



## Creating a Green Supply Chain

Information Technology as an Enabler for a Green Supply Chain

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## Evolution of Concept

We are constantly confronted with environmental changes across the world ranging from extreme weather to a scarcity of water for nearly 2 billion people, nearly 40% of the world's population. Such weather phenomena and reality has created a movement across the globe to identify the causes of global warming and develop solutions to end it before it is too late. In an effort to address the growing evidence of climate change, many nations are passing laws and regulations aimed specifically at reducing carbon emissions and greenhouse gas from the atmosphere.

Aside from nations that are actively involved in reducing climate change, many consumers, shareholders, and businesses are becoming more attuned to and involved in the growing green movement. With customer loyalty shifting towards environmentally friendly products, businesses are increasingly trying to make their supply chains greener by introducing sustainability strategies throughout their organizations and supplier relationships.

The focus on sustainability has resulted in a growing need for integrating environmentally sound choices into supply chain management research and practice.

### Green Supply Chain Overview

Patrick Penfield of the Whiteman School of Management defines Green Supply Chain Management (GSCM) as "the process of using environmentally friendly inputs and transforming these inputs into outputs that can be reclaimed and re-used at the end of their lifecycle thus, creating a sustainable supply chain<sup>1</sup>."

GSCM integrates ecological factors with supply chain management principles to address how an organization's supply chain processes impact the environment. Organizations are increasingly becoming aware of the impact of tight integration of supply chain and environmental management systems in enabling a sustainable business strategy. Many are now seeking out solutions and guidance on how to implement a sustainable supply chain. A sustainable supply chain is a supply chain that is not only optimal for the organization, but is optimal relative to its limited environmental impact.

With Increasing customer awareness and regulatory norms, organizations with greener supply chain management practices will have a competitive advantage over companies that are reluctant to embrace GSCM. Hence across industry there is shift in the focus of GSCM programs from compliance to creating value for customers and shareholders. Examples include:

- Dell saves over \$20mn annually as a result of supply chain and packaging improvements<sup>12</sup>. In fact, this market leader achieved its goal of becoming carbon neutral by 2008<sup>4</sup>.
- Texas Instruments saves \$8mn each year by reducing its transit packaging budget for its semiconductor business through source reduction, recycling, and use of reusable packaging systems (20% annual savings)<sup>4</sup>.
- Pepsi-Cola saved \$44mn by switching from corrugated to reusable plastic shipping containers for one liter and 20-ounce bottles, conserving 196mn pounds of corrugated material<sup>4</sup>.

