

April 2010

Sustainability Reporting and Greenhouse Gas Management—Sensing Market Trends and Evolution in U.S. Manufacturing

Despite economic conditions over the past year and the failure of the Climate Accord, drawn up as an outcome of the Copenhagen COP-15 meeting, to reduce uncertainty at the international level, the manufacturing industry continues to internalize carbon as a compliance focus and a cost of doing business. Sustainability is also increasing in significance across the manufacturing community in response to multiple stakeholders and regulators.

The commencement of the EPA Mandatory Reporting rule on January 1, 2010, along with the growing anticipation of national climate regulations, forced companies back to the drawing board to review their strategies. The marketplace is changing. Few find the collecting and reporting of greenhouse gas (GHG)-related information straightforward, but most recognize the growing importance of tracking, managing, and reducing GHG emissions and other sustainability-related factors (e.g., waste, water, and energy).

Current GHG emission strategies are focused on building out robust compliance reporting platforms. This is a significant shift from the previous year when business intelligence and related activities were emerging as important sub-themes under the broader umbrella of emission management. The need in the marketplace is evolving rapidly. Robust reporting frameworks for carbon emissions are now table stakes. A more operationally connected portfolio of energy and resource efficiency-related actions is emerging around areas such as building energy efficiency optimization, sub-building scale sustainable enterprise asset management, and on-site energy generation in part as a substitute for the purchase of voluntary carbon credits and renewable energy certificates (RECs).

AMR Research recently surveyed 189 U.S.-based respondents responsible for decisions regarding envi-

ronmental sustainability initiatives. The survey reached across the following energy-intensive industry segments: energy, chemical/oil and gas, and industrial manufacturing/automotive/aerospace and defense. (Note: Some of these respondents sit on the fence between energy intensive and non-energy intensive. Given the way the data was collected, there was no way to account for this discrepancy.) The survey also included non-energy-intensive industry segments, including high tech, consumer, and retail

The survey focused mainly on line-of-business roles within the organization (71%) along with some IT roles (29%). Respondent firms ranged in size from the smallest firms, starting at \$500M in annual revenue, to the larger firms (35% of the overall sample) with over \$10B in annual revenue.

Compliance—A great leap backwards?

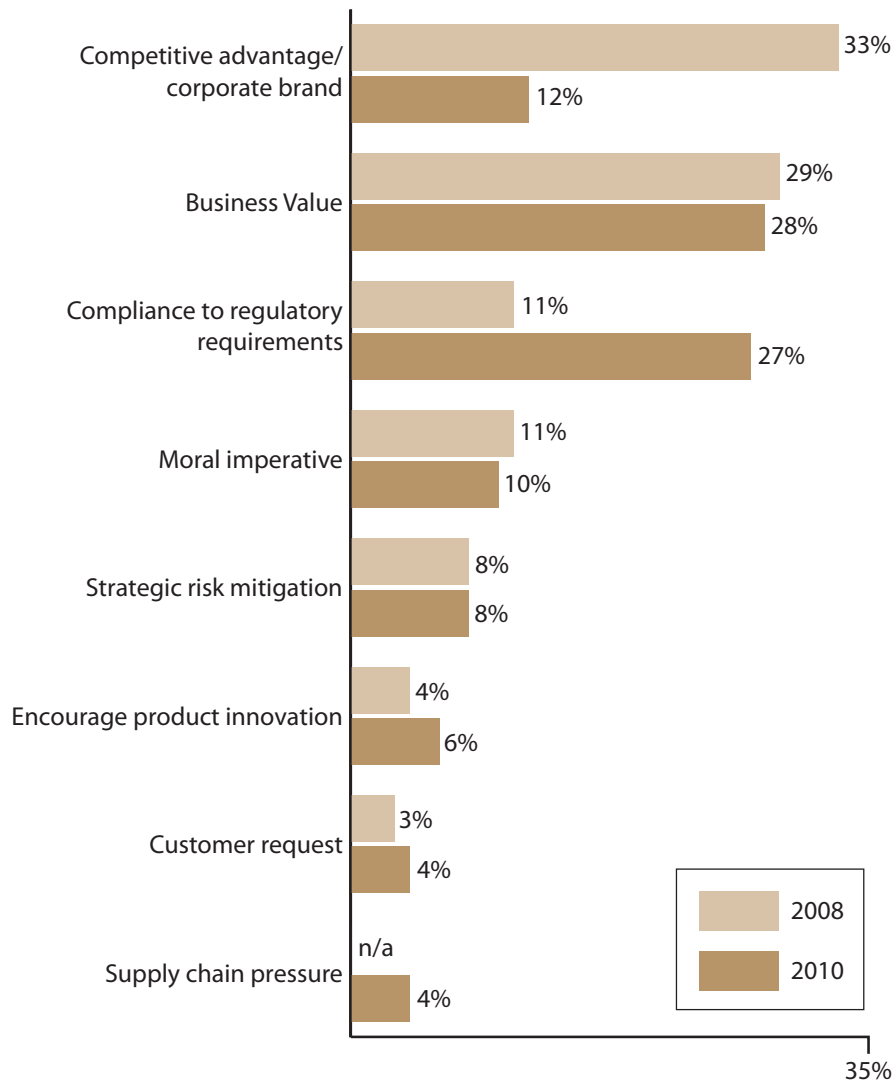
In the 2010 AMR Research study, respondents were asked to name their top drivers for participation in enterprise sustainability. The study demonstrated business value (including cost reduction or revenue growth) as the main driver (29%), as it was in a similar study completed in 3Q08 (28%). When comparing the two studies year over year, the results showed a significant increase in the immediate and midterm importance placed on compliance to regulatory requirements,

jumping from 11% in 2008 to 27% in 2010. Given the predominantly U.S.-centric respondent pool of the 2010 study and the current political climate, this could be interpreted as a major shift backwards.

12 to 18 months ago, companies were focused on business process and intelligence as well as models to slice and dice the data, but now they are now focusing on the compliance agenda being in order first to make sure their risk is minimized and to safeguard them against

the EPA regulations that have already commenced. Most of the marketplace also realizes there is an inevitable path to some form of national and international formalized regulation around carbon. Indeed national and regional carbon markets are already in existence in the United States, such as the RGGI. And while still under discussion in the U.S. Senate, the evolution of the initial Waxman-Markey legislation is developing into a blended sector-based cap-and-trade regime combined with direct carbon taxation for liquid fuel users.

