

Tech-Clarity

making the value of technology clear

Tech-Clarity Perspective: Product Environmental Compliance

***Sustainable Processes to Reduce
Compliance Cost and Risk***



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Executive Overview

Manufacturers today are under pressure to comply with an increasingly complex array of product-focused regulations. After exerting tremendous effort to comply with the European Union's RoHS mandate, they now face additional environmental compliance requirements to address REACH, WEEE, numerous local versions of RoHS, customer-specific requirements, company "green" policies, and more. Manufacturers need to comply with this tangle of legislation to ensure business continuity and reduce risk. This helps the environment, but it's also just good business because it protects revenue streams and mitigates potential losses from stopped shipments, fines, or brand damage.

Manufacturers have to comply to keep their market share, but to maintain profitability they also have to do it in a cost effective way, particularly in current economic conditions. Previous compliance benchmarks uncovered wide ranges in the total cost for companies to comply with regulatory demands. To better understand how some companies are able to achieve compliance at a significantly lower cost than others, Tech-Clarity surveyed product environmental compliance leaders from over 300 companies and interviewed several leading manufacturers. The study found developing and supporting compliant products using sustainable processes and enterprise solutions significantly reduces the cost of compliance.

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RoHS has now been joined by REACH as the most commonly reported environmental regulation impacting products (79%). While some manufacturers took a project-based approach to RoHS, others chose a programmatic approach to address compliance across regulations. Those that took a project focus versus a process-oriented approach have learned that addressing regulations one by one consumes scarce resources that could be better put to use developing new, innovative products. Particularly today, as companies have to do more with less, leading companies are taking a more systematic approach to product compliance. Brute force is not the answer, particularly in obtaining supplier data which appears as the most common challenge in achieving product compliance (52%).

The research concludes that the key elements of a sustainable approach include:

- Compiling a common set of product environmental performance requirements
- Gaining a better understanding of the substances that make up components
- Automating the analysis and monitoring of product structures and composition against requirements
- Documenting proof of compliance electronically

The Changing Regulatory Landscape

Most companies are just recovering from the first big wave of improvements to the environmental performance of their products. This first wave was primarily driven by RoHS (Restriction of Hazardous Substances Directive) from the European Union (EU) and numerous industry-specific regulations. Those that thought that compliance with RoHS was a one-time effort are now finding that developing sustainable, environmentally compliant products is a never-ending – and potentially very costly – pursuit. To be clear, most compliance efforts are driven by regulations and public scrutiny, not corporate altruism. It is becoming a bigger market requirement to be seen as a “green” business. But particularly with today’s heightened attention on “greenwashing,” no company wants to look hypocritical about environmental compliance. As Brian Martin, the Senior Director of Corporate Product Environmental Compliance for hard disk drive and storage solution company Seagate explained, “*Our objective is to be a green company, and not just perceived as green.*”

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The problem is that following RoHS, more regulations were on the way, such as new versions of RoHS that are appearing by country, versions from individual US states such as California, and now “RoHS2” coming from the EU. This is in addition to requirements such as REACH (Registration, Evaluation, Authorization and Restriction of Chemicals), which are far more encompassing than those of RoHS. Today, focus is beginning to shift from RoHS to a combination of both REACH and RoHS (see Figure 1). REACH is a much broader regulation than RoHS, applying to more industries, regulating essentially all substances, and potentially restricting thousands as opposed to only six. And REACH is just one example of new legislation that companies should expect to encounter. As Gerald Sprague, Principal Software Engineer for Environmental Compliance at global communications giant Motorola observed, “*REACH showed us there will be continuing efforts to add more compliance regulations to things we ship to different locations around the world.*”

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The survey results clearly indicated that REACH has quickly become a leading concern in addition to RoHS. In fact, 89% of those concerned by RoHS are also concerned by

REACH. Of those companies, those that treated RoHS as a one-time project are now facing a repeat of their efforts (or worse). For example one company surveyed reported “*substantial (estimated > \$2,000,000) compliance-related expenses for RoHS alone.*”