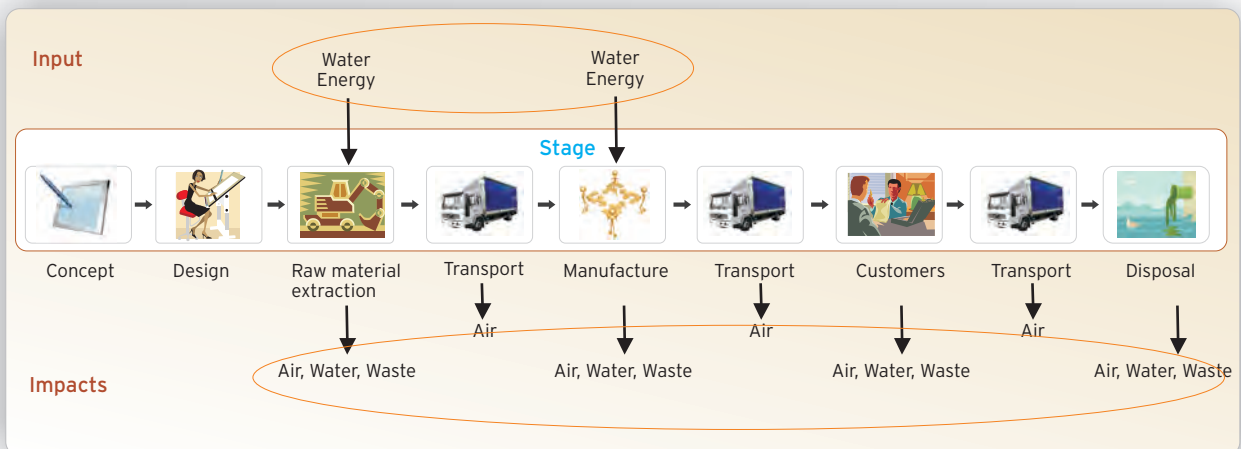


Figure 1 Environmental impact at each stage of the supply chain<sup>4</sup>

- Commonwealth Edison generated \$50mn in financial benefits from managing materials and equipment by taking a lifecycle management approach to production management<sup>4</sup>.
- Dow Corning saved \$2.3mn by using reconditioned steel drums in 1995 and conserved 7.8mn pounds of steel<sup>4</sup>.

A majority of executives at large and small companies understand and embrace the need for protecting the environment and utilizing GSCM as a method for reducing costs while increasing customer and shareholder value. However, many executives remain

Point along with Supply Chain Standards (SupplyChainStandards.com) conducted a "Global Green Supply Chain" survey across sectors, spanning major global organizations to organizations with less than \$100mn in revenue (see figure 3).

The survey, which included responses from 600-plus senior managers, revealed the level of interest in the green supply chain was directly proportional to the size of the company. About 54% of companies with revenues in excess of \$1bn claimed to have established green initiatives, but this dropped to 29% for companies with

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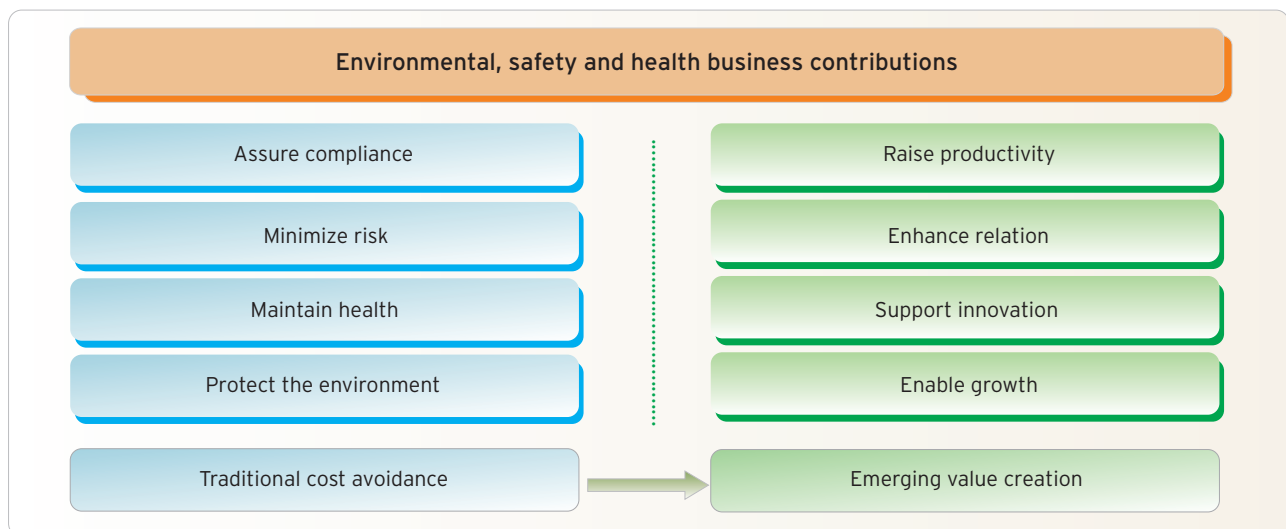


Figure 2: From cost compliance to value creation<sup>3</sup>

unsure about how to deploy GSCM in ways which ensure that the desired cost savings and value creation are achieved.