Figure 1: Top drivers for participation in enterprise sustainability – 2008 vs. 2010



Q. What are your top 3 most important drivers behind your company's participation in enterprise sustainability initiatives?

2010 N = 189 Total Respondents 2008 N=236 Total Respondents

Source: AMR Research, 2010

Companies are looking for solutions that primarily offer a robust reporting platform, which secondarily delivers business intelligence around energy efficiency. Vendors need to focus their solutions on what companies want and realize the dangers of getting too far ahead of the curve and over-serving the demand. At the same time, it should be remembered that this is a dynamic and rapidly maturing marketplace.

When looking at the data broken down by segment, the study found:

- Drivers for energy-intensive industries were surprisingly similar to those of non-energy intensive industries. This is surprising because the energy-intensive sectors are the ones that will be required to directly engage with the reporting regimes. Wider factors may be in play here, including stakeholder pressure and the increasing influence of green perceptions in both the consumer and investment marketplaces.
- Comparing the companies that will definitely be required to report under the EPA reporting rule to the companies that will not show that both had business value and compliance as their top two drivers. However, 22% of those respondents not required to report said moral imperative was a top driver compared to only 8% of those respondents that will be required to report.
- Respondents who rated themselves as immature with respect to GHG management also had business value as its No. 1 driver (28%), but their second largest driver stated was competitive advantage at 23%, which is significantly higher than the 6% of self-assessed mature companies, which rated it as such.

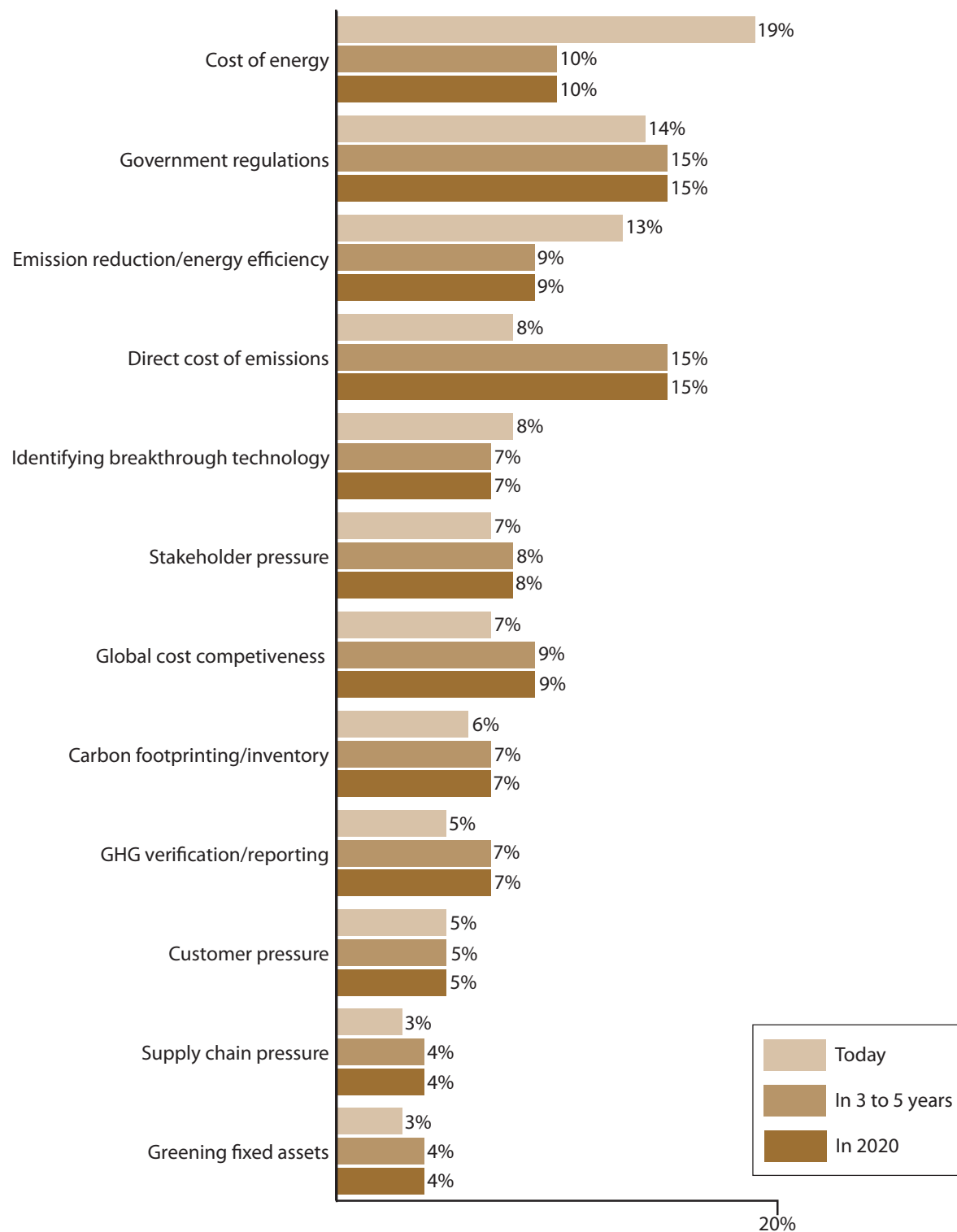
Two types of risk emerging

The study probed respondents on what they felt posed the largest business risks in a low-carbon economy today, in three to five years, and in 2020. Over all timescales we found two types of risk emerging. The first is an immediate, real, and monetized series of risks around energy/emission performance and regulations. These findings corroborate other areas of the study that point to the importance of compliance regimes. Additionally, concerns around long-term energy security and price volatility are important factors, ranking highest at 19%. It is interesting that the sustainable/low carbon debate distills down to energy costs in the short term. With that said, the study did show regulations and emissions costs growing in importance in the midterm and long term.