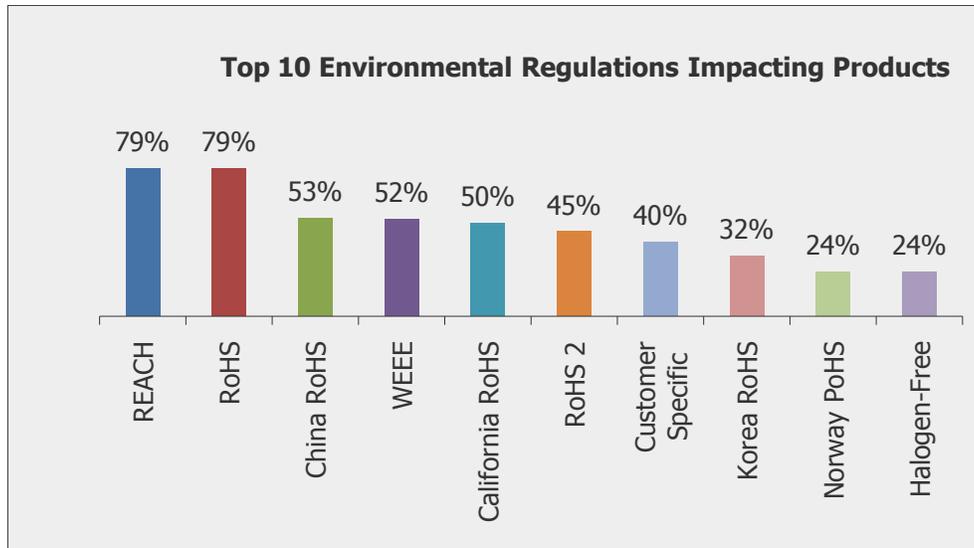


Figure 1: Top 10 Environmental Regulations Impacting Products

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The most frequently cited concerns after the top two (REACH and RoHS) include different versions of RoHS by geographic location, Waste Electrical and Electronic Equipment Directive (WEEE), customer-specific requirements and a significant number (24%) concerned about halogen-free requirements. Additional concerns included California Proposition 65, which was the most frequent write-in response. One of the interesting implications of the results is that REACH and RoHS are top concerns, but not the only concerns. Companies have to deal with combinations of requirements. In addition to regulations, companies must address customers who develop requirements and specifications above and beyond the published regulations and lists. As Seagate’s Brian Martin states “*Compliance with customer requirements is an overarching requirement. Compliance is really a customer-driven job. It is an absolute requirement for any business.*” This just adds more complexity as companies manage the overlaps and intersections between these requirements.

RoHS was the top concern (91%) for high-tech and electronics, followed by REACH (80%). This compares to higher numbers concerned about REACH in Aerospace and Defense (93%) and Automotive and Transportation (90%). In fact, Automotive has the largest percent of respondents (32%) that have been addressing REACH for greater than one year, while the Consumer Products industry has the largest percent (66%) of respondents that have been addressing REACH for at least six months.

When evaluating the focus on compliance, it's important to keep in mind that the issue is not just about compliance, it is about reducing market risk. Ray Lizotte, Director of the Environmental Stewardship Office for electronics firm American Power Conversion by Schneider Electric (APC), cautions, *“There can be a big impact if you don't have the right process in place. In December, 2008, a Japanese OEM noticed a noncompliant cage nut on one of our products. It was a part worth 6 cents on 125 units, a total of \$7.00 worth of material. But it put all products sold in Japan on hold. The incident could have resulted in a loss of \$14 million per quarter of revenue, and it cost us \$600,000 to fix the problem - despite the paperwork stating compliance.”*

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The consequences of noncompliance are clear, although it is true that regulations are not uniformly enforced. In this environment, how can companies limit the business risk of noncompliance, including brand damage from bad PR, poor product quality due to late changes, and more? If the impact of noncompliance is so clear, why hasn't everybody addressed the issue? Unfortunately, the business of developing and maintaining compliant products is complicated.

Barriers and Challenges

Manufacturers face a series of challenges when developing sustainable products, ranging from supply chain issues to internal challenges (Figure 2). The top challenges reported are *“Difficulty in obtaining accurate or timely environmental data from suppliers”* and *“Lack of awareness or education among suppliers.”* Clearly, compliance is a supply chain issue as well as a product development issue. The supply chain holds the key to product content and the compliance level of purchased components. Unfortunately, in addition to the lack of awareness and understanding of compliance issues in the supply chain, some suppliers are also protective of their product content due to concerns of sharing IP. This puts the manufacturer at risk, because in the end, the manufacturer is responsible for what they deliver. But as one respondent indicated *“gathering compliance data from suppliers is both challenging and time consuming.”*