#### Global Green Supply Chain Survey<sup>5</sup>

In March 2008, technology consultancy firm Bearing

revenues of less than \$100mn. As for the level of investments, almost 50% had invested less than 10% of the total supply chain operations budget on green initiatives, and roughly 38% had no visibility of the level of investment in green initiatives.

### Has your green supply enabled your company to...

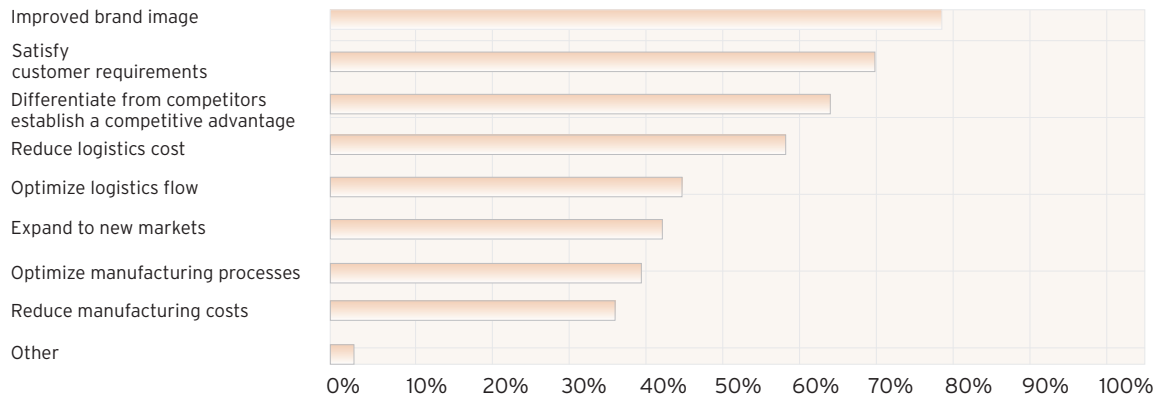


Figure 3: Global green supply chain survey 2008<sup>5</sup>

#### The priorities of investments were:

- Regulatory requirements (22%) - Compliance with relevant laws and anticipation of future requirements.
- Brand image and influence on markets (19%) - Compliance with customer requirements.
- Product /Process innovation (15%) - Different green supply chain approaches (logistics, sourcing, manufacturing, design, reverse logistics) for new sources of innovation.
- Cost cutting (13%) - Optimizing costs and processes.

Transportation and logistics were the areas of focus in most companies' green initiatives. As many as 81% have taken action in transportation and logistics. Optimizing the number of transportation trips (41%) and optimizing among the modes of transport (31%) are among the most common initiatives.

#### Challenges in Adopting a Green Supply Chain

Implementing GSCM has never been easy. Organizations are likely to face certain challenges some of which include:

**Lack of information about the green supply chain best practices:** The aforementioned green supply chain survey found that it was not investment costs, but a lack of information on regulations and green supply chain best practices that left organizations with a limited view of what to do and implement. GreenSCOR<sup>4</sup> incorporated within the SCOR framework can provide immense help by offering information on best practices, waste disposal process and metrics to increase the success of GreenSCOR initiatives.

**Lack of tools to optimize the supply chain with environmental management:** There is no dearth of tools for supporting green supply chain initiatives. The challenge lies in selecting the right tool. Tools such as ARIS are available for business process modeling based

on the SCOR industry framework and its new GreenSCOR model, which provides environmental metrics that can be included in the calculations for optimizing the supply chain.

**Global sourcing making tracing of carbon footprint difficult:** Given global sourcing, tracking the carbon footprint of finished products can be difficult. Increasingly, however, new initiatives have emerged for adopting the practice of requesting a carbon footprint from suppliers. One of the examples is the carbon disclosure project that is being piloted by 11 multinationals including Dell, L'Oreal and Unilever. The project asks participating organizations to request carbon footprint information from suppliers and promote emission reduction measures across the supply chain.

#### Industry framework -SCOR

Due to numerous challenges that can potentially limit success, an industry-proven framework is needed to govern and steer green initiatives.

