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EQUIPMENT MANUFACTURERS

The Compliance Value Proposition
TURNING COMPLIANCE INTO PROFITABILITY

Rather than viewing "compliance" as a high-cost/low-value "have-to" set of activities, forward thinking companies are already leveraging their compliance activities to achieve lower costs, increase sales and enhance profitability, while conserving financial and human resources.

TOP 10 TAKEAWAYS

1. Governments are reducing environmental impacts on human health and natural habitats, as well as their associated costs. As a result, REACH, RoHS, Conflict Minerals, ELV and other global regulations targeting products and/or manufacturing processes are an ongoing aspect of the business landscape.

2. The gradual depletion of many metals, minerals, water supplies and other natural resources will be exacerbated in the next fifteen years, as an estimated three billion more people enter the middle class and demand products that will increase scarcities, raise commodity prices and create surges in price volatility.

3. While "compliance" has rightfully been viewed as a "have-to" cost center in the past, there are substantial opportunities for manufacturing firms to integrate their compliance activities into a Regulatory Compliance Management Process and substantially reduce their long-term costs of compliance.

Download the complete Compliance Value Propostion white paper at aem.org/regulatorywhitepaper

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4. Manufacturing firms can leverage compliance activities in order to reduce long-term costs and to capitalize on the Compliance Value Proposition: the portfolio of sales, marketing, sourcing and other revenue opportunities that enhance profitability and strengthen competitive advantages.

5. Companies in virtually every industry are implementing aspects of the Compliance Value Proposition that include re-manufacturing, leasing and selling products-as-services.

6. Key to unlocking the Compliance Value Proposition is supply-chain collaboration in order to achieve Full Material Disclosure regarding substances that are incorporated into products and manufacturing processes.

7. Today's wide range of data-collection forms, formats, tools and exchange platforms only partially address industry-specific requirements, and none of them have resulted in either complete, accurate substance data or a cross-industry data exchange platform.

8. While Full Material Disclosure was virtually impossible in the past, recent advances in data standards and data exchange platforms make it a realistic possibility in the near future to achieve Full Material Disclosure and to protect confidential business information.

9. For manufacturing firms to achieve Full Material Disclosure and to capitalize on the Compliance Value Proposition, there is the need for low-cost/high-value training for the tens of thousands of supplier companies and internal employees. In heavy equipment and similar industries that have deep supply chains averaging ten or more tiers, this education need is a critical requirement.

10. AEM anticipates a 2015 launch of its integrated data standard, data exchange and training programs. AEM's Market Access Pathway (MAP) program, along with its sponsorship of an Evaluation Steering Committee comprised of industry representatives, is making this launch possible.

For the complete, in-depth analysis of the Compliance Value Proposition, please see AEM's white paper, now available at aem.org/regulatorywhitepaper

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EQUIPMENT MANUFACTURERS

The Compliance Value Proposition

TURNING COMPLIANCE INTO PROFITABILITY

An AEM White Paper

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EXECUTIVE SUMMARY

"Compliance" and "Value Proposition" are rarely spoken in the same sentence. These days, they should be.

In the course of developing its Market Access Pathway program for compliance with REACH, Conflict Minerals and other global environmental regulations, AEM has recognized a surprising wealth of financial opportunities that comprise the Compliance Value Proposition (CVP).

The CVP represents a shift in thinking that is justified by today's business landscape. Rather than viewing "compliance" as a high-cost/low-value "have-to" set of activities, forward-thinking companies are already leveraging their compliance activities to achieve lower costs, increased sales and enhanced profitability, while conserving financial and human resources.

The CVP is especially driven by the interplay of two "events" that have emerged in the last fifteen years: the mainstreaming of Extended Producer Responsibility directives and the surge in material costs and volatility.

This White Paper highlights the Compliance Value Proposition and its current and longer-term profitability benefits for companies in the heavy equipment and related industries.

It also discusses the importance of collecting full material disclosure data for unlocking the CVP potential.

Finally, it details a set of next-step activities that will allow companies and supply chains to cost-effectively achieve full material disclosure, while protecting confidential business information.

DEFINITIONS

Words matter.

As used in this White Paper, the following three words or phrases are defined below.

Compliance

The requirement that manufacturing firms meet their:

- Legal obligations in regard to worldwide Extended Producer Responsibility laws and similar regulations that directly or indirectly target products, and/or
- Business obligations to customers who must comply with those laws

Compliance Value Proposition

The portfolio of cost-saving and revenue-generating opportunities that enhance corporate profitability and competitive advantage, when manufacturing firms capitalize on their legal and/or business obligations in regard to Extended Producer Responsibility directives and similar product-oriented laws.

Full Material Disclosure

While respecting legitimate Confidential Business Information, the ability of manufacturers to identify, document, evaluate, trace and update every substance in every material, part, alternate parts and sub-assembly in the products they manufacture and processes used to manufacture them.

INTRODUCTION

"If we have to comply with REACH or other regulations, we might as well make money off it."

In the last two years, we have heard variations on the above statement from executives in the heavy equipment, automotive, defense, electronics, shipping and other industries.

In the next two years, we expect to hear many more similar statements, as "Compliance" and "Value Proposition" are rightfully joined into a phrase that OEMs and suppliers utilize to guide their short-term tactics and longer-term strategies.

Fundamentally, "Compliance Value Proposition" (CVP) is a paradigm shift. Previously, executives and managers viewed environmental regulatory compliance as a high-cost/low-value activity. Today, an increasing number of them view it as a high-value/low-cost activity with a high and growing profitability upside.

At its core, the Compliance Value Proposition (CVP) is a company's ability to leverage its product-oriented environmental regulatory compliance activities in order to reduce costs, increase sales and enhance long-term profitability and competitiveness.

In AEM's experience over the last two years implementing its Market Access Pathway (MAP) program for Original Equipment Manufacturers (OEMs) and their very deep supply chains, "CVP" is a largely under-appreciated portfolio of opportunities that companies would be wise to investigate and to integrate into their business strategies.