Figure 2: Challenges in Ensuring Product Compliance

Beyond gathering data, companies must also ensure that the data they collect is accurate. As APC discovered, simply having documentation of compliance from the supplier is not enough to protect the manufacturer from compliance risks. As APC's Ray Lizotte explains, *"Our biggest problem is verifying that the compliance data received represents the actual compliance status of the component, material or product. There have been a lot of problems when the supplier indicated compliance for products that were in fact not compliant."* To address this issue, leading manufacturers combine data gathering with additional validation techniques such as physical testing. More progressive manufacturers are systematically gathering test data to uncover where there may be supply chain issues, and focus their efforts on underperforming or suspect suppliers.

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Perhaps one of the biggest underlying compliance challenges, as reported by 41% of the manufacturers surveyed, is *"Lack of resources within my company to perform compliance-related tasks."* The current economy has made compliance even more difficult. Despite the resource crunch, companies can't afford to let compliance slip or it could come back to undermine top line revenue and bottom line profitability. APC's Ray Lizotte observes a common occurrence in the industry, *"The work hasn't gone away, but*

our resource pool has gotten smaller.” Compliance processes have to be extremely efficient given today’s economy and lean organizations. This is a big concern for many organizations, as they are being asked to address ever-increasing regulations with flat or shrinking resources. Brian Martin describes this scenario at Seagate, “We saw that spending on compliance would start ratcheting up. We predicted a saw tooth, where for every new regulation we would have to spend resources, and then spend more resources on the next challenge. Overall, the cost was trending upwards, and the peaks would have been very painful. We realized that we needed to step back and look at how to make the process sustainable”

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Designing for Compliance

One step in developing a sustainable product compliance process is to design compliance into new products from the start. When engineers have visibility to regulatory requirements and the right supporting data up front, they can design a product for compliance from early in the product’s lifecycle. Addressing compliance early allows designers to include compliance choices while design flexibility is still high, and avoids costly late-stage changes (see Figure 3.) Late changes can cost the company more than just the direct expense, they can cost time which can delay product introduction. Late changes can also impact product performance if suitable alternates can’t be found and design intent is compromised through workarounds.

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Designing for compliance requires companies to address a series of processes, each with their own challenges:

- Understand Regulations and Requirements
- Document Product Structures / BOMs
- Gather and Validate Component Data from Supply Chain
- Analyze Products and Perform What If
- Document Compliance and Achieve Auditability

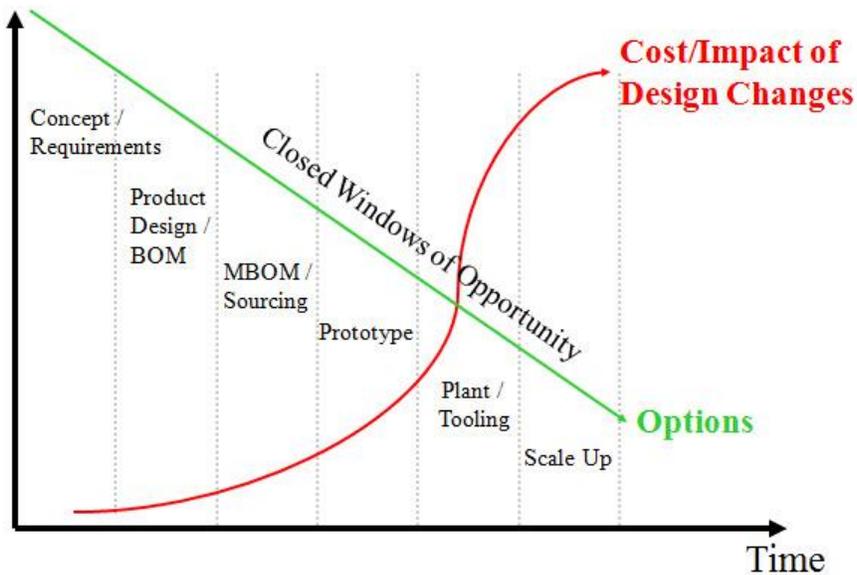


Figure 3: Windows of Opportunity for Product Compliance

The good news is that there has been progress over the last few years in addressing compliance earlier in the product lifecycle (Figure 4). About one-half of surveyed companies are addressing compliance prior to design. High-tech and Electronics companies are most likely to address these requirements further upstream, with over one-quarter (27%) addressing compliance in marketing specifications. Across industries, more than three-quarters of companies (85%) are addressing compliance by the end of design. Brian Martin explains Seagate's approach, "*As we launch products, we have a BOM review meeting. The BOM is tracked as a countdown to 100% compliance.*"