Supply Chain Council's SCOR framework has incorporated GreenSCOR in its latest version 9. GreenSCOR can be one such guide to help organizations in their green initiatives. GreenSCOR integrates environment best practices and metrics into the entire supply chain planning process. It also enables a systematic study of the supply chain to unearth opportunities for making the supply chain greener.

#### Capabilities of GreenSCOR<sup>7</sup>:

- GreenSCOR incorporates industry best practices for making the supply chain more environment friendly, such as collaborating with partners on environmental issues, reducing fuel and energy consumption, and minimizing and reusing packaging materials.

- Metrics to measure the effects of greening, including carbon and the environmental footprint, emission costs per unit, energy costs as a percent of production costs, waste produced as a percent of production, and returned products disposed of versus remanufactured.
- Processes to address waste management, such as how to collect and manage waste produced during production and testing (including scrap metal and nonconforming product).

Adoption of the SCOR version 9 framework increases the chance of success of any green initiative. It also enables more efficient use of resources and increases the visibility of financial and operations benefits of supply chain practices. Lastly, the metrics can be effectively used to monitor the progress an organization is making towards a green supply chain.

### IT Enables Green Initiatives

In most new initiatives adopted by organizations, IT has played a pivotal role. Likewise, for the success of green initiatives, it can play a large role in ensuring the chances of success and reaping the expected benefits.

Contributions of IT in GSCM can be viewed from two different perspectives. From the hardware perspective,

IT can make the supply chain greener by optimizing the resources required to support the business. Technology providers are innovating and developing energy-efficient solutions that have a more favorable impact on the environment. From a software perspective, IT can enable more effective supply chain planning, execution and collaboration, thereby reducing resource requirements.

#### Hardware Perspective - Optimizing hardware resources to support the business

**Right-Sizing IT infrastructure:** Technological innovation in energy-efficient computing and data storage systems as well as devices by hardware manufacturers such as IBM, HP, and Intel have helped in the greening of IT worldwide. Right-sizing the IT infrastructure can enable greater effectiveness with less consumption of resources. For example, multiple application and database servers can be squeezed into a fewer number of systems, creating a virtual multi-server scenario while consuming less resources.

**Re-architecting Data processing and Storage operations:** Re-architecting data processing power footprint and maximize productivity by doing more with less.