The purpose of this White Paper is to:

1. describe several business landscape factors that make the CVP a realistic approach;
2. illustrate a sample of cost-savings and revenue-generating opportunities that the CVP can potentially deliver; and
3. discuss the key to unlocking those opportunities, as well as needed next steps to turn the key.

PART ONE: TODAY'S BUSINESS LANDSCAPE MAKES POSSIBLE THE COMPLIANCE VALUE PROPOSITION

As economic, financial, technological, political and other factors constantly alter the business landscape, manufacturers face new risks and opportunities. In particular, two seemingly independent factors in the last fifteen years have been instrumental in the emergence of the Compliance Value Proposition as a corporate strategy for enhancing profitability and competitiveness.

1. The Mainstreaming of Extended Producer Responsibility and Similar Regulations that Target Products

It is well known that – in the last half century – economic progress engendered a very sharp rise in pollution, deforestation, cancer and other environmental and human health issues.

Less well known is that major-market governments – in particular, the European Union (EU) – determined that preventing human health issues and avoiding the need for environmental remediation was far less costly than treating the illnesses and performing the cleanups.

They also determined that those same preventative measures would generate an increased source of non-virgin materials and other resources; reduce waste streams; stimulate new businesses; create employment; and help EU industries to compete in the future global marketplace.

After making that determination, the EU spearheaded a series of policies, programs and laws that have collectively helped to make possible the CVP.

One of the most transformative of those actions was the elevation of the Precautionary Principle to legal status. In effect, it legalized a "Better Safe Than Sorry" approach to manufacturing. Specifically, it shifted the responsibility for determining product safety to the companies that manufactured the products prior to placing them on the market.

Then, acting under the umbrella of the Precautionary Principle, the EU enacted a series of Extended Producer Responsibility (EPR) directives that - for economic reasons as well as for environmental ones – targeted the products that companies were placing on the EU market, as well as chemicals used in manufacturing processes in the EU.

Initially, the EU enacted the End-of-Life Vehicle (ELV), Waste Electrical and Electronic Equipment (WEEE), Restrictions on Hazardous Substances (RoHS), Packaging and Battery directives.

Subsequently, it has recast the WEEE and RoHS Directives; enacted the Energy-related Products directive; passed the far more comprehensive Registration, Evaluation and Authorization of Chemicals (REACH) regulation; and more.

Over time, governments in North America[1], Asia[2] and other major markets have followed the EU's lead and enacted similar EPR laws. They are also enacting an ever-broader set of related laws, e.g. those that target substances in products from high-conflict areas around the world (US and EU Conflict Mineral legislation) or target the manufacture of products where workers are treated inhumanely (California Slavery Law).

Considering all of these legislative initiatives as EPR variations, manufacturers today face a web of EPR laws that are often very similar, but have differing areas of focus, bases for compliance, and timetables.

Manufacturers also face fierce reputational risks as non-governmental organizations, shareholder advocacy groups and others closely track their compliance with these laws.

Further complicating the issues, they face dynamically changing reporting requirements not only from governments, but also from customers, from shareholders and, for publicly traded companies, even from stock markets.

Despite all these differing requirements, the good news for manufacturers is that there is a consistency throughout them: namely, they are requests for information built upon knowing the substances and how they are used in products. These requests require companies to identify the substances in products; their locations and concentrations within products; their usages or applications; the manufacturing processes used; where they were originally mined or processed; potential exposure routes; safe handling methods; health and environmental impacts; and more.

In the past, collecting and exchanging all these variations of substance data has been very fragmented and difficult. Today, it is arguably the single most critical and costly bottleneck to companies' fully executing the CVP.

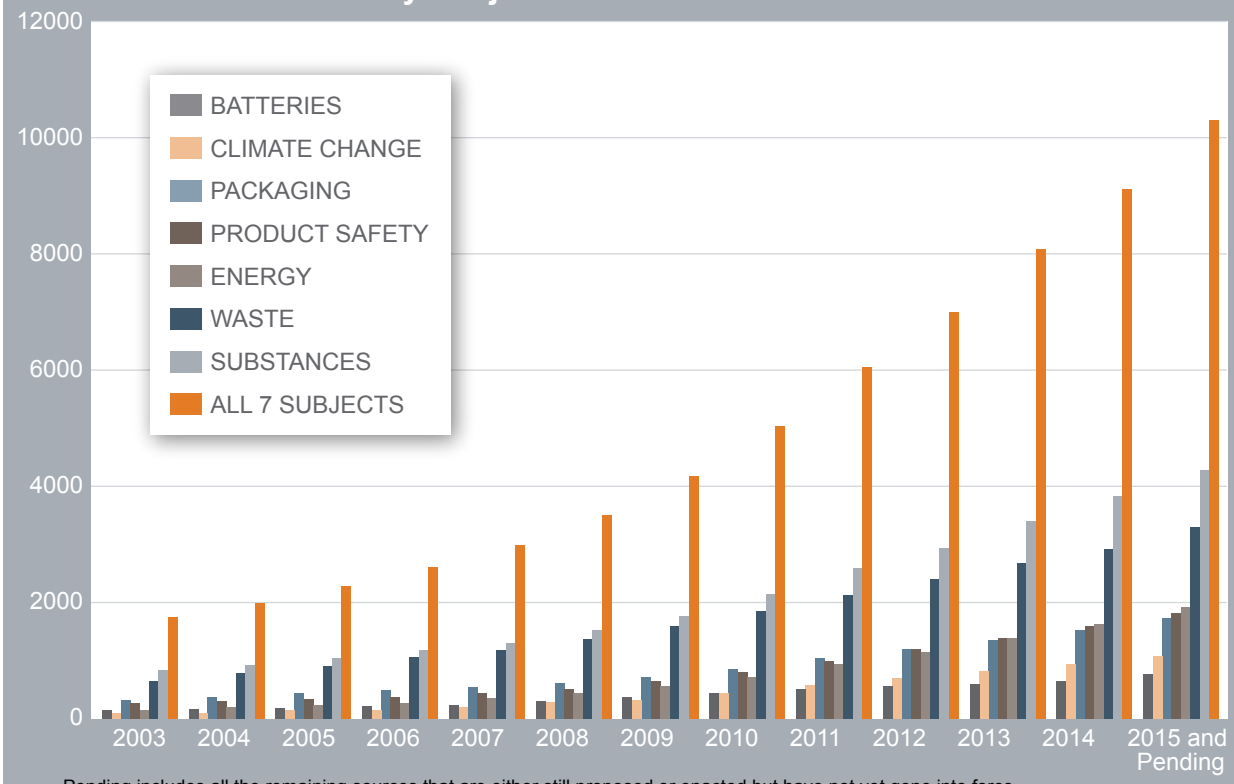
[1] http://www.hks.harvard.edu/var/ezp_site/storage/fckeditor/file/pdfs/centers-programs/centers/mrcbg/publications/awp/Nash_Bosso_2013-10.pdf; http://www.ec.gc.ca/gdd-mw/default.asp?lang=En&n=FB8E9973-1