The second set of risks are significantly less important over all timescales, more indirect, and less easily monetized. These risks include anticipation of technology change, stakeholder, customer and supply chain pressure, and greening of assets. This under-representation was a surprise given the increasing importance of managing carbon and related sustainability data across the supply chain and through embodied carbon in products and services. Major moves by retailers to push for sustainable product performance as a basis for both competitive advantage and efficiency gains are digging into manufacturing, particularly consumer packaged goods (CPG) supply chains with ferocity. Technology support for this trend is likely to follow closely even though it was not strongly called out within the survey. The bottom line is that companies are worried about risk. There is a growing need for forecasting and positioning not just of financial performance, but of operational performance and implications as well. This can be difficult to accomplish. The vendors which include forecasting, modeling, and projection functionality into their solutions should achieve traction in the marketplace.

Segment analysis revealed one more difference: More high tech (36%) companies stated cost of energy as the highest business risk over the other industries surveyed.

Figure 2: Highest business risk in low carbon economy



Q. As the world transitions to a low carbon economy, which area do you feel represents the highest business risk to your company today? In 3 to 5 years? In 2020?

N = 189 Respondents

Source: AMR Research, 2010

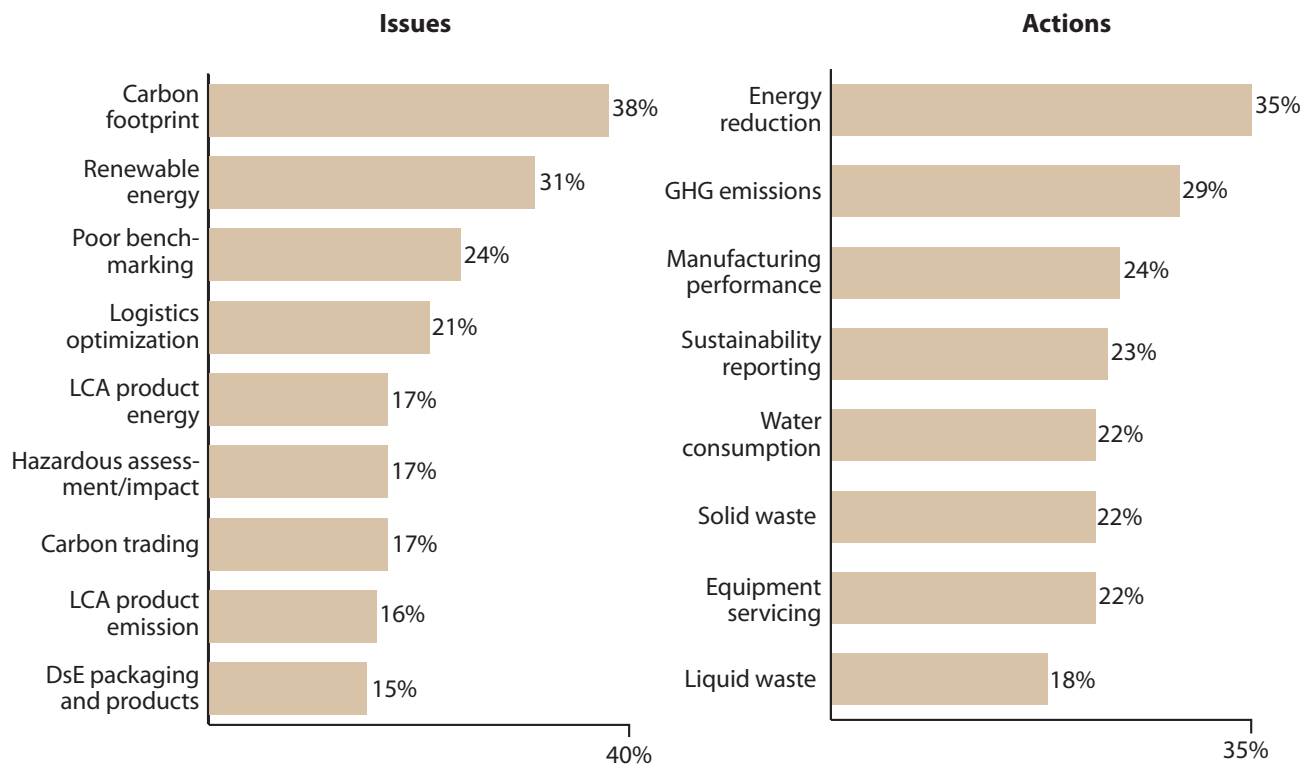
Reconfirmation of the energy/emissions link

The study found emissions and energy agendas are increasingly intertwined. As shown in the results, carbon footprint (38%) and renewable energy sources (31%) are the two sustainability-related issues that present the largest challenges today. When asked about the largest challenges with respect to sustainability-related actions, the results show energy reduction (35%) and GHG emission management (29%) as the top two challenges. Companies are starting to understand that it is not just about emissions. Leading companies realize the need to connect the energy profile to

emissions profile as they plan for their overall organizational metabolism. This is a crucial opportunity to the vendor spaces as it links the emerging “smart” asset and system transformation with sustainable business outcomes.

Companies should look to solutions which encompass the imperative of managing energy as well as a strong reporting framework. Although surprisingly short lived, the era of stand-alone enterprise carbon accounting has already passed, and users are looking to track not just emission outputs, but to link these to energy and other inputs and additional outputs such as water and waste.