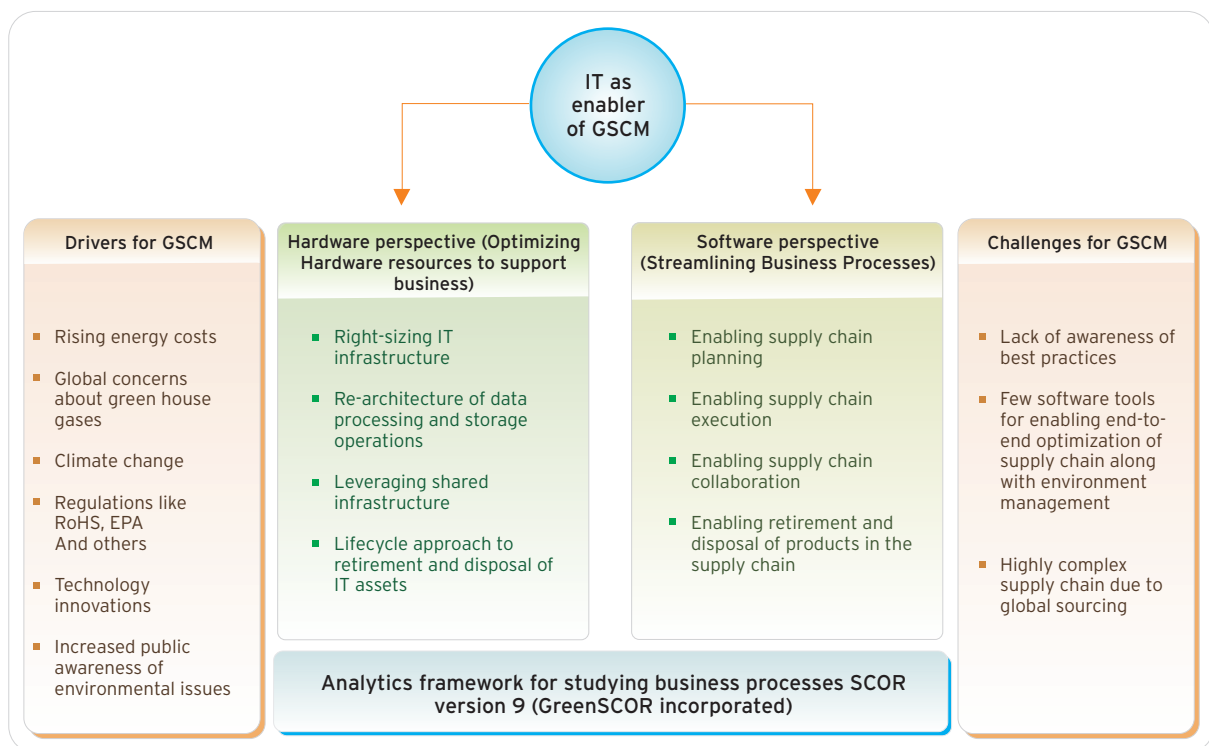


Figure 4: IT as enabler of GSCM



While implementing the solution, data storage can be evaluated for instances of low utilization; over-allocation; stranded storage; redundant copies; low access speeds; inefficient search mechanism; and solution redesigns, if required.

**Leveraging shared infrastructure:** Organizations can leverage shared infrastructure for their IT solutions thereby requiring less resources for operational effectiveness. Software models like SaaS (Software as a Service) require less equipment and energy. A SaaS data center combines the operations of many companies, drives efficiencies, and directly reduces the amount of carbon dioxide emissions.

By working in shifts, organizations can reduce the need and/or improve the utilization of infrastructure such as floor space and the number of desktops, resulting in reduced e-waste and decreased usage of natural resources to support the information technology workforce.

**Adopting a lifecycle approach to the retiring of IT waste:** A lifecycle approach to retire and dispose of IT hardware assets should be used by all companies. This approach includes the refurbishment and recycling of hardware to reduce waste for disposal. IT solutions like Gari Software & Simi Pro can help IT organizations carry out such lifecycle analyses.

#### **Software Perspective - Streamlining / Transforming Business Processes:**

**Green Supply Chain Planning:** Information Technology can optimize transportation planning routes and ensure that goods/services are delivered in the most energy efficient and cost-effective manner. Automation of the transportation planning process enables transportation managers to manage by exception to mitigate the effects of unexpected events. Cognizant has worked with leading logistics players in providing transportation planning solutions to optimize operations, identify non-value added manual processes, implement dashboards for metrics, and utilize the proven principles of Six Sigma and Lean Manufacturing to identify hidden variance and complexity within the supply chain.

The Supply Chain Council has documented the best practices for transportation and distribution in its SCOR framework. Some organizations like IBM have developed Business Process Modeling software based on the SCOR framework to enable efficient planning of supply chain functions<sup>8</sup>.

Many IT solutions exist that can evaluate the impact that various supply-chain network configurations and transportation strategies have on the carbon footprint. For example, LogicNet plus XE solution with the carbon

extension from ILOG takes into consideration multiple parameters -- including environmental factors -- to help organizations choose the right kind of supply chain network configuration<sup>9</sup>.

**Green Supply Chain Execution:** Information technology can help in streamlining business processes and, thereby, enable reduction in resource usage while executing business processes. For example, visibility solutions provided by Cognizant to leading logistics players for asset tracking helped them reduce their resource consumption while achieving higher service levels.

