Adapting to Climate Change: A Guide for the ICT Industry

Joyce Wong, Associate, Advisory Services
Ryan Schuchard, Manager, Climate and Energy

March 2011

This guide is part of a BSR industry series. For more, see www.bsr.org/adaptation.

Contents and Methodology

This brief covers:

Reporting on Risks and Opportunities: Based on reporting of climate risk in 2009 by 133 ICT companies to the Carbon Disclosure Project (CDP)

Current Practices: An outline of actions related to climate change adaptation, based on reporting from the CDP, interviews, and other publications

Emerging Practices: Synthesis of company disclosures, literature reviews, and input from climate change professionals through interviews

This primer on climate change adaptation in the information and communications technology (ICT) industry summarizes how ICT companies are reporting on climate change risks and opportunities. It outlines current and emerging best practices and guidance for ICT companies on how to develop a proactive approach to climate change adaptation, and makes recommendations.

In this brief, ICT refers to a broad range of companies, including those from the telecommunications, consumer electronics, software, and internet sectors.

Introduction

While the role of the ICT sector in slowing climate change through products and services that enable emissions reductions is well-recognized ("mitigation"),[1] less often discussed is the potential for the sector to enable society to prepare for and respond to imminent climate change impacts ("adaptation"). In many cases, ICT contributes to both mitigation and adaptation efforts at the same time. A clear example is energy management, which is a key to reducing energy use (thereby reducing emissions), as well as coping with rising energy costs and shortages.

As climate change brings warmer temperatures, increased water scarcity, and more frequent and severe extreme weather events, there is an increase in the risk to ICT manufacturing facilities and infrastructure and in the need for ICT solutions. Global businesses, governments, communities, and consumers will need to better manage energy and water use, be able to depend on reliable communication, and stay apprised of potential disruptions to maintain business continuity and sustainable growth. Many existing ICT companies can fill this role—but there is significant and growing opportunity for the sector to do more.

Proactive and responsible adaptation should concern the ICT industry for the following reasons:

- Customers need information-based tools to understand, anticipate, and prepare for changing weather patterns and physical landscapes.
- There is opportunity for sales growth in emerging markets that are especially at risk from the impacts of climate change and in which network infrastructure is less developed.
- The industry heavily relies on geographic locations vulnerable to climate change for manufacturing and sourcing of key materials.

Against this backdrop, this brief examines ways that climate change is affecting the ICT industry and how companies are responding. It also proposes priority

[1] For more information, see: Global e-Sustainability Initiative and The Climate Group. "Smart 2020: Enabling the low carbon economy in the information age" (2008). http://www.smart2020.org/publications.

areas for further exploration. Our analysis shows that there is solid understanding, management, and communication of climate-related risk and opportunity among ICT companies, but a less-distinct focus on adaptation. There are many examples of adaptive practices to draw on, but still room for innovation, exploration, and collaboration around the opportunities identified for the sector as a whole. Based on company-reported risks, opportunities, and actions, this brief will help ICT companies identify material climate risks and opportunities, and develop practical approaches to preparing for climate change.

The ICT sector has a unique role to play in enabling business and society to both reduce contributions to climate change and cope with effects already being felt:

Mitigation refers to actions taken to reduce greenhouse gas emissions, which are primarily driven by energy use.

Adaptation refers to activities that reduce harm or risk of harm, or realize benefits associated with climate variability and climate change.

Reporting on Risks and Opportunities

Most large ICT companies are reporting on climate change risk and opportunity. The following is an analysis of 2009 ICT company disclosures of climate change risks and opportunities to the Carbon Disclosure Project (CDP), one of the largest repositories of company reporting on climate change.[2] Our review of company responses revealed common trends in reported risks and opportunities, which are grouped and summarized in the four areas below, and accompanied by examples of companies that provided those responses.

Note that while company names are provided as examples, they do not constitute a comprehensive list of all companies that provided similar responses.