Figure 3: Sustainability-related issues/actions which present largest challenges

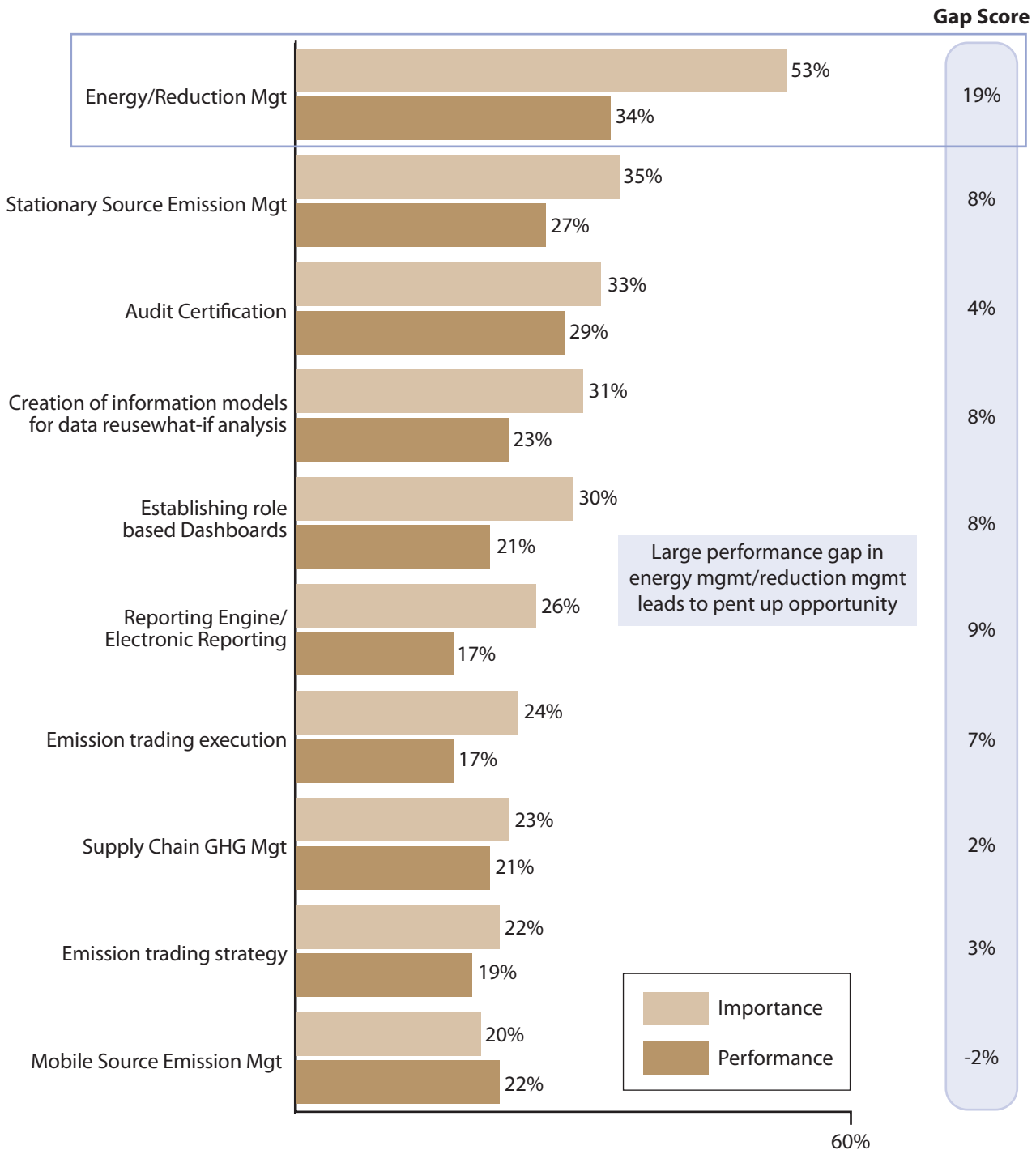


Q. Which of the following sustainability-related issues present the top 2 challenges for your company today?
Which of the following sustainability-related actions present the top 2 challenges for your company today?

N = 189 Total Respondents Top 2 combined

Source: AMR Research, 2010

Figure 4: Performance gap for GHG management capabilities



Q. Using a scale of 1 to 10, how important are each of the following capabilities to the success of your GHG management? Using a scale of 1 to 10, please tell us how well your company performs at each of the capabilities.

N = 189 Total Respondents

Source: AMR Research, 2010

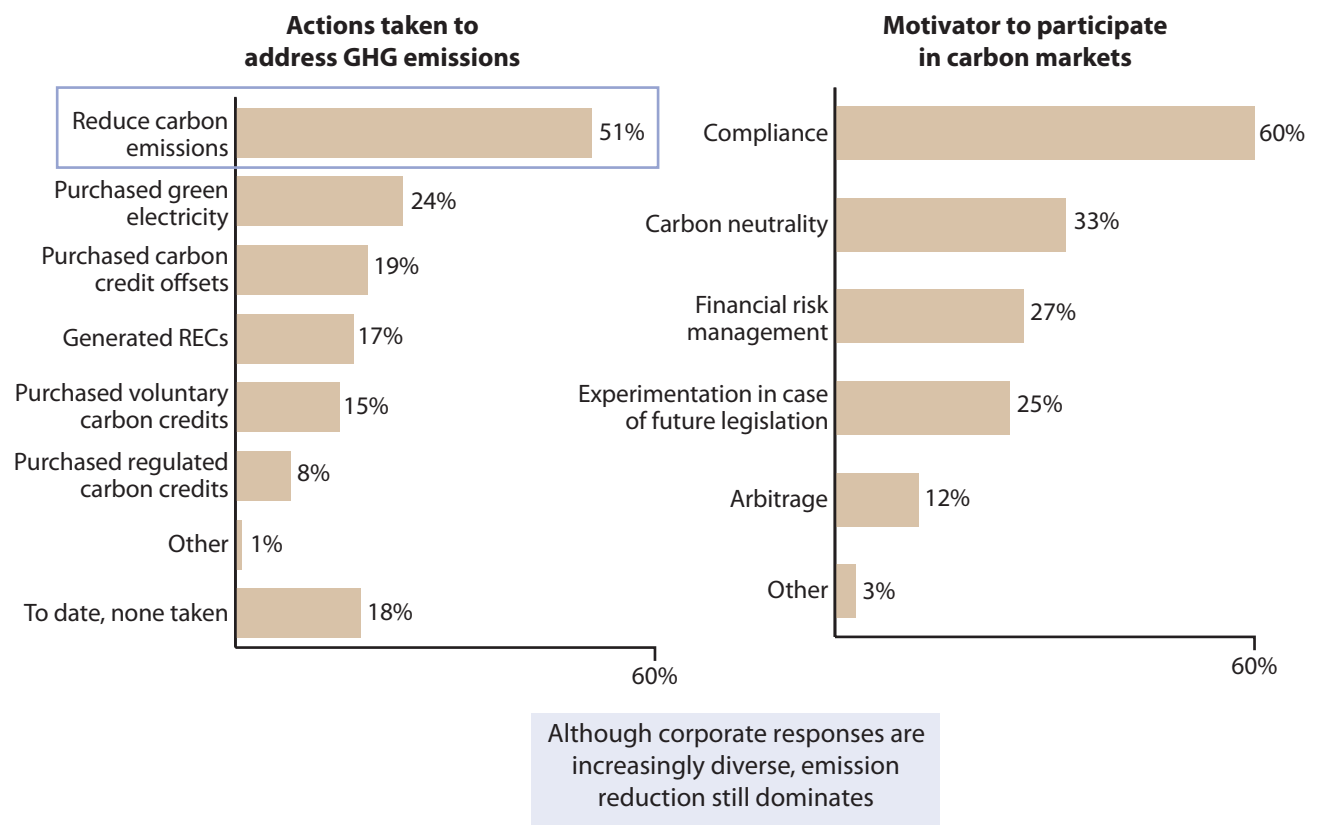
Further segment analysis revealed the following differences:

- 26% of companies in the industrial manufacturing/automotive/A&D industry sectors stated the preponderance of poorly defined benchmarking data as the sustainability-related issue that presents the largest challenge. This was significantly higher than the other industries surveyed.
- High-tech companies (37%) and chemical/oil and gas companies (33%) were more inclined than the other industries surveyed to state carbon footprint reduction as the sustainability-related issue presenting the largest challenge.

There is activity beyond carbon reduction

Although carbon reduction dominates the actions taken by companies to address GHG emissions by a substantial margin, the study shows that companies are starting to do a lot more around developing next-generation carbon management. There is a much higher percentage of companies today that have purchased green electricity (24%) and purchased carbon credits offsets (19%) than in years past. These sorts of non-carbon reduction strategies point to an important evolution in the marketplace. Although some of these actions may actually be more services focused, companies should still consider solutions which can produce differentiated next-generation GHG outcomes like green energy to support these strategies.

Figure 5: Actions taken to address GHG emissions/motivator to purchase carbon credits



Q. Which of the following actions has your company undertaken to address GHG emissions within your operations? Which of the following are motivating your company to participate in carbon markets?

N = 189 Total Respondents

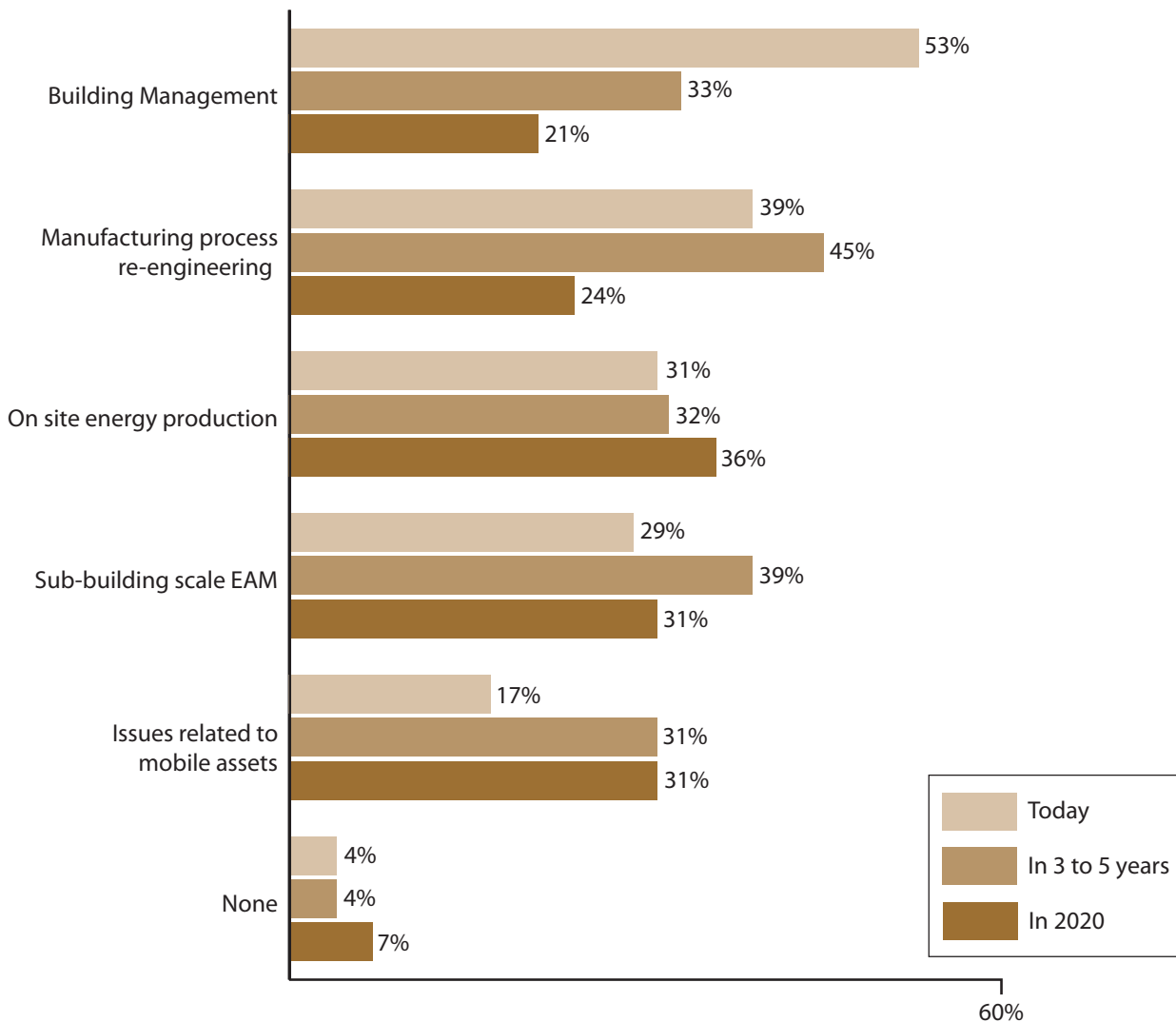
Source: AMR Research, 2010

Further segment analysis revealed the following differences: More CPG companies (37%) stated they have purchased green electricity to address GHG emissions, followed by chemical/oil and gas companies (26%).

Looking forward there is a highly dynamic sustainability/operational improvement agenda

The trends in Pareto actions relating to energy efficiency are some of the more interesting findings in the survey. The study shows that companies view building management (53%) as the top critical area in which they are seeking improvement in energy efficiency.

Figure 6: Areas seeking improvement to energy efficiency: current and planned



Q. In which of the following areas is your company seeking improvements to energy efficiency and emission reductions within your operations today? In which area will your company seek improvements in 3 to 5 years? In which areas will your company seek improvements in 2020?