Automation for enabling end-to-end paperless operations is a major target for waste reduction. Cognizant has developed an Enterprise Mobility Solution framework for enabling real-time tracking and dynamic scheduling of pick up and delivery jobs. This solution has made the entire process paperless for a leading European warehousing and logistics company, thereby reducing the need for paper, reducing the need for printing, storage, and shipping of the paper based work orders. This has in turn resulted in reducing this organization's expenditure on natural resources consumed for maintaining the paper-based process of its business.

RFID technology can also be a huge enabler for GSCM strategies. RFID-enabled tracking of energy footprint data can make it possible for organizations to understand the "who, why and how" a product reached a

particular stage in the supply chain. RFID labels can carry information related to the carbon/energy footprint and help organizations more accurately analyze their supply chains from a variety of environmental perspectives. At Cognizant, there is a dedicated Center of Excellence for RFID that has helped in the implementation of RFID solutions for leading logistics providers and retailers.

Organizations like Hewlett Packard have come up with global supplier codes of conduct and partner programs ensuring compliance with environmental regulations and stakeholder expectations<sup>10</sup>. IT can help organizations in such initiatives by offering solutions that can provide supplier evaluation / scorecards for effectively monitoring and rewarding the suppliers that consume less energy and have smaller carbon footprints.

**Green Supply Chain Collaboration:** Collaborative Transport Management (CTM) goes hand-in-hand with GSCM. IT solutions for facilitating the involvement of all partners in the supply chain can help organizations achieve better utilization of transportation assets and reduce overall energy requirements. Cognizant recognizes the need for collaboration throughout our business and supply chain partnerships. At Cognizant, we pioneered the concept that collaboration accelerates innovation.

IT can also facilitate collaborative planning forecasting and replenishment resulting in higher accuracy of



forecasting thus reducing the resources consumed in production. Cognizant has worked with leading retailers by providing solutions to facilitate the collaborative planning, forecasting and replenishment process thereby reducing the environmental impact of supply chain operations.

**Disposal :** This has gained increased importance due to regulations passed by various governments aimed at minimizing the impact business has on the environment. Europe has already passed several laws to this effect, including the restriction of Hazardous Substances (roHS) directive and the waste electrical and electronic equipment (WEE) directive". The roHS directive restricts the amount of certain substances in electrical and electronic equipments. The WEEE directive sets collection, recycling, and recovery targets for electrical goods and is part of a legislative initiative to solve the problem of huge amounts of toxic e-waste.

Cognizant has taken the initiative in creating solutions for addressing the issue of waste disposal and has developed an web-based solution called 'Waste-Trace', a customizable, end-to-end service for industrial waste management. Waste-Trace tracks waste data from product conception and shipment through waste disposal. It can also print labels, manifests, and all necessary reports in compliance with U.S. federal, state, and EPA regulations.

### Cognizant's Green Supply Chain Expertise

Cognizant has a well-earned reputation for helping its clients greatly reduce costs, increase efficiencies, and accelerate ROI. Green supply chain management is no exception. Unlike other global consulting and services

firms that struggle with finding individuals skilled in green logistics, one of the chief architects of Dell's successful green sustainability program recently became a member of the Cognizant team. With proprietary green implementation processes and strategies designed for all areas of the supply chain, Cognizant can meet any company's green supply chain needs.

#### Cognizant's GSCM strategies include:

- Identifying best-of-breed software and performance metrics for measuring the carbon footprint and reporting the results accurately to internal personnel, shareholders, customers, or third-party environmental organizations such as the EPA's SmartWay program.
- Working with a company's R&D team, suppliers and customers to design products that are more energy efficient and easier to recycle.
- Helping retailers and manufacturers ensure that they utilize packaging materials and methods that will reduce packaging costs while increasing shipping efficiency.
- Implementing shipping methods and technology that can be used to virtually eliminate damage to products shipped on pallets in LTL or TL quantities from city-to-city or coast-to-coast.
- Helping organizations achieve end-to-end supply chain sustainability, cost efficiency and improved customer experience leveraging the proven value of advanced supply chain network modeling and optimization. Cognizant leverages its partnerships to surgically apply network analysis and modeling to drive cost reductions and operations efficiency.