[2] http://pub.iges.or.jp/modules/envirolib/upload/2607/attach/i-xiv.pdf

Part Two below discusses the path forward for breaking that bottleneck and capitalizing on the CVP.

Bottom line: In today's business landscape, manufacturing firms should consider EPR and similar laws as a permanent fixture. They should anticipate a rash of new laws that are more complex and require additional data sets to be reported upon (see Figure 1). In addition, they should continue to pay close attention to current and future EPR-related market-access and other financial risks.

Figure 1: Global Extended Producer Responsibility Regulations by Subject: Cumulative Totals[3]



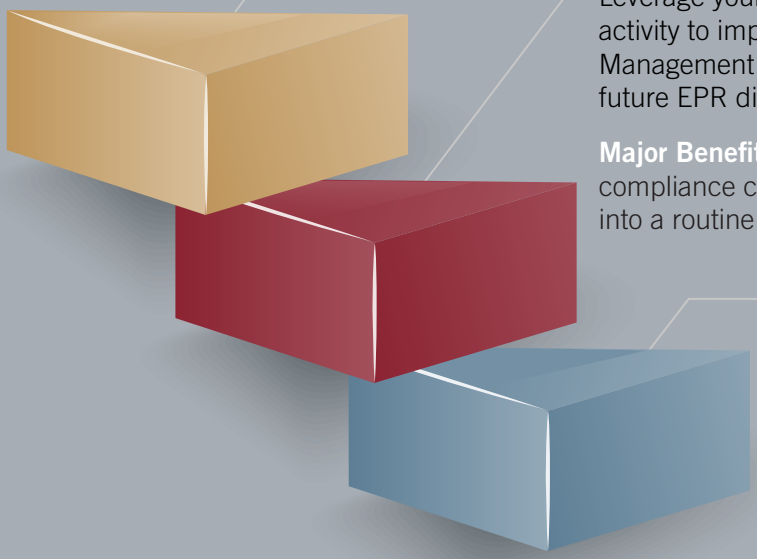
Pending includes all the remaining sources that are either still proposed or enacted but have not yet gone into force.
This chart includes only regulations on the topics listed in the accompanying chart. C2P covers other topics that are not included in this chart.

Source: Compliance and Risks

[3] Compliance and Risks: http://www.complianceandrisks.com

Most importantly in regard to this White Paper, they should proactively climb the Compliance Ladder *(see Figure 2)* described below by implementing an integrated compliance process and turning their compliance activities into a Compliance Value Proposition.

Figure 2: The Compliance Ladder[4]



STEP 3

Capitalize on your Regulatory Compliance Management Process to increase your sales, revenue streams and overall profitability and competitiveness.

Major Benefit: Increasing your sales, revenue, profitability and competitiveness by leveraging your compliance activities and capitalizing on business opportunities.

STEP 2

Leverage your individual regulation compliance activity to implement a Regulatory Compliance Management Process for all other current or future EPR directives.

Major Benefit: Dramatically reducing your compliance costs by turning "compliance" into a routine business process.

STEP 1

Complying with REACH, Conflict Minerals or any other individual EPR directive.

Major Benefit:
Protecting your markets.

[4] RSJ Technical Consulting: www.rsjtechnical.com

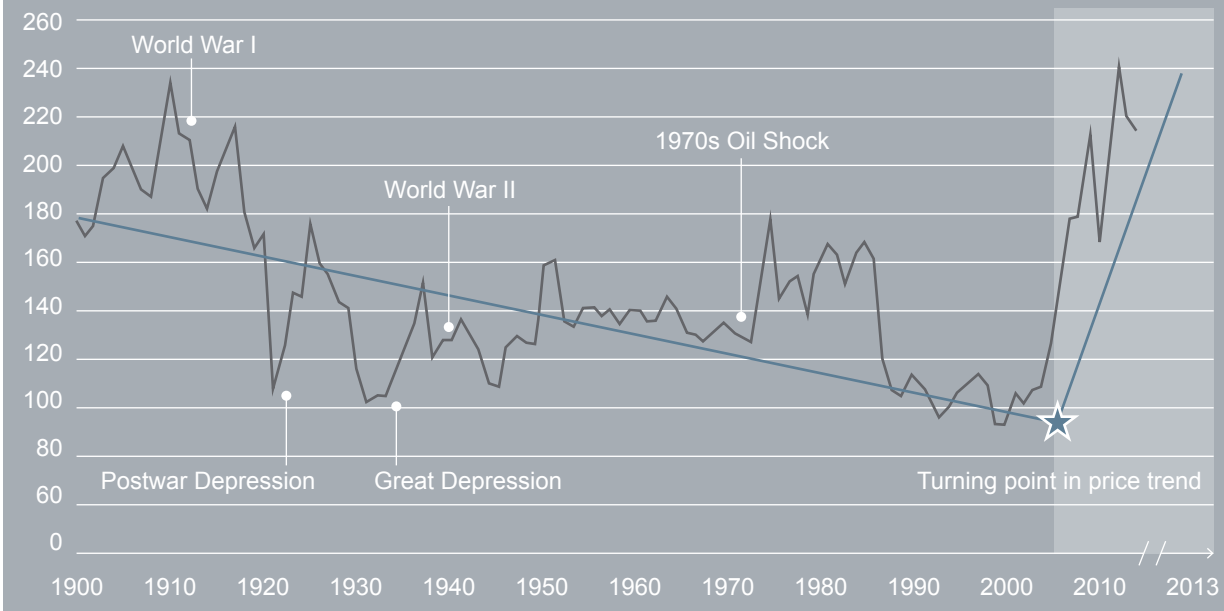
2. Surging Commodity Costs

The second major formative trend in the emergence of a CVP is the rise in commodity costs and volatility.