N = 189 Total Respondents

Source: AMR Research, 2010

When looking three to five years out, companies cited manufacturing process reengineering (45%) as the top critical area. Over longer timescales (decade-long), on-site energy production is a primary energy efficiency focused strategy (36%). This signals a significant shift in the market maturity in terms of the future potential of leveraging sustainability and energy efficiency in the new economy. This should push some aspects of sustainability back toward the mainstream line of business and drive much needed innovation. Companies are going to require smart information-enabled application support. This is a focus of real change in the manufacturing and wider economy—and its where sustainability directly connects to cash.

The Scope 3 conundrum

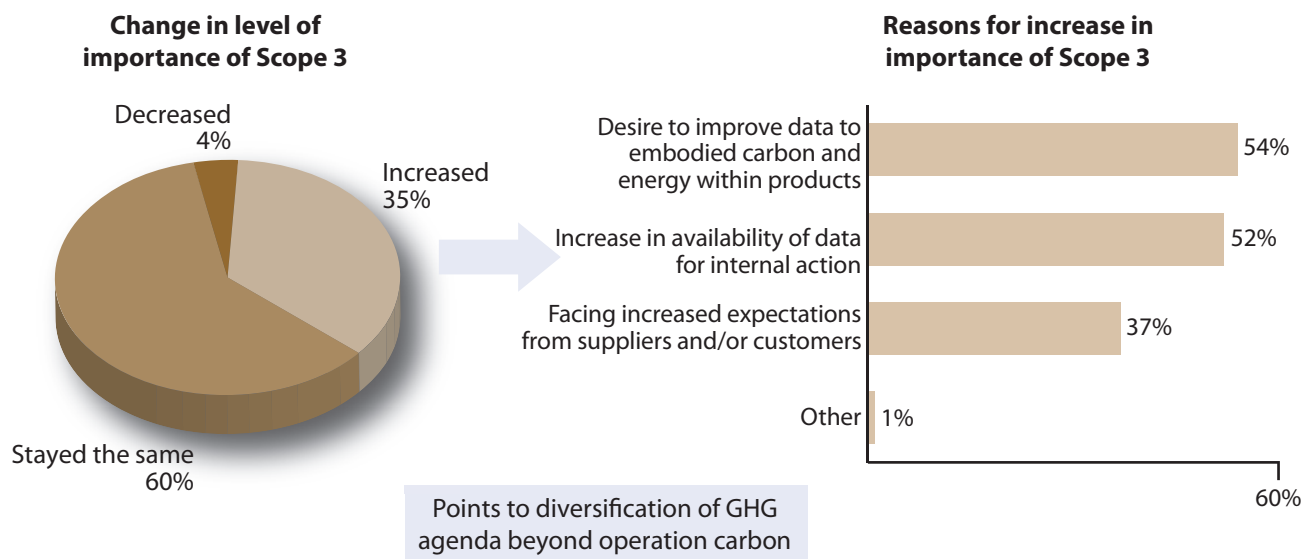
Many companies today are actively reporting their direct emissions (Scope 1 and Scope 2). By analyzing and understanding these, they are almost always a profit center because of the efficiency savings and transparency they deliver across the organization. With pending regulations on the horizon, companies are now faced

with the challenge of diversifying their GHG agenda beyond operational carbon. We have seen an uptick in the number of stakeholders and internal factors driving the need for accurate accounting for emissions produced in the upstream supply chain (Scope 3).

The survey results support this finding with 35% of respondents stating an increase in importance of Scope 3 emissions reporting over the previous year. Therein lays the conundrum: Scope 3 efforts are a complicated cost center. Companies required to report on Scope 3 emissions will not only need to build consistency into processes and develop standards for the collecting and reporting on embodied carbon and other environmental factors inside products, but they will also need to be able to share this information throughout the supply chain.

Adding complexity to the issue, the current proposed Scope 3 protocol is highly problematic and remains under development. Scope 3 is now a necessary evil for supply chain collaboration and transparency as well as for product-embodied energy and emissions estimates.

Figure 7: Importance of Scope 3 emissions reporting



Q. Has the level of importance of Scope 3 emissions reporting changed over the last 12 months? Which of the following contribute to the increase in the level of Scope 3 reporting?

