissions, and product design specifications for use and disposal phases of product life cycles will lead to more comprehensive knowledge of business risks and opportunities.

Thus, reporting a facility’s or company’s direct emissions, whether by law or voluntarily, will not offer it a full picture. There are several tools available to help a company understand the GHG emissions occurring across its supply chain, though most fall under the umbrella of “life-cycle assessment” (LCA), a relatively new but fast-growing field. LCA attempts to delineate emissions throughout the production, use, and disposal of goods and services, and several methods exist.

5. Based on information from the Greenhouse Gas Protocol Initiative, [www.ghgprotocol.org](http://www.ghgprotocol.org).

# SUMMARY AND CONCLUSIONS

## UNDERSTANDING THE FACTORS THAT AFFECT YOUR BUSINESS

In light of all that is happening in climate policy, how should companies prepare? As previously explained, whether a company creates intermediate or final products, or is a small or large emitter of greenhouse gases, climate policies will affect it. The first step for any company is to understand where emissions of regulated greenhouse gases occur in its supply chain by using life-cycle assessment tools or similar techniques. This first-level analysis will allow the company to examine where it may wish to dig deeper to understand and cut its own costs by eliminating wasteful or inefficient processes.

Specific responses and preparations will vary by industry and by region. The following table summarizes some ideas for different businesses. Large emitting businesses that are or could become regulated in Europe and the United States (see the table in the section called “Background on Global Greenhouse Emissions”) should become very familiar with existing and potential future regulation. Lower emitters in these regions need to determine which of their suppliers are likely to be regulated and what cost increases most likely will be associated with this. The consumption of all forms of energy will become increasingly expensive, especially transportation fuels and fossil fuel electricity. Companies in both

the developing world and industrialized nations should become familiar with local policies and their potential to become mandatory emissions regulations in the future. Those facing the potential of large emissions reduction policies should also consider their eligibility for such money-generating programs as the Clean Development Mechanism of the Kyoto Protocol. Through programs like this, emissions reduction projects in the developing world can qualify for emissions credits in trade markets like the EU-ETS. All companies should consider voluntary reporting practices to appease potential consumers and investors and look for ways to save money through energy efficiency improvements.

### Actions to Minimize Risks of Climate Policies

	EU and United States	Developing World
<b>Potentially Regulated Businesses</b>	Understand baseline emissions	Learn about local policy atmosphere
	Look for low-cost reductions	Examine the potential for project-based credits
	Examine emissions-trading options	Consider voluntary reporting
	Consider voluntary reporting	
<b>Nonregulated Businesses</b>	Understand baseline supply chain emissions	Understand baseline supply chain emissions, especially for EU and U.S. suppliers
	Determine what parts of the supply chain might be regulated	Examine the potential for project-based credits
	Look for energy-saving measures	Consider voluntary reporting
	Consider voluntary reporting	





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