Internally, companies need transparency to compliance information so each individual can play their role in developing and maintaining compliant products. Each company needs to determine what information they need, and for whom (compliance, engineering, design, marketing, supply chain). Ray Lizotte reports that APC makes compliance data visible to designers throughout the design process. "*The key is to deliver compliance information in a quick and easy way to the employees who make decisions influenced by a component or product's environmental compliance status. Compliance information is provided to design engineers during their routine work-flow. This ensures that the engineers select components and materials that achieve company environmental goals.*"

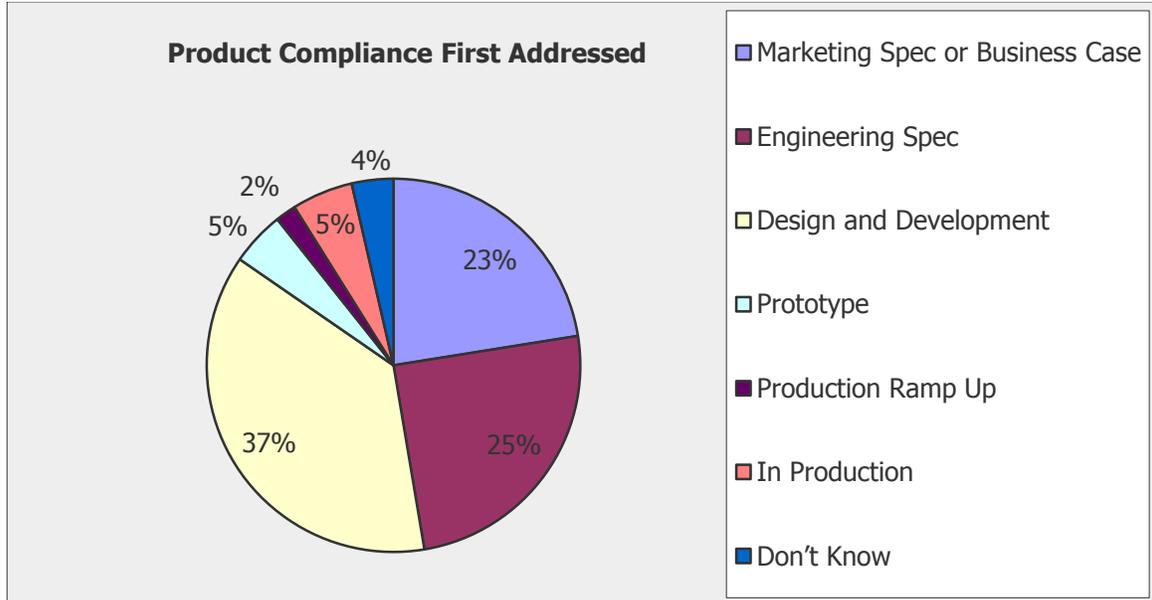


Figure 4: Product Compliance First Addressed in Lifecycle

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Ray Lizotte, Director of Environmental Stewardship Office, APC

Compliance is also a lifecycle issue. Building sustainability into market requirements at the earliest stages is important, but companies still need to ensure the requirements are fulfilled in the development, production, and maintenance of the product. Manufacturers need to monitor and test throughout the lifecycle to ensure compliance, as well as to assess supplier and product quality. Perhaps just as importantly, manufacturers have to monitor changes in regulations, products, and customer specifications to ensure compliance requirements are met as products and requirements evolve. In addition, designers should be ready for ad-hoc requirements and inquiries as new regulations, corporate initiatives, customer demands, and public opinions change.

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Documenting and Communicating Compliance

Developing and maintaining compliant products is only part of the challenge. Companies must maintain the appropriate documentation to satisfy customers and regulators. As Brian Martin of Seagate explains, “*We have to focus on not just what is restricted, but also what is required to prove and document it.*” It is common to find documenting compliance as the longest step in product development, delaying time to market as necessary paperwork is put into place. Documenting proof of compliance electronically saves time and effort in developing compliance documentation, and also allows for rapid response to inquiries. Fulfilling customer data requests can take time, delaying orders as the paperwork is compiled and data is assembled.