N = 189 Total Respondents

N = 67 Respondents who said Scope 3 has increased in importance

Source: AMR Research, 2010

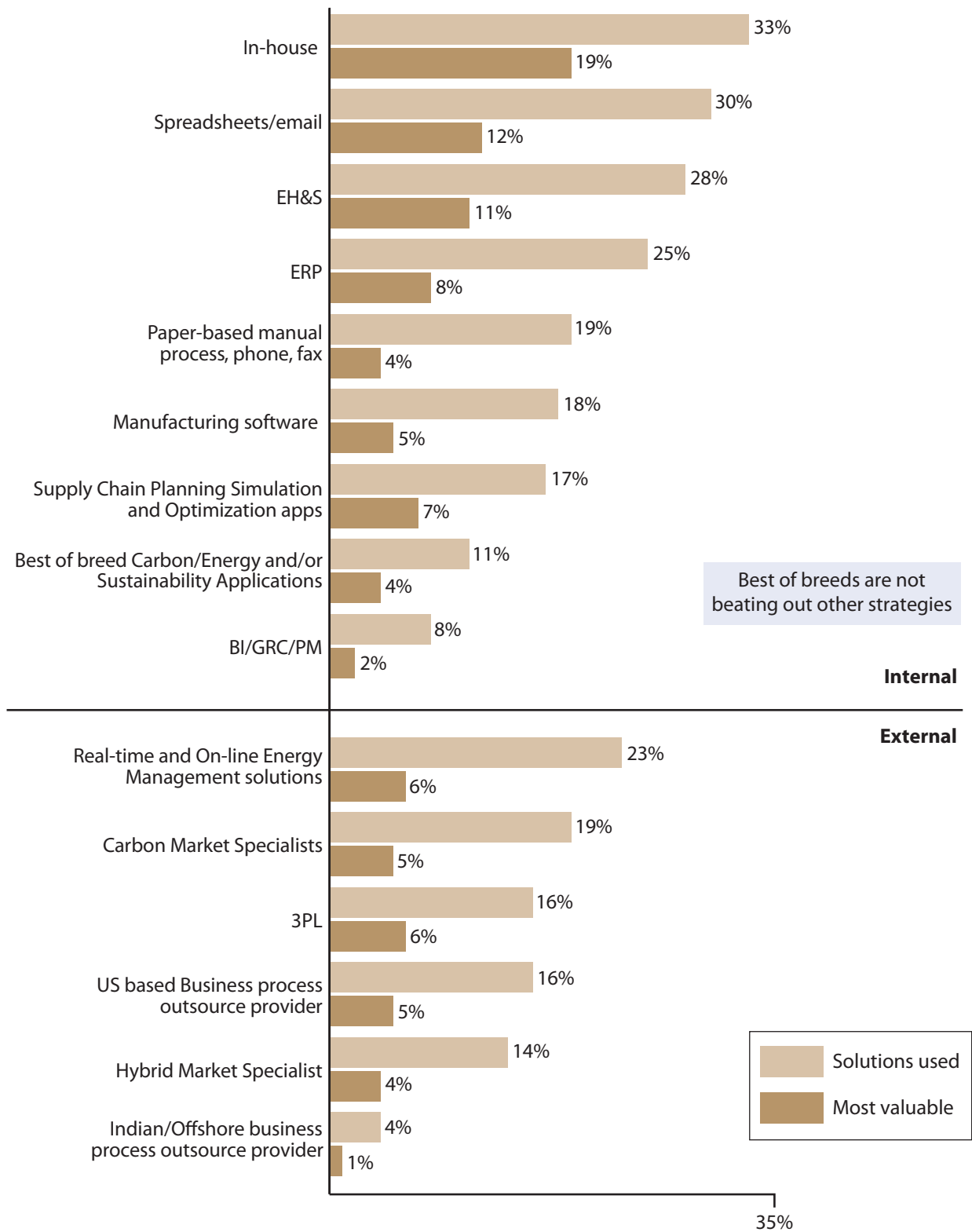
Finalization of the Scope 3 protocol may be some way off, but it is now overdue for companies to develop strategies that focus on both the tracking of Scope 3-related information and its use for process improvement and for reporting across the supply chain, particularly to retail and consumer end-users.

Legacy systems and manual processes still prevail

The number of companies with modern IT systems to manage GHG emission data is increasing—29% did not have IT systems in 2008 but only 18% in 2010—which supports prior conclusions about market education as proliferation of options continues. Despite this increased usage of IT, the actual integration and completeness of architectures is not fully there. Only 35% of this year's respondents feel they've achieved a level of standardization/complete integration. Many companies indicate they are managing their operation with either

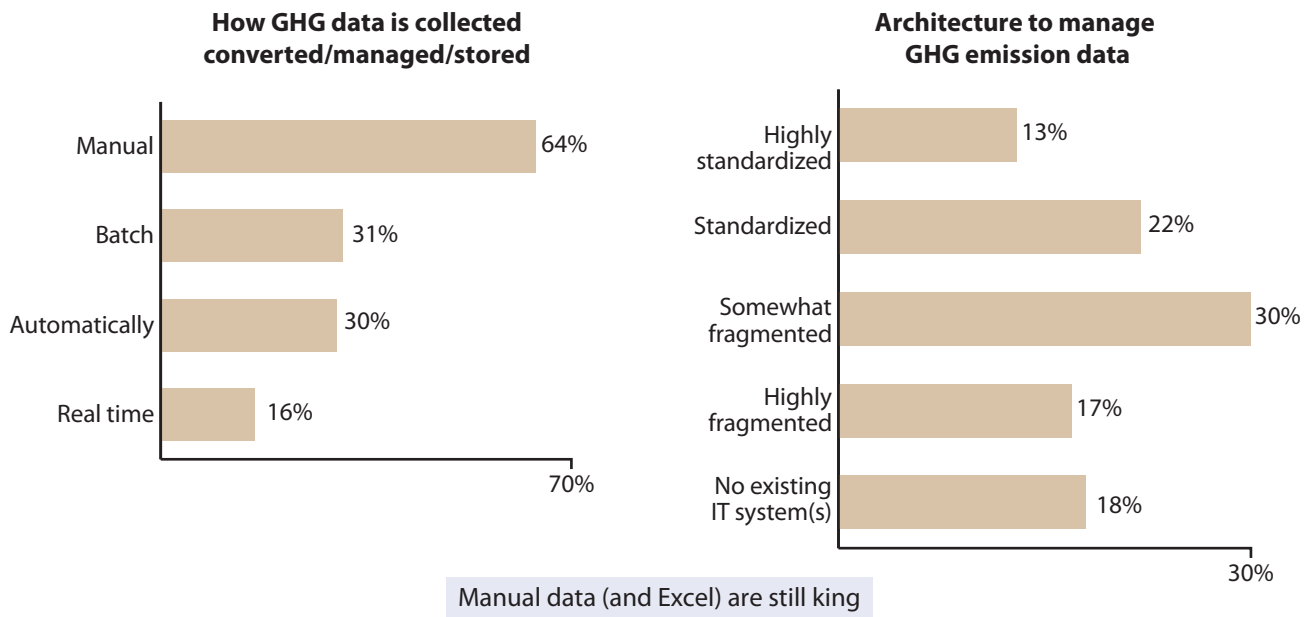
highly fragmented or no complete systems approach whatsoever. Energy-intensive industries demonstrated high levels of architectural fragmentation. Delaying this realization, not to mention the emergence of more complete architectures, are the mass of in-house constructed, legacy systems approaches and continued reliance on Excel spreadsheets. Over half of the respondents indicate reliance on these systems approaches to support their GHG management efforts, and 31% said these are the most valuable to solutions. This reliance on in-house and legacy systems also suggests the market has yet to perceive that a platform exists that can help overcome the high total cost of ownership (TCO), inconsistent business process management, and general lack of optics into relevant operational performance and provide a basis for more effective tradeoffs to be made. Vendor success is contingent upon not just continued education of both IT cost and pure business advantages and efficiencies to be gained by migrating off legacy approaches.

Figure 8: Solutions used to support GHG management



Q. Which of the following solutions do you currently use to support your company's GHG management efforts?
Which is most valuable to your company in supporting your GHG management efforts?