Key:
Risks
Opportunities

1. EVOLVING CUSTOMER NEEDS Increased natural disasters and more gradual weather changes will result in demand for products and services that enable businesses, consumers, governments, and communities to prepare for and respond to sudden disasters and adapt to resource shortages.	
Impacts	**Reporting Companies**
There is likely to be a greater demand for consumer products and solutions to track and reduce energy and water usage.	Cisco Systems, Motorola, Microsoft
There is also likely to be growth of demand for products and services to minimize business disruption through business recovery, continuity, etc., in the event of power outages.	EMC, SAP
Population migration stemming from climate-related pressures will change the type of technologies needed, and the places where customer bases are strongest.	Dell
Growth is likely in emerging markets that are more vulnerable to climate change impacts, and which currently have less network infrastructure.	BT Group, Cisco Systems
Increased demand is expected for solutions that help customers understand and protect themselves from physical risks of climate change while maintaining and enhancing communications capability.	Cisco Systems, Motorola, SK Telecom, KT, Acer
Development and provision of equipment and services to measure, monitor, mitigate, and respond to climate change impacts, such as increased satellite monitoring, and to provide emergency and disaster warning, is expected.	Agilent, Google, BT Group, NTT, Royal KPN, SES, SK Telecom

[2] For more information on the Carbon Disclosure Project, see www.cdproject.net

Carbon Disclosure Project Highlight:
Of 133 ICT company disclosures in 2009, 68 percent responded that climate change represents physical risk to the company, and 61 percent responded that physical impacts of climate change present opportunity.

Source: BSR Analysis

2. PRODUCT MANUFACTURING AND SUPPLY CHAINS Anticipated increase in demand for, and shortages of, natural resources (e.g., energy, water), and increased frequency and severity of extreme weather events in key manufacturing regions will affect the stability and cost of product manufacturing.	
Impacts	**Reporting Companies**
Increasing scarcity will impact water cost and availability for water-intensive manufacturing processes, such as cooling.	Hitachi, Sharp
Higher temperatures will exacerbate pressure on energy demand and supply, leading to increased likelihood of energy shortages/outages that disrupt production and increase costs.	Sun Microsystems (now Oracle), Fujitsu, Motorola
Increased occurrence of extreme weather events will interrupt materials supply and manufacturing operations.	Acer, Lenovo, Samsung Electronics

3. WORKFORCE INSTABILITY Natural disasters and warmer temperatures may lead to an increase in safety risk, diseases, and other factors that affect workforce health and/or workers' ability to go to work.	
Impacts	**Reporting Companies**
Occurrence of typhoons, hurricanes, and other windstorms may render it impossible or dangerous for employees to get to work. Also, increased risk of disease associated with catastrophic disasters and warmer temperatures may affect the health, productivity, and ability to work of employees of ICT companies and their suppliers.	Allied Electronics (Altron), Samsung, Acer, Konica Minolta
Climate change is likely to result in population migration, which will affect workforce stability in more vulnerable areas in which ICT companies have operations.	Dell

"Our customer's expectations are increasing dramatically, and they expect us to provide reliable service 24 hours a day, 365 days a year. To meet those demands, we need to be able to withstand increasing weather risk. As a result, we've built redundancy into our networks, so that if there's a challenge in one area, we can instantly reroute traffic on our networks and people can still communicate."

Jim Gowen, Verizon Chief Sustainability Officer

4. INFRASTRUCTURE AND BUSINESS PROCESSES Projected rises in sea level and more frequent and severe weather events threaten to increase logistics disruption and cost, and heighten risk to physical assets. Heightened risk of natural disasters in areas with heavy concentrations of ICT companies, facilities, and suppliers increases the need to build strong, resilient communications networks.	
Impacts	**Reporting Companies**
Data networks, equipment, and offices are at higher risk from high winds, floods, and other catastrophic weather events that can cause damage, impede maintenance and repair responsiveness, and/or drastically increase network traffic.	BT, Sprint, NTT DoCoMo, Verizon
Increased need for reliable communications networks to respond to catastrophic weather events will lead to more pressure on government entities to support voice and data communication capability.	American Tower Corp.

The responses indicate broad awareness of the risks that climate change poses to a company's physical assets, supply chain, business continuity, and employees, as well as an understanding of how the ICT sector can play a role in helping customers adapt to increasing disruption, resource constraints, and information needs. It is important to note that this list is not a perfect representation of all real risks and opportunities. Climate reporting is new; while standards are coalescing about reporting topics, detailed guidance is scant, and reporting is uneven among companies.[3] Also, because it is difficult to attribute a given weather event to climate change, it can be challenging to distinguish risks and opportunities that are specifically related to the phenomenon. Finally, the distinction between risk and opportunity is not always clear—the difference might be how a company is poised to handle a given disruption or risk, especially relative to its competitors.

About Adaptive Practices
Based on previous risks and opportunities, companies report on pursuing a range of adaptive responses, which are included in this section.