Since materials can account for 60-70% of manufacturing costs, the recent surges in commodity pricing and uncertainty represent financial risks for automotive, defense, heavy equipment, medical, shipping and other industries.

While some fluctuation is expected, there are strong indicators that 20th century price declines have been reversed (see Figure 3). Worse, companies within those industries are facing an extended period of price inflation that could impact their bottom lines.

Figure 3: Commodities since 2000 have Erased all the Real Price Declines of the 20th Century[5]



McKinsey Commodity Price Index1

Index: 100 = years 1999–2012

• Based on the arithmetic average of four commodity sub-indexes: food, non-food agricultural items, metals, and energy.

• Data for 2013 are calculated based on the average of the first three months of 2013.

[5] Source: Grilli and Yang; Pfaffenzeller; World Bank; International Monetary Fund; Organisation for Economic Cooperation and Development (OECD) statistics; Food and Agriculture Organization of the United Nations (FAO); UN Comtrade; McKinsey Global Institute analysis: http://reports.weforum.org/toward-the-circular-economy-accelerating-the-scale-up-across-global-supply-chains/the-limits-of-linear-consumption

Figure 4 below cites several examples of price rises.

Figure 4: Selected Globally Scarce Metals[6]

Metal	2000-2008 Price Increase	Critical Applications
Chromium	***266%***	Stainless steel, super alloy in jet engines and gas turbines
Copper	***190%***	Thermal and electrical conducting applications, including super-conducting; metal alloy; and antibacterial applications; essential to all plant and animal life
Iron Ore	***132%***	The only feedstock for iron and steel
Magnesium	***99%***	Structural applications (aluminum alloy) in cars, aerospace equipment, electronic devices, and beverage cans; die casting (zinc alloy); desulfurization of iron/steel; reducing agent (uranium production); and titanium production
Manganese	***227%***	Aluminum, iron, and steel alloy (stainless steel); gasoline additive; pigment; (disposable) dry cell batteries; required by all living organisms
Molybdenum	***795%***	Alloy and super-alloy in aircraft parts electrical contacts, industrial motors and tool steels; catalyst; lubricant; fertilizer; adhesive; and pigment; required element in higher life forms
Tin	***145%***	Alloy (in bronze, pewter, and solder), anti-corrosive metal coating, food packaging, manufacture of window glass, and superconducting magnets
Tungsten	***239%***	High temperature electrical and electronic applications such as incandescent light bulb filaments, rocket engines (nozzles), and turbine blades; fabrication of cutting and wear-resistant materials; x-ray tubes, wear-resistant and high temperature alloys and super-alloys; armaments; and catalyst
Uranium	***215%***	Fuel in the nuclear power industry, weapons (including high density penetrators), and dating rocks and fossils
Vanadium	***547%***	Iron and steel alloy, high speed tool steels, catalyst in the production of sulfuric acid, superconducting magnets, and surgical instruments

These price increases impacted every metals-using industry. As an example, the auto industry consumes 15 – 20% of manufactured steel. The price increase for iron ore is reflected in the price of steel, which rose 60% in 2004 and remained high until the 2008 economic downturn, impacting manufacturers in the auto and other steel-using industries.[7]

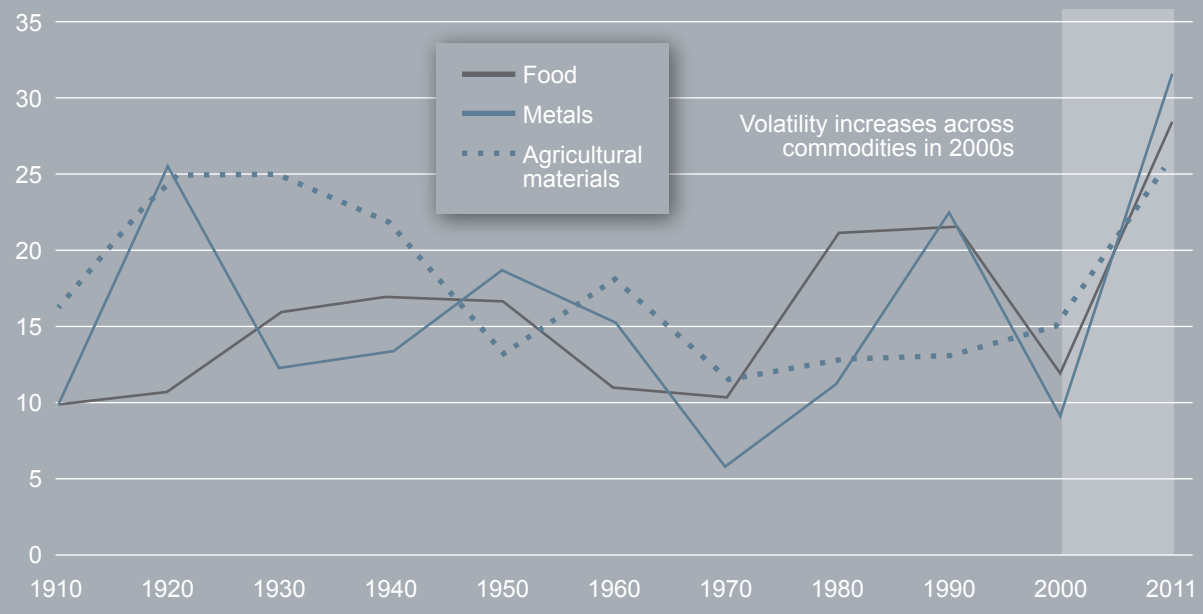
[6] USGS: Reported at http://www.resilience.org/stories/2012-01-04/there-more-it-oil

[7] https://www.innovateuk.org/-/opportunities-in-the-circular-economy-your-essential-guide

> ***"The prices of all important commodities except oil declined for 100 years until 2002, by an average of 70%. From 2002 until now, this entire decline was erased by a bigger price surge than occurred during World War II. It's perhaps the most important economic event since the Industrial Revolution."*** [8]
>
> Jeremy Grantham, co-founder of GMO, a global investment management firm

In addition to a sharp rise in commodity prices, there has also been a sharp rise in commodity price volatility, as seen in Figure 5.