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*Brian Martin, Sr. Director Corporate Product Environmental Compliance,
Seagate*

Electronically documenting compliance can also help companies prove compliance by associating relevant documentation and test data directly with the components and products. As APC’s Lizotte explains, “*We store and integrate the analytical data, so for example if a Japanese official says show me the compliance information for a part we can find an answer in 30 seconds. There is a lot of value there.*”

Collecting and Managing Supplier Data

The leading companies interviewed for this paper are taking a very different approach to gathering supplier data than others who treated RoHS as a one-time event. They have adopted an integrated approach, and are moving to share information across the enterprise. Motorola’s Gerald Sprague explained, “*We needed a worldwide approach to deal with REACH, WEEE, CMM (China RoHS), RoHS.*” Some companies have tried to address regulations on an individual basis, believing that an integrated approach is unattainable due to lack of resources and high costs. Prior benchmark studies by Aberdeen Group have shown that this is not the case, and that companies taking a process-based approach achieve greater levels of compliance without spending more on their compliance programs.

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A systematic, sustainable approach is the only way to address the changing regulatory landscape in a cost-effective way. “*The standard path was to address what we need today, and change only when new requirements came along, sending out new requests to*

suppliers,” Brian Martin of Seagate recalls, “We looked at the cost of supply chain turns and realized it was time consuming, expensive, and not easy to get the information in. At that time, the team at Seagate decided to get information on every substance in every material by CAS number.”

Seagate felt they couldn’t afford to go look for information every time a new requirement came along. Instead, having higher levels of disclosure made new regulations an analysis issue as opposed to a fishing expedition. Having more detailed substance information for components avoids the time required to gather new data to make decisions, allowing companies to be proactive and analyze potential substances before they are mandated. Not all companies are striving for full disclosure (Figure 5), but a sustainable approach will lead them towards greater levels of disclosure and to be more aggressive in disclosure requirements of their suppliers.

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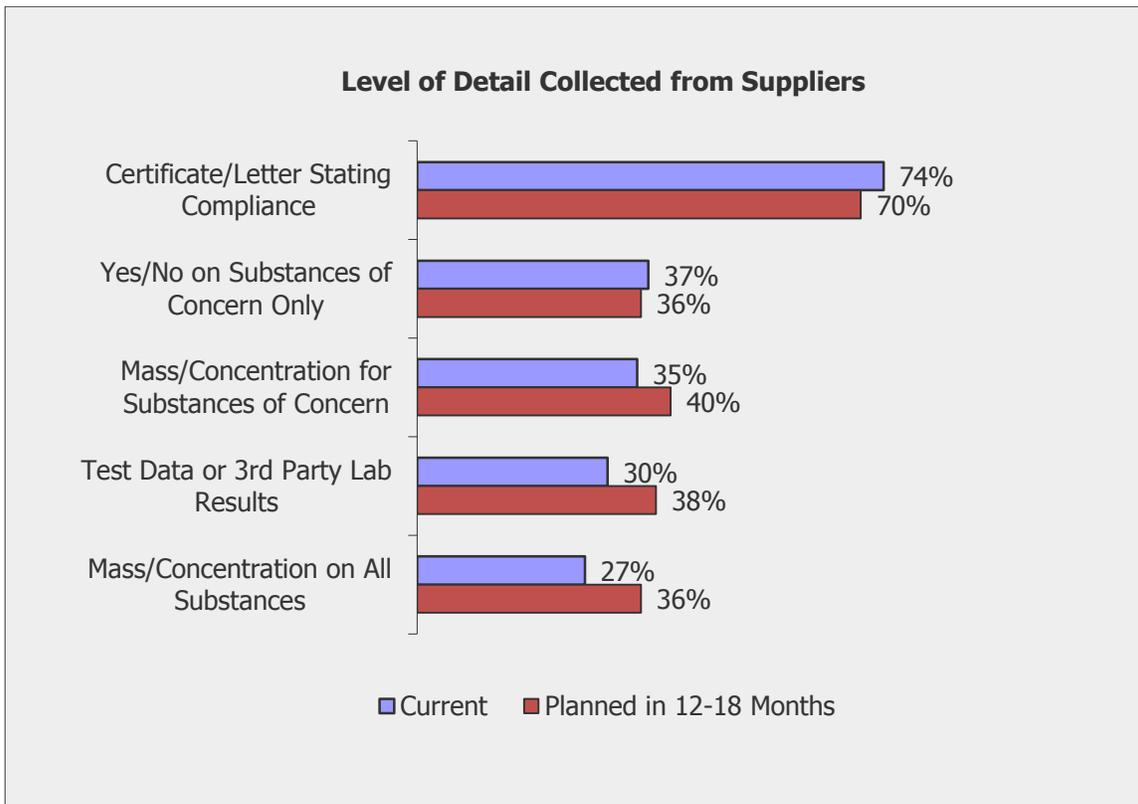