Adaptive practices are grouped by two types:

- **Value protection:** Ensuring resilience of owned physical assets and planning responses to maintain business as usual
- **Value creation:** Devising solutions that contribute to the ability to pursue new revenue-generating opportunities and that help suppliers, stakeholders, and customers adapt to a changing climate

Current Practices

In response to these risks and opportunities, companies are pursuing a range of adaptive practices to identify, respond to, and stay ahead of current and expected disruptions. In some cases, these practices are intended to ***protect value*** of existing assets and systems. In others, practices are aimed more at ***creating value*** through innovation and meeting new needs that stem from climate change effects.

The following examples of ICT sector practices and innovations are drawn primarily from 2009 CDP responses.

VALUE *PROTECTION*

These practices provide examples of how companies are promoting resilience of physical assets and improving systems responses to effectively execute on existing plans and expectations and maintain business as usual.

1 **Site and asset risk assessments and continuity planning:** Physical risks at sites and in key regions are regularly assessed. Climate-related risks are typically evaluated as part of routine risk assessments, and subsequent actions are included in business continuity planning. Because of the recognized concentration of ICT operations in regions more vulnerable to climate change (e.g., Asia), many companies cite specific countries of concern.

   » **Motorola** conducts routine risk assessments to identify and plan for high-risk situations. Based on identified risks, continuity and preparedness plans are developed and tested.

   » **Jabil's** corporate and environmental responsibility team monitors climate change risk and engages with the company's risk and assurance group (which is responsible for risk mitigation and reports to the board) as warranted. Climate risk factors are being incorporated into internal due diligence for mergers and acquisitions.

   » In response to the facility shutdown risk due to heavy rains and typhoons, **Hitachi** has implemented water exposure prevention training for employees in buildings located near rivers, and is working toward the abolition of underground tanks in factories in Japan.

   » **Samsung** provides environmental safety and risk prevention education for selected company workers.

[3] For more on standards, see the CDP Investor Questionnaire (at https://www.cdproject.net/en-US/Programmes/Pages/More-questionnaires.aspx) and the U.S. Securities and Exchange Commissions' Guidance Regarding Disclosure Related to Climate Change (at http://www.sec.gov/rules/interp/2010/33-9106.pdf),

2 **Strengthened resilience of business assets and processes:** To minimize the disruption and damage to services and networks from sudden weather events, companies are investing in improvements to existing network infrastructure, and incorporating such considerations into plans for future networks.

   » **BT Group** has invested in making its underground network more resilient to flooding, with cables better able to withstand water damage. This initiative is reducing network faults and improving the reliability of networks while cutting repair costs.

   » **Hitachi** is responding to increasing energy shortages in China with in-house power generation.

   » **American Tower Corporation** designs tower sites to strict engineering standards, so that they are able to withstand hurricane force and flooding conditions.

   » **Sharp** diversifies the location of its plants and also installs solar power generation systems on all of its manufacturing plants in Japan.

3 **Improved resource efficiency and conservation in manufacturing sites and processes:** Companies are minimizing consumption of, and reusing, resources in response to increased demand and decreased availability and reliability.

   » **Hitachi** established a reduction target of 10 percent from a baseline of fiscal 2005 for water usage, reuses water in water-stressed manufacturing sites outside Japan, and has implemented a cascade use method (a reuse system according to the quality of used water).

   » **Sharp** recycles 100 percent of process wastewater at LCD-panel plants, which use significant quantities of water.

4 **Supply chain risk assessment and management:** Companies are evaluating supply chain risk and developing continuity plans.

   » **EMC's** Global Supply Chain group has a business continuity program that assesses the potential impact of events on its suppliers and ensures that mitigation plans are in place for all medium- and high-risk areas/suppliers.

   » **Jabil** works through trade associations and collaborations, such as the Electronics Industry Citizenship Coalition, to engage supply chain members to perform risk identification, assessment, mitigation, adaptation, and management.

5 **Workforce protection:** The ICT sector contributes to monitoring and protecting workforces against potential health risks.

   » **Samsung SDI**'s risk management system includes a specific focus on industrial health care, employee health care, and contagious diseases.

   » **Siemens** has an occupational health and safety process that ensures medical care and minimizes the risk of illness due to the workplace environment. Preventative measures include necessary vaccinations for business trips.

VALUE *CREATION*

These practices offer examples of how ICT companies help suppliers, stakeholders, and customers adapt to a changing climate and generate new revenue in the process. As an "enabling" industry—that is, one in which many companies' core competencies answer needs for addressing climate change—the activities described are related to product and service innovation.