Figure 5: Price Volatility has Risen Above Long-Term Trends in Recent Decades[9]



Price volatility, in %, 10-year average ending at start of year cited** Index: 100 = years 1999–2012*

** Calculated as the standard deviation of the commodity sub-index divided by the average of the sub-index over the time frame*

*** 2000-2011: 11-year average*

[8] http://eandt.theiet.org/blog/index.cfm?forumid=24

[9] Source: Grilli and Yang; Pfaffenzeller; World Bank; International Monetary Fund; Organisation for Economic Cooperation and Development (OECD) statistics; Food and Agriculture Organization of the United Nations (FAO); UN Comtrade; Ellen MacArthur Foundation circular economy team. Reported in http://reports.weforum.org/toward-the-circular-economy-accelerating-the-scale-up-across-global-supply-chains/the-limits-of-linear-consumption

And, troubling for companies seeking to control manufacturing costs in highly competitive markets, the upward trends in price and volatility are expected to continue due to a number of overlapping supply-and-demand trends.

Dwindling Supplies

As indicated in the graphic below, supplies of many non-renewable substances are dwindling.

Figure 6: Permanent Global Natural Non-Renewable (NNR) Shortfall (by 2030) Probability Summary[10]

Nearly Certain Probability (5)	Very High Probability (8)	High Probability (11)	Low Probability (3)
Cadmium	Cobalt	Chromium	Bauxite
Gold	Lead	Coal	REM
Mercury	Molybdenum	Copper	Tin
Tellurium	PGM	Indium	
Tungsten	Phosphate Rock	Iron Ore	
	Silver	Lithium	
	Titanium	Magnesium Compounds	
	Zinc	Natural Gas	
		Nickel	
		Oil	
		Phosphate Rock	

Corporate Practices

Case in point: starting in 2017, Tesla's giga-factory will double the electric batteries manufactured today and will consume very large quantities of cobalt, graphite and lithium.[11]

Population Increases

McKinsey estimates that – by 2030 – 3 billion people will enter the middle class, draining further the world's supply of metals and other commodities that are commonly used in the heavy equipment and related industries.[12]

[10] http://www.resilience.org/stories/2010-04-06/increasing-global-nonrenewable-natural-resource-scarcity%E2%80%94-analysis

[11] http://www.visualcapitalist.com/inside-teslas-5-billion-gigafactory

[12] http://www.mckinsey.com/insights/energy_resources_materials/mobilizing_for_a_resource_revolution

Geopolitical Risks

Case in point: Rare Earth Elements (REE).

The 17 REEs have been inappropriately named, because sizeable reserves have been identified. The issue is that – with its low-cost operations - China has cornered the REE market, today producing 96% of the world's REEs.[13]

As a result, China carries disproportionate weight in the world REE market and the industries (wind turbines, hybrid vehicles and many others) that depend on them. For example, in 2010, China lowered its exports of REEs by 72%, which impacted REE-using manufacturers. It also temporarily cut all REE exports to Japan, allegedly over a maritime dispute.

Implications of Material Shortages, Cost Increases and Rising Volatility

Liebig's Law – or the Law of the Minimum – states that "…growth is controlled not by the total amount of resources available, but by the scarcest resource."[14]

Originally applied to agriculture, it is equally applicable to manufacturing.

Today, governments are deeply concerned about the implications of Liebig's Law in regard to the future of substance and material supplies for the industries that are the backbone of their civil societies.

In that regard, in 2013, the US House of Representatives passed the National Strategic and Critical Minerals Production Act of 2013, and the US Senate introduced the Critical Minerals Production Act of 2013. In the EU, the first criticality analysis for raw materials was published in 2010 by the Ad-Hoc Working Group on Defining Critical Raw Materials and was updated in 2013.[15]

For manufacturers and suppliers whose products incorporate many thousands of materials and many hundreds of substances, Liebig's Law could have very direct consequences.

Furthermore, the two historic solutions to material shortages seem inadequate to today's situation.

[13] http://fas.org/sgp/crs/natsec/R41744.pdf

[14] http://www.oxfordreference.com/view/10.1093/oi/authority.20110803100104700

[15] http://ec.europa.eu/enterprise/policies/raw-materials/critical/index_en.htm

Technological advances like 3D printing and bio-based materials are promising. However, none of these or other technologies can scale up soon enough to supplement the growing industrial and consumer demand for materials – especially in emerging economies like China and India.

Plus, the discovery of scalable innovative material substitutes also seems unlikely in the timeframes before increasing shortages further impact economies and companies.

In that regard, a 2013 report in the Proceedings of the US' National Academy of Sciences found that – of 62 metals studied - none had "…exemplary substitutes available for all major uses."[16]

What seems more likely is that the potential for future shortages in gold, manganese, indium, REE or any other metallic or non-metallic substance, will be increasingly incorporated into corporate risk management practices.

Additionally, the ability to own, control, take-back, re-use and recycle materials will become increasingly important to manufacturing firms.

In that regard, Extended Producer Responsibility regulations are a perhaps surprising driver towards a solution to material shortages.

Namely, WEEE, Packaging and other EPR directives are legislatively driving the end-of-life take-back programs that, if properly approached, can help companies to control their material costs.

Similarly, ELV, RoHS, REACH and similar laws are legislatively driving the reduction of toxic substances in products, which will make disassembly, re-use and remanufacturing more cost-effective. More importantly in terms of the Compliance Value Proposition, they are also driving industries towards Full Material Disclosure, which is arguably the most important key to unlocking the Compliance Value Proposition.