Figure 9: How GHG data is collected/stored and the architecture used



Q. Please tell us how GHG-related data is currently collected, converted from energy to emissions figures and then managed/stored? Which of the following best describes the current architecture to manage your GHG emission data?

N = 189 Total Respondents

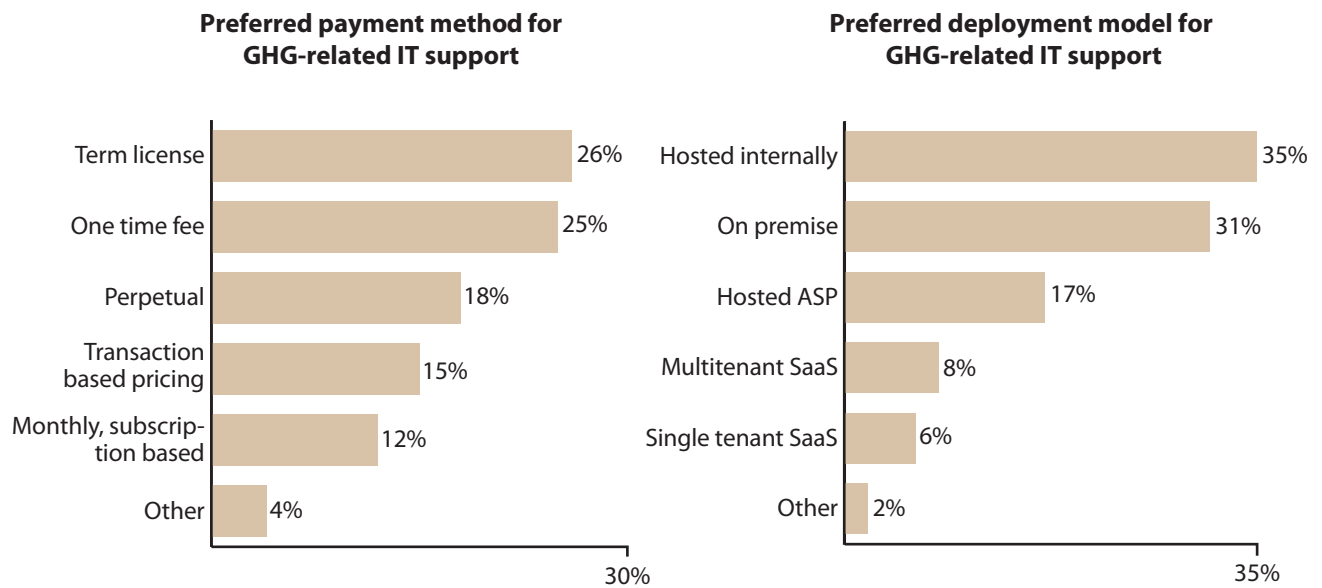
Source: AMR Research, 2010

Payment and deployment methods

Both the 2008 and the 2010 studies indicate a perception of technology support being an even mix of software and services. Services can be technology and not just pure consulting. Focusing on technology, two-thirds of the respondents are open to hosted models (split evenly between internally hosted and external, SaaS-based deployments). While debate on the residence of the information (on premise, off premise, in the cloud, etc.) is one thing, these approaches offer relief for companies concerned over a lack of IT skill sets or of gaps in current (or currently non-existent) systems by providing a foundation for a single version of the truth of information while keeping costs in check.

The data shows that operational employees are still in need education on the merits of newer deployment models. Part of any resistance they show could be attributed to the comfort level with in-house and legacy systems. Payment for these models is a different story. While a majority of respondents seem amenable to term and flexible pricing models, only 27% of companies seem inclined to newer usage-based and subscription pricing models. Again, it's a matter of continuing to educate operational employees on the virtues of service-based approaches to not just assuage data collection woes, but also to limit any concerns on customization/reconfiguration as data requirements shift.

Figure 10: Preferred payment method/deployment model for GHG-related IT support



Q. How does your company prefer to pay for GHG-related IT support? What is your company's preferred deployment model for GHG-related IT support?

N = 189 Total Respondents

Source: AMR Research, 2010

When looking at the data by segment the study found:

- C-levels favor the external application service provider (ASP) while those closer to the detailed, real time operations tend to lean towards “inside the firewall” approaches.
- Both groups are receptive to hosted approaches.

Conclusion

The survey has both confirmed many of the emerging GHG and sustainability market patterns exposed by the 2008 AMR Research survey and additionally highlighted some contrasts and the further evolution of the market. The sustainable business market has arrived—sustainability winners will be the market makers, not the market takers. The market makers are exploiting aspects of sustainable business performance to enhance their actual and anticipated environmental and regula-

tory compliance risk profiles, to further their green communication and marketing messages and drive new levels of organizational efficiency and operational performance. These key drivers require supporting robust sustainable software and services to accurately deliver critical information.

For vendors, the survey data demonstrates that the market today is looking toward reporting platforms as a basis for risk-minimized compliance. This seems to be the case independent of energy-intensive versus non-intensive sectors. Vendors should focus sales execution on minimization of anxieties around the difficulties associated with potential reporting reliability and accuracy. Current marketing strategies should focus on laying a foundation for longer term benefits realization. This means focusing on the basics of data collection, reporting, and presentation today and evolving from these descriptive analytics to more discovery analytics and modeling and simulation approaches in the future.

There are a number of key patterns that additional emerge from our analysis:

- The imperative of linking energy usage to emission management to develop quantified and variously granulated facility, process, and organizational metabolism.
- The need to rethink the existing enterprise asset management (EAM) space—the arrival of sub-building smart grids is likely to radically change the focus on facilities and asset management and shift it from retrospective reporting to real-time and interactive asset management, operation, and maintenance.
- We are seeing the emergence of many lenses through which to define the sustainable software landscape. An important area of differentiation is the development of solutions designed to support either strategic, aggregated top-down approaches or granulated and typically operational bottom-up approaches. Currently the market is seeking and being supported by one or other approach. We anticipate that in the future we will see the increased merging of these patterns to develop fully integrated and smart solutions. Vendors would be wise to anticipate this evolution within their product development pipelines.
- Developing applications that can more fully incorporate Scope 3 emissions is a necessary evil, but vendors should try to do this with more creativity than just the current draft WRI protocol in mind.