1 **Network design for resiliency:** Companies are developing solutions that allow rapid deployment and establishment of new networks.

   » **Sprint** is taking measures to reduce the effect of power loss on wireless networks in storm-prone coastal communities. This includes permanent and portable/mobile generators that can help to restore service quickly.

- » **Sun Microsystems** (now Oracle) has developed products and services that can respond to physical changes and sudden events. For example, disaster recovery organizations can take modular data centers into the field and provide information technology infrastructure where it's needed.
- » **Verizon** is utilizing fiber optic technology and advanced electronics to build additional redundancy into its network, allowing network traffic to be rerouted when a portion of the network is affected.

2 **Development of solutions to cope with energy and water shortages:** Technological solutions are improving the ability to monitor, manage, and increase efficiency of water and energy use.

- » **Alcatel-Lucent's** solutions allow governments to monitor and control water use.
- » **Cisco Systems** develops smart grid products for improved utility power management. These solutions will make utility grids more resilient and enable more decentralized (and therefore less vulnerable) power generation.
- » **Samsung** develops batteries and solutions for reliable power generation, storage, and supply for manufacturers and all customers. These include UPS batteries, solar cells, and fuel cells.
- » **Ericsson** is designing and delivering energy-efficient products that let mobile operators improve the energy efficiency of their radio networks. They provide optimal network design and are introducing alternative energy sources to power these networks.

"The biggest impact on our business is the expectations of customers and partners for ICT to lead the way in providing solutions enabling customers to adapt to climate change and other sustainability challenges. We are seeing customers push even further to create competitive advantage. One of our customers is leveraging technology to model what the rainfall and temperature will be over the next 20 – 30 years to project changes in crops. Based on the changes, they are determining whether and where they want to make investments."

- Scott Bolick, SAP VP, Sustainability

3 **Business continuity and resiliency:** ICT companies are developing products and services that allow businesses to identify and address points of vulnerability within their own operations, systems, and processes.

- » **EMC** provides business recovery, continuity, and back-up products, solutions, and services to companies that may be exposed to power outages and other physical disruptions.
- » **SAP** helps customers in the food, beverage, and agriculture sector to manage supply chain unpredictability and costs through development of a more responsive supply network.

4 **Disaster preparedness and response solutions:** Telecommunications companies in particular are developing early warning and disaster-response systems.

- » **KT** plans to work with local municipal entities and stakeholder organizations to build disaster-forecasting systems through real-time monitoring of disaster status utilizing sensor networks.
- » **NTT Group** companies provide a range of disaster-response systems and solutions, including services for delivering earthquake early warnings and systems to allow organizations to contact employees in the event of a disaster.
- » **SK Telecom** has, since 2005, offered a text-messaging service for disaster-related information so that customers in disaster-prone regions can stay informed of and prepare for emergencies.

5 **Enhanced climate change monitoring, decision-making, and preparation:** Technological solutions are being developed and applied to collect, analyze, and disseminate data related to the effects of climate change.

- » **Agilent's** measurement equipment can be used to enable the scientific community to better quantify the impact of climate change.
- » **Google** has partnered with organizations including the United Nations Environment Programme to create functions in Google Earth that allow other organizations and users to see where the effects of climate change are being felt.
- » **Microsoft Research** develops tools and partnerships to advance understanding of climate change impacts and the development of prediction models and response capabilities. For example, its Computational Ecology and Environmental Science Program works with the scientific community to develop

computational tools and methods to predict and mitigate critical environmental changes.

Recommendations

Mobile technology can be use to enhance flood risk data and response capabilities:

In the Lower Mekong Basin of Vietnam, villagers used mobile phones to gather data to improve flood forecasting and preparation. Given phones and training, the villagers sent measurements twice a day via SMS to authorities. With this more precise data, the community was able to better prepare for evacuation and protect livestock.

Source: "Villagers Provided with Cell Phones to Help Improve Accuracy of Flood Warnings." Mekong River Commission for Sustainable Development, 2009. http://www.mrcmekong.org/MRC_news/press09/Vietnamese-Villagers-provided-with-cell-phones21-9-09.htm

This paper has cited a range of responses that are readily observable, and many of them will be familiar to those who are managing climate change or business risk more generally. **However, there is much more to be accomplished if the ICT industry is to play its full role in the proactive and responsible management of climate change adaptation.**

Current science clearly indicates the significant chance that climate change will be far more disruptive than companies report being prepared for.[4] Moreover, many needs are only recently becoming evident, and these may present new and evolving risks and opportunities for the ICT sector and its customers and business partners. Due to the magnitude of the underlying risks and opportunities, traditional management techniques and technological solutions may not be adequate to address the rising degree of unpredictability and severity of climate change impacts.