Part One Summary: *The evolution of global Extended Producer Responsibility regulations and the increase in commodity prices and volatility are two aspects of today's business landscape. They are both key drivers that make possible the Compliance Value Proposition: the portfolio of revenue-generating opportunities that – along with cost-reductions – allow manufacturing firms to leverage their compliance activities, enhance their profitability and strengthen their competitive position.*

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[16] http://www.pnas.org/content/early/2013/11/27/1312752110.full.pdf+html

PART TWO: THE KEY TO CAPITALIZING ON THE COMPLIANCE VALUE PROPOSITION IS FULL MATERIAL DISCLOSURE

Substance Data and the Compliance Value Proposition

Financial data…sales data…production data: optimizing decisions for business success requires many kinds of business-related data.

In today's regulatory landscape, manufacturing firms also need complete and accurate substance data in order to adjust to the business-landscape trends discussed earlier: namely, 1) to meet the legal reporting and use requirements for REACH, RoHS2, Conflict Minerals and other EPR regulations and related business requirements, e.g. GHG and water usage, which are now being collected in the automotive industry; and 2) as discussed below, to help assure a steady flow of materials at a time of material shortages and price surges.

The more substance data that companies collect from their internal systems, external suppliers and public sources, the closer they approach Full Material Disclosure (FMD). As a reminder, the definition of FMD is: "While respecting legitimate Confidential Business Information, the ability of manufacturers to identify, document, evaluate, trace and update every substance in every material, part, alternate part and sub-assembly in the products they manufacture and the processes used to manufacture them."

As companies approach closer and closer to FMD, they collect an ever-more detailed library of information in regard to the substances that they and their many thousands of primary and secondary suppliers have incorporated into their products and manufacturing processes.

This data includes substance names, locations, concentrations, uses, original sources, geographies where substances were utilized, exposure routes, safe handling methods and more.

It also includes the names and concentrations of substances integrated into products via manufacturing processes like electroplating, molding, joining and others. It includes the identification of substances by the material manufacturer, who incorporates the substance into the products it formulates and sells.

Now, with FMD or close to it, companies are able to unlock the portfolio of revenue-generating and cost-cutting opportunities that, together, comprise the Compliance Value Proposition.

CVP and Revenue-Generating Activities

Today, very few companies approach FMD. To appreciate how FMD can help to unlock the Compliance Value Proposition and generate incremental revenue, it is a useful exercise to project several years into the future.

Let's assume that – except for Confidential Business Information - your company has achieved FMD and has used that comprehensive substance data in a variety of ways to generate revenue, several of which are very briefly described below.

Product Sales Opportunities

One emerging aspect of today's business landscape is the need for manufacturing firms to routinely ship substance data in products along with the products themselves.

In that regard, let's say that your non-EU company ships both its products and the associated substance data to your EU importer, who, under REACH, has legal responsibility for placing those products on the EU market.

At the same time, your competitor has not come close to achieving FMD and fails to ship substance data along with its products. In this scenario, as a trusted supplier, you are poised to win new business from your customers and from others, who learn that you can document the substances in your products and reduce their risk of penalties from non-compliance.

Scrap Sale Opportunities

Manufacturing processes typically generate scrap. With FMD, your company can sort that scrap in a more granular way, e.g. identifying scrap steel with differing amounts of chromium or nickel. Since sorted scrap is more valuable than mixed scrap, tracking the spot market price for the various alloys enables your company to sell its scrap for the highest price possible.

End-of-Life Sale Opportunities

Armed with FMD, your company can also generate new or incremental revenue from a range of rapidly growing revenue opportunities associated with end-of-life products.

Re-manufacturing Sales

Re-manufacturing is an established business model that dates back to the 1940's and represents 2% of today's overall manufacturing revenues.

Especially in durable-goods industries, re-manufacturing provides companies with a flow of materials, components and assemblies that can be repaired or replaced at a far lower materials-and-energy cost than virgin materials. FMD contributes to re-manufacturing by documenting materials and parts that are free of toxic substances and therefore more likely to be repaired or replaced. In so doing, FMD assists in generating incremental revenues from existing and new customers, who buy remanufactured products at reduced prices.

As an example, Renault's remanufacturing plant near Paris generates $270M annually. A World Economic Forum report indicates that, while more labor is required than making new parts, "… there is still a net profit because no capital expenses are required for machinery, and no cutting and machining of the products, resulting in no waste and a better materials yield."

> **"…the profitability of Choisy le Roi is far higher than the average profitability of Renault's industrial sites."** [17]
>
> — Philippe Klein, Renault's Executive Vice President, Product Planning, Programs & Light Commercial Vehicle Division

Recyclable Materials and Parts Sales

With today's advanced collection and separation systems, there is a growing market for recyclable parts and materials that can't be re-used. Today, metals represent the best recyclable sales opportunities. Over time, there will be greater demand for recyclable plastics, ceramics, textiles and other materials as well.

Future Sales Opportunities

Longer term, companies like Maersk are identifying every substance in their new ships. In several decades when those ships reach their end-of-life, Maersk will be able to determine the market value of disassembling the ships and reusing the metals vs. selling them on the open market.[18]

[17] http://reports.weforum.org/toward-the-circular-economy-accelerating-the-scale-up-across-global-supply-chains/the-limits-of-linear-consumption/#/view/fn-10

[18] http://www.bagreborn.com/2014/06/27/seeking-out-design-for-a-circular-economy/

Leasing Opportunities

In 2012, more than a half trillion dollars was generated leasing everything from hay balers to helicopters.[19] But leasing is not only a financing model to generate revenue. In a growing number of industries, it is also a strategy for taking back, disassembling and re-using equipment in order to reduce material costs and to lock-in customer engagement, e.g.:

- Michelin leases the tires on more than 290,000 EU commercial vehicles
- Tandus Centiva leases commercial carpets and re-uses carpet fibers
- Philips leases "lighting services" to control materials like copper and their associated costs

Knowing the substance content is important to taking full advantage of these opportunities.