Figure 5: Level of Compliance Detail Requested from Suppliers

Most companies surveyed are focused on letters from suppliers stating compliance, although that number appears to drop slightly in the future. About three-quarters (74%) collect letters of compliance, with many collecting the letters without the associated data. Simple certificates will not be adequate as new regulations like REACH come into play. Today, only about one-quarter of companies surveyed are collecting data on all substances, although that is growing over the next 12-18 months. Even though companies are trending towards more detail, it is difficult for most companies to get there quickly. Many companies practice progressive disclosure which can mean collecting more than they need today, but not requiring full disclosure. Interestingly the Consumer Products industry is moving towards getting both the mass and concentration data of substances of concern more often (55%) than other industries. Aerospace and Defense (42%) and Automotive and Transportation (42%) are the most likely to gather data for all substances, although the biggest planned growth in full disclosure is Consumer Products (34% to 43%).

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Leading companies interviewed, however, have made significant strides towards full disclosure. Motorola's approach also involves seeking greater substance disclosure from suppliers. As Gerald Sprague explains, "*The standards-based spreadsheet we use walks the manufacturers through filling out and doing data integrity checks, and makes them report down to the CAS number at PPM % or mass level for each compound. Once a part has been graded, suppliers are not contacted again unless Motorola's standard changes.*"

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*Gerald Sprague, Principal Software Engineer, Environmental Compliance,
Motorola*

The result of fuller disclosure is transparency into what goes into a manufacturer's products. This creates an information asset that can be used to rapidly analyze products against new regulatory requirements. Seagate's Brian Martin explained how this asset helped them prepare for REACH, "*For REACH, we never needed a form from Seagate because we already had the information, although we did check on some specific areas of concern.*" Motorola's Sprague describes a similar scenario, "*Since detailed substance data is what's required for REACH, we had all the information we needed for REACH. We just had to put together specific reports.*"

In fact, REACH appears to be a driver for companies to transition towards gathering the mass and concentration for substances of concern. Those companies surveyed that are concerned with REACH are planning to grow in collecting substance of concern data (from 39% to 43%) and all substances (30% to 42%). The increase is even more pronounced for those companies concerned about RoHS2 (grows from 46% and 35% to 54% and 49% respectively over next 12-18 months.)

Enabling Sustainable Compliance

Technology is a key enabler of a sustainable approach, and can be applied to each part of the compliance framework. Each of the companies interviewed for this report stressed the importance of enabling software solutions. Ray Lizotte explains APC's adoption of new software solutions for compliance, "*We were just beginning to make the transition from compliance that was project oriented to a sustainable process, where compliance was embedded into existing processes, so our tools had to change accordingly.*"

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Gaining a better understanding of the substances that make up components and products allows for faster compliance with new regulations, but it also requires the data to be digitized in a way that it can be readily analyzed. Requirements, product structures, and substance levels must be stored as data as opposed to documents so you can interrogate them and do what-if analysis rapidly. "*Early on, we decided we needed a real database and not just a document repository so we could grade compliance part by part against the Seagate specification,*" explained Seagate's Brian Martin, "*We simply couldn't do this without software automation.*"

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Technology can help improve data gathering and supply chain collaboration as well. Effective compliance requires the ability to efficiently gather compliance-related information from the supply chain. Unfortunately, as shown previously in Figure 2, gathering data was the most frequently cited challenge, followed closely by lack of understanding in the supply base. One particularly challenging aspect is gathering data in a consistent format (Figure 6). In an ideal world, data would be provided in a consistent format such as the IPC 1752 form. Unfortunately, over one-half of companies surveyed (57%) are using custom forms to gather data. . Not only are companies requesting

information from suppliers in non-standard formats, suppliers are returning the favor by responding in varied ways forcing manufacturers to accept data in multiple formats. Over one-half of surveyed companies, in fact, will take the data in any form the supplier will provide. Accepting non-standards-based approaches to collecting data when necessary is the reality that they are facing, but it hurts repeatability and efficiency.