For these reasons, BSR recommends that ICT companies establish climate change adaptation strategies that contain the following key components.

1. Innovate for the base of the pyramid and climate adaptation. In addition to helping global businesses become more resilient, ICT companies can play a critical role in enabling the most vulnerable populations to protect themselves and their livelihoods. There is more opportunity than ever to contribute to building the resilience of the global South by providing access to information, capital, and resources—and development and humanitarian practitioners are eager to collaborate with ICT companies.[5] While many respondents identified opportunities to meet universal needs, such as improved water management, and the link between ICT and economic development has long been recognized, awareness of climate adaptation needs and opportunities to partner with international agencies and governments is nascent.

2. Rethink intellectual property and the greater good. Because so much business value is at stake with climate disruption, there is a natural tension between collaboration and competition. While ICT companies have opportunities to collaborate with others, questions may arise about how open the resulting information and advancements are, who owns them, and whether anyone should own them. If information can be used to further the development of adaptation measures, thereby potentially saving lives, ethical and financial obligations could conflict. Companies moving toward increased collaboration, and developing platforms to facilitate doing so, may face a new set of intellectual property challenges. The ICT industry, however, by nature of its products and services, already has extensive experience navigating similar issues related to intellectual property.

3. Collaborate on adaptation with other industries. The most confident climate science projections are usually made at global or large-scale regional levels—and for this reason there is a significant need to gather, analyze, and

[4] For example, see Intergovernmental Panel on Climate Change. "Climate Change 2007: Impacts, Adaptation and Vulnerability." (2007). http://www.ipcc.ch/ipccreports/ar4-wg2.htm.
[5] Ospina, Angelica Valeria and Richard. Heeks "Linking ICTs and Climate Change Adaptation: A Conceptual Framework for e-Resilience and e-Adaptation." Institute for Development Policy and Management, SED, University of Manchester, 2010.

disseminate information on impacts and predictions in the most vulnerable regions at a more detailed and local level. Companies with operations, customers, or raw materials sensitive to extreme weather—such as food, beverage, and agriculture companies and suppliers—would benefit from enhanced ICT solutions that can help them monitor and respond proactively to impacts. Although many ICT respondents noted that they are in the business of designing and delivering solutions for businesses, climate change has magnified the challenges and potential consequences that each industry faces. However, these efforts are not yet commensurate with the challenge—perhaps at least partly due to an overall nascent understanding of adaptation—and there is an urgent need and opportunity to work more closely with members of other industries to understand and innovate for their adaptation needs.

4. Balance growth and promoting responsible adaptation. In many cases, the risk that climate change brings to other sectors and individuals translates into opportunity—or new problems to solve—for the ICT sector. As the sector continues to develop solutions for climate mitigation *and* adaptation, and enable broader access to ICTs, the overall carbon footprint of the sector is projected to increase, even taking into consideration efficiency gains[6]. While studies indicate that this increase would be far outweighed by a decrease in other sectors,[7] industry leaders recognize that efficiency alone is not enough. Just as the sector is well-positioned to help customers prepare themselves and their businesses for the effects of climate change, it is also in a position to raise awareness about responsible adaptive behaviors—e.g., combining energy-efficient products with conservation practices.

It is especially important that ICT companies view these recommendations through the lens of their specific product and service mix. An internet company's climate adaptation strategy will be different from that of a telecommunications company, just as the strategies of companies focused on consumer markets will vary from those focused on enterprises. Differences will also exist between companies with and without growth strategies for emerging markets. In spite and in light of these differences, however, ICT companies are well-positioned to be a more active partner and solutions *driver* in enabling companies, governments, and vulnerable communities to protect assets, livelihoods, and lives from imminent climate change impacts.

For more tools on managing climate change adaptation, visit www.bsr.org/adaptation.

[6] David Owen, "The Efficiency Dilemma.," *The New Yorker*, December 20, 2010).
[7] Global e-Sustainability Initiative and The Climate Group, "Smart 2020: Enabling the low carbon economy in the information age," 2008.