Marketing Opportunities

If your company has achieved FMD, it can document the presence or absence of any declarable substances, e.g. substances that are within scope of China RoHS, Korea REACH or the Canadian Environmental Protection Act. Furthermore, it can target products to specific markets, and it can implement end-of-life strategies that allow maximum product lifespan.

Additionally, this accurate and complete documentation allows your company to launch "REACH-Compliant," "RoHS-Ready," Operator-Safe" or "Conflict-Mineral Free" marketing campaigns. This enhances efforts at brand and company imaging for increased market penetration.

Eco-Design Opportunities

As companies collect increasingly accurate and complete data, they can proactively design products that drive sales because they require less energy, contain fewer toxins, have lower environmental impacts or reduce customers' total cost of ownership. These factors also provide lower cost of manufacturing over the long term. In turn, these eco-parameters drive sales by appealing to the growing number of governmental, business and consumer customers who demand better, safer, "greener" products.

Eco-parameters are also likely to lower the total cost of ownership for products, thereby incenting customers to choose these products over competitors' offerings.

[19] http://www.slideshare.net/pk18july/the-history-of-leasing

CVP and Cost-Cutting Activities

In addition to the revenue opportunities from FMD described earlier, there are also many cost-cutting opportunities, several of which are briefly described below.

Costs of Compliance

To comply with REACH, Conflict Minerals, RoHS and other EPR regulations, companies must collect, evaluate, trace, exchange and update data.

While there are costs associated with those activities, arguably, 70% of today's compliance costs are directly tied to re-work activities that become necessary when data-entry specialists are poorly trained; when data is inaccurate and/or incomplete; when there is no standardization of data forms and data structures; and when there is no common data exchange system or systems that can flexibly incorporate requirements from current and future data sets.

Approaching FMD makes it possible for companies to substantially reduce their compliance costs because – with FMD – they can integrate their disparate compliance activities with multiple individual regulations into a Regulatory Compliance Management Process (RCMP).

Similar to their Quality process, an RCMP enables the "Do It Once. Do It Right" approach that routinizes compliance and reduces its associated costs.

In the same vein, an RCMP makes it easier and more cost-effective to comply with new regulations and/or upgrades to existing regulations. For example: if, as is widely anticipated, the EU updates REACH and incorporates the "Once An Article, Always An Article" basis for compliance, companies will be prepared to meet this new, more stringent requirement with minimal additional effort.

Similarly, an RCMP reduces the cost of identifying declarable substances in your products when, e.g., under REACH, new substances are added to the Substances of Very High Concern (SVHC) Candidate List for Authorization, the Authorization List and/or the Restrictions List.

And an RCMP will reduce the costs of compliance when new regulations are introduced that require information on new data sets, e.g. energy, water and greenhouse gases. Today, these data sets are already being gathered and reported by OEMs and many direct suppliers. As governments seek to further reduce their health care and environmental costs, it is highly likely that they will enact legislation requiring these additional data sets as well.

Sourcing Cost-Cutting Opportunities

As material costs continue to increase in both price and volatility, FMD provides companies a range of cost-cutting opportunities. For instance, if the price of material X is rising because of dwindling supplies, companies can identify and implement alternatives, or they can proactively accumulate needed supplies. Similarly, if the price of material Y is rising due to short-term geo-political risks in a particular area of the world, companies can source material Y from other geographies.

End-of-Life Cost-Cutting Opportunities

By enabling more efficient take-back programs, re-manufacturing and recycling capabilities, FMD can substantially reduce the cost of obtaining virgin materials.

Varied Function-Related Cost-Cutting Opportunities

In addition to the cost-cutting opportunities mentioned above, there are many other opportunities related to corporate functions. Below is a representative sample of them.

FUNCTION	ACTIONABLE DECISION
Procurement	Select suppliers based on the cost and availability of substances they incorporate into their parts
Manufacturing	Phase out newly-identified SVHCs, thereby reducing the risk of employee lost-work time, health care costs and lawsuits
R&D, Design	Proactively eliminate substances in new products that could incur price spikes or regulatory risks
Compliance	Reduce or eliminate reliance on external consultants and trainers for data collection and evaluation activities
Marketing	Ensure market access by proactively identifying substances that could trigger product bans, fines and penalties
Legal	Reduce time spent determining compliance risks, requirements and defenses
IT	Reduce costly reliance on “compliance” software tools and integration services

Part Two Summary: *In today’s business landscape, collecting accurate and complete substance data is as much an opportunity as it is a requirement. The more substance data a company has, the more it can leverage that data to increase its revenue and to reduce its costs.*

PART THREE: IMPLEMENTING FULL MATERIAL DISCLOSURE AND THE COMPLIANCE VALUE PROPOSITION

Evolution of Compliance Complexity

The complexity of addressing today's worldwide web of EPR directives is unprecedented.

The modern era of environmental regulations began with 1970s "end-of-pipe" environmental regulations (Clean Air Act, Clean Water Act). To comply with them, companies typically acted on their own.

Today, however, complying with EPR regulations requires the cooperation of many thousands of companies throughout the supply chain who – in addition to supplying products to their customers – must now also supply substance data about those products.

These companies range from multi-national giants to small family firms. They are geographically dispersed. They speak different languages. And they vary widely in their ability to implement and fund data-collection activities for regulatory compliance.

Coordinating all these firms into a "well-oiled machine" requires several advances that are on the horizon and that are described below.

Evolution of Methods for Exchanging Substance Data

Looking retrospectively, a great deal of effort has been made in developing a substance-data infrastructure that enables cooperation between thousands of suppliers and customers.

For example: many companies have developed in-house data collection forms that they required their suppliers to complete.

Industry associations advanced the data collection process with their industry-developed standards and forms.

And private firms have developed data structures, material classifications and software tools that addressed critical aspects of the data collection process and that integrated with corporate ERP and PLM systems.

However, after nearly two decades of data collection attempts, the reality is clear: compliance with ELV, Conflict Minerals, REACH and all the other current and future EPR regulations cannot be achieved through the highly fragmented portfolio of forms, formats, classifications and tools that are in use today.