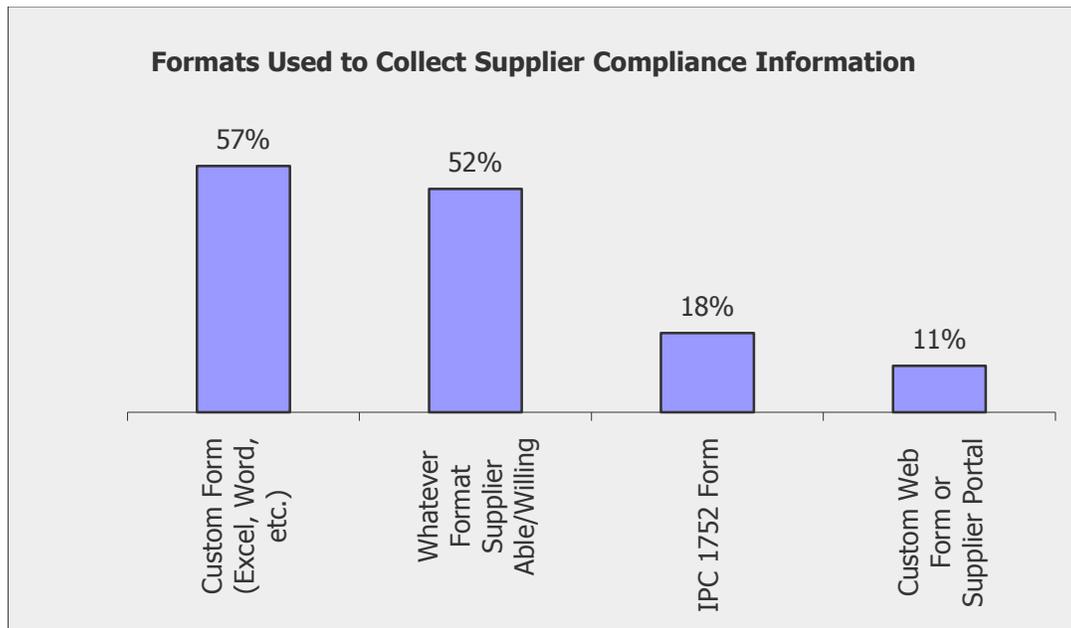


Figure 6: Formats Used to Collect Supplier Compliance Information

When gathering data, companies should move towards standards-based approaches to reduce overall friction in the supply chain. But in the near-term, most companies should be prepared to accept different forms of input. Even though data may not be collected from suppliers in a standard format, it needs to be standardized internally for analysis purposes. Technology can help translate information from different sources so it is useful in automated analysis and monitoring. Ray Lizotte describes APC's ability to work within the capabilities of their supply chain. *"We can support collaboration with our supply chain because our tool accepts data in a variety of formats,"* he explains, *"Suppliers are not solely constrained to supply information in the 'APC way' - which has reduced the costs of gathering our compliance information."*

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Once supplier data is gathered and standardized, sustainable compliance depends on good product data. Whether collected in a standalone way or captured in an ERP or PLM system, bills of material – including supplier designations and alternates – must be accessible. As companies have moved away from spreadsheets and documents towards PLM, this information is now much more readily available.

***Automation makes a sustainable approach efficient,
improving compliance at a lower total cost.***

Gerald Sprague describes the process at Motorola. “*We have integration to PLM to get to the BOM information we need,*” he described, “*Then we contact different suppliers for parts to get standard spreadsheets or IPC forms, load the data to our system, and it does the calculations for the parts.*” Automation makes a sustainable approach efficient, improving compliance at a lower total cost. “*We couldn’t do this manually,*” he concludes.

Technology provides the ability to digitally collect requirements, product data, and substance levels to enable automated analysis against multiple regulations. It also allows for the easy capture and retrieval of compliance documentation such as supplier certificates or associated test data. Good systems are an absolute requirement for a sustainable compliance approach.