## Conclusion

Green initiatives, if properly managed, can enable organizations to be responsible corporate citizens and also deliver higher profitability and competitive advantage. With experience in providing end-to-end supply chain solutions aligned with industry trends, Cognizant proposes the following steps organizations can adapt while implementing green supply chain initiatives:

- Use industry standard frameworks like SCOR version 9 to identify potential areas for green initiatives in the supply chain. With GreenSCOR incorporated in SCOR version 9, the chances of success in any green initiatives increases.
- Align green initiatives with the strategic objectives of the company.
- Adopt GSCM best practices when implementing green initiatives.
- Use technology solutions to facilitate GSCM initiatives with a special focus on the need and importance of end-to-end supply chain analysis and network design.
- Focus efforts to reduce packaging and in-transit damage when shipping.
- Pay special attention to reducing inventory and identifying optimal distribution solutions.
- Perform lifecycle analysis for choosing products/solutions to minimize environmental impact.

## References

- 1 Patrick Penfield- Sustainability can be competitive advantage- Whitman School of Management <http://www.mhia.org/news/industry/7056/the-green-supply-chain> - Aug 7, 2007
- 2 What is RoHS? <http://www.rohs.gov.uk/>
- 3 'Best Practices in Implementing Green Supply Chains' Supply Chain World, Conference and Exposition, April 5, 2005
- 4 LMI The Green SCOR Model - Enabling Green Supply Chain Management through SCOR April 9, 2003
- 5 Green for Go Survey by Technology Consultancy Bearing Point and Supply Chain Standard on Global Green Supply Chain [http://www.bearingpoint.com/Documents/StaticFiles/SCS\\_GreenSupplyChain.pdf](http://www.bearingpoint.com/Documents/StaticFiles/SCS_GreenSupplyChain.pdf) -March 2008
- 6 Multinationals to Assess Their 'Carbon Footprint' <http://www.washingtonpost.com/wpdyn/content/article/2008/01/20/AR2008012002319.html>
- 7 Supply Chain Council Press Release New SCOR® 9.0 Release Includes Expanded Risk Management Capabilities and Addresses Sustainability Efforts March 17, 2008
- 8 IBM SmartSCOR - a SCOR based supply chain transformation platform through simulation and optimization techniques <http://portal.acm.org/citation.cfm?id=1218112.1218234>
- 9 ILOG LogicNet Plus XE Carbon Footprint Extension - <http://www.ilog.com/products/logicnet-plus-xe/carbon-footprint/>
- 10 HP Supplier Self Assessment Supply Chain Operations, Social and Environmental Responsibility Program [Http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/ohsenviroquestionnaire.pdf?jumpid=reg\\_R1002\\_USEN](Http://www.hp.com/hpinfo/globalcitizenship/environment/pdf/ohsenviroquestionnaire.pdf?jumpid=reg_R1002_USEN)
- 11 WEEE: Waste Electrical and Electronic Equipment <http://www.environment-agency.gov.uk/business/1745440/444663/1106248/>
- 12 Dell Sustainability Report 2007 - [www.dell.com/downloads/global/corporate/enviromentreport07.pdf](http://www.dell.com/downloads/global/corporate/enviromentreport07.pdf)

## About Cognizant

Cognizant (NASDAQ: CTSH) is a leading provider of information technology, consulting and business process outsourcing services. Cognizant's single-minded passion is to dedicate our global technology and innovation know-how, our industry expertise and worldwide resources to working together with clients to make their businesses stronger. With more than 40 global delivery centers and 59,500 employees as of September 30, 2008, we combine a unique onsite/offshore delivery model infused by a distinct culture of customer satisfaction. A member of the NASDAQ-100 Index and S&P 500 Index, Cognizant is a Forbes Global 2000 company and a member of the Fortune 1000 and is ranked among the top information technology companies in BusinessWeek's, Hot Growth and Top 50 Performers listings.

### Notes:

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