Conclusion

There is a wide gap in how companies address product compliance. Many companies are still addressing compliance on a project basis, and far too many are collecting insufficient information, such as simple letters of compliance, that will fall short of the needs generated by upcoming regulations like REACH. Those with a systematic approach will continue to lead, providing better product compliance at a lower total cost.

The bottom line is that we have a system designed for the lowest cost means of meeting customer requirements, but it also allows us to be a greener company and allows us to have more environmentally friendly products.

*Brian Martin, Sr. Director Corporate Product Environmental Compliance,
Seagate*

Brian Martin of Seagate puts the sustainable approach to compliance in perspective. “*In the end, this is about business. The bottom line is that we have a system designed for the lowest cost means of meeting customer requirements, but it also allows us to be a greener company and allows us to have more environmentally friendly products.*” Manufacturers need to comply with regulations to protect their profits. Today, they are facing increasing

levels of legislation from many sources. To meet these growing demands, companies will have to do more with less as they address the combination of increased complexity and the necessity for lean organizations due to the economy. Manufacturers have to cost effectively collect data and analyze their products, or choose to put their top- and bottom-lines at risk. A sustainable approach is the key.

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Recommendations

- Focus on product compliance to reduce business risk and ensure business continuity
- View environmental compliance as both a supply chain and product development issue
- Transition compliance efforts to a systematic, sustainable approach as opposed to a project-by-project effort for every new regulation or customer requirement
- Collect supplier data proactively to address future compliance needs and avoid fire drills
- Move towards full substance disclosure on a progressive basis, potentially starting with current substances of concern and customer requirements
- Standardize data collection where possible, but be prepared to accept data in multiple formats
- Automate product analysis to reduce cost of compliance and support a sustainable approach
- Leverage existing technology and data such as product information in PLM systems
- Maintain focus on compliance across the product lifecycle, monitoring existing products as regulations and requirements are projected to change

As Brian Martin of Seagate concludes, “*Align to answer a simple question – what’s in my product? Stop worrying about lists of substances and move towards full substance-level disclosures. It’s better for our industry, and better for our cost structure.*” Not all companies can get there at once, but setting this direction will help companies transition to a cost-effective way of reducing compliance risk.

About the Research

Tech-Clarity gathered and analyzed 331 responses to a web-based survey on product compliance. Survey responses were gathered by direct mail and online posting through partners including Greentech Media and Green SupplyLine. Tech-Clarity also interviewed compliance leaders from three leading manufacturers in order to share their environmental product compliance experience and knowledge.

The majority of the respondents were manager, director level, or VP (56%), with additional responses from the executive level (10%) and individual contributors (27%) among others.

Many of the respondents (47%) were from smaller companies less than \$250 million, 16% between \$250 million and \$1 billion, 11% between \$1 billion and \$5 billion, and 9% greater than \$5 billion. 17% did not disclose their company size. All company sizes were reported in US dollar equivalent.

The responding companies were a good representation of the manufacturing industries, including High-tech and Electronics (51%), Consumer Products (33%), Aerospace and Defense (26%), Automotive and Transportation (22%), Machinery and Industrial (26%), and others. Note that these numbers add up to greater than 100% because some companies indicated that they are active in more than one industry.

The respondents reported doing business globally, with most companies doing business in the North America (88%), over half doing business in Western Europe (53%), almost half doing business in the Asia-Pacific regions (44%), and about one-quarter doing business in Latin America (27%) and Eastern Europe (25%). Few companies were doing business in Africa (8%).

Respondents included manufacturers as well as service providers and software companies, but only those responses from manufacturers were included in the analysis. The majority of companies (70%) indicated that they were from manufacturing companies.

About the Author

Jim Brown is the President and founder of Tech-Clarity, an independent research and consulting firm that specializes in exposing the true business value of software technology and services. Jim has over 20 years of experience in application software for the manufacturing industries, with a broad background including roles in industry, management consulting, the software industry and research spanning enterprise applications such as PLM, ERP, SCM and others. Jim has conducted numerous studies on how best practices and enterprise software can be leveraged to improve product environmental compliance

Jim is an experienced researcher, author and public speaker and enjoys the opportunity to speak at conferences or anywhere that he can engage with people that are passionate about improving business performance through software technology.

Jim can be reached at jim.brown@tech-clarity.com, or you can find him on Twitter at @jim_techclarity or read his blog at www.tech-clarity.com/ClarityonPLM.