On the contrary, what is required is something unique and unprecedented: namely, a common data structure and a highly flexible common data exchange system (or several systems) that:

- Key companies within a major industry have evaluated and consensually agreed upon
- Are affordable and easily accessible to all companies in the supply chain, including even the smallest family firms
- Are maintained by a "disinterested third party" that doesn't engender resistance to the common data structure and common data exchange system(s) by using them for additional private gain
- Allow companies to accurately and consistently portray and roll-up the substance data in their products
- Preserve the business confidentiality of substance data and the companies who supply it
- Routinely and cost-effectively enable companies to exchange substance data; to approach Full Material Disclosure; and to unlock the many cost-saving and revenue-generating opportunities that comprise the Compliance Value Proposition (CVP)

To date, the automobile industry's data exchange system represents the greatest progress in achieving Full Material Disclosure through the implementation of a common data structure and data exchange system. Today, more than 100,000 companies are registered on the system. Created approximately 15 years ago to meet the requirements of just one directive – ELV – it is not equipped to meet the multiplicity of requirements from the many EPR directives that have been enacted since then. Furthermore, it is not equipped to handle other industries' reporting needs.

At the time of this writing, AEM is in the process of bringing together key industry companies to evaluate a range of platforms that might serve as a common data exchange for the entire industry.

A consensual decision on one or several systems is likely in Q2, 2015. Once a decision is made, it is expected that a similar collaborative effort will evaluate and recommend enhancements to a new common data structure so that it will serve the industry for the foreseeable future.

The results of these consensual efforts will be made available to the heavy equipment and other durable-goods industries, along with a likely recommendation to utilize the consensually-agreed upon data structure and data exchange system as the vehicles for exchanging substance data, approaching Full Material Disclosure and unlocking the CVP, while protecting confidential business information.

In addition, those results will be incorporated into AEM's MAP program; specifically, the how-to sections of its affordable and engaging REACH, Conflict Mineral and RoHS compliance trainings for OEMs and their multi-tiered suppliers. In general, these regulatory compliance training programs accomplish what has typically been missing in past tools-training, i.e. they educate data collection staff about why substance data is so critical…about the importance of material classifications…and much more, as well as the specific methods and mechanics for collecting the data before the data is generated. This, along with integration of the RCMP, is a unique approach that will benefit the entire supply chain.

Benefits of Implementing a Common Training Platform, Common Data Exchange System(s) and Common Data Structure

As the common data structure, data exchange system(s) and training platform are implemented over the next several years, it is expected that companies throughout the supply chain who utilize them will benefit in a variety of ways that reduce the time-and-cost of compliance, as well as improve their ability to use substance data as a revenue-generating asset.

To cite just a few of these benefits, companies will have a predictable, low-cost method for requesting, receiving and sending substance data to their customers in multiple industries.

They will be able to "do it once and do it right," thereby reducing substantially the amount of re-work and its associated costs.

AEM's common training platform is electronically hosted within a third-party learning management system. With the integration of training-completion information into data submissions, companies will know which parts came from suppliers who have completed specific training programs. While protecting the names of their suppliers' suppliers, companies will also know the number and percentage of those lower-tiered suppliers, who have completed the training. As a result, companies will have greater confidence that the substance data they receive is accurate and complete.

By using a common data exchange platform, companies will be far better able to trace their data back through the supply chain all the way to the materials manufacturer that incorporated the substances. This traceability will improve companies' ability to document substances, comply with legislation and reduce regulatory-related financial risks. It further provides an expedient way for materials manufacturers to update the data when they are required to declare additional substances.

From another perspective, consider a materials manufacturer who protects the identity of polymer-based additives. If one of those additives is identified as an SVHC under REACH and is now declarable…and if the material manufacturer changes its formulation to eliminate the new SVHC… the materials manufacturer can use an automated process to notify all companies on the data exchange system that it has a new formulation or that it is declaring the additive substance. Either way, the time and complexity of notifications to the supply chain are reduced.

Using a common data structure, companies with ERP, PLM and/or LCA systems will be able to integrate the substance data into those systems for better product design, process control and decision-making. Once FMD becomes a reality - with a standard data format and a process for generating the data - the ability to use the integrated LCA data to compare supply chains and products will also become a reality. The potential long-term advantages along supply chains may be enormous.

With these three pieces in place, companies will be able to routinely and cost-effectively comply with future regulations, customer requirements and new data sets along supply chains - without the crisis management we are experiencing today.

Part Three Summary: *a common data structure, common data exchange and common training platform will make possible – for the very first time – the achievement of full material disclosure within a very deep industrial supply chain. In turn, FMD will unlock the cost-saving and revenue-generating possibilities that underscore the Compliance Value Proposition for companies throughout the heavy equipment and related industries.*

CONCLUSION

Today, durable-goods industries operate in a business landscape characterized by a growing web of product-oriented regulations and a surge in commodity pricing and volatility. While these regulations and surges result in greater financial risks to companies, they also converge in a manner that opens cost-reduction and revenue-generating opportunities.

To take advantage of these opportunities, forward-thinking firms are implementing a Regulatory Compliance Management Process that integrates their compliance activities; enables them to meet their current and anticipated future regulatory requirements; reduces their compliance costs; and turns “compliance” into a routine business process.

Additionally, forward-thinking companies are leveraging their compliance activities to generate sales, marketing, sourcing, end-of-life and other revenue streams, thereby making compliance a value-added proposition.

As part of its Market Access Pathway (MAP) program, AEM is spearheading the development of a cross-industry data exchange system and data format, as well as a low-cost training platform that can be utilized by multiple-tier supply chains. Collectively, these activities assist cross-industry firms and their supply chains in capitalizing on the Compliance Value Proposition, enhancing their profitability and strengthening their competitive position.

REFERENCES

RSJ Technical Consulting

RSJ Technical Consulting specializes in “Do It Once. Do It Right.” compliance with product-oriented regulations. For more than a decade, it has provided consulting, training and managed substance-data services for automotive and heavy equipment OEMs and suppliers. The firm is also a consultant to AEM’s Market Access Pathway program.

AEM

AEM is a trade association that provides services on a global basis for companies that manufacture equipment, products and services used worldwide in the following industries: Agriculture, Construction, Forestry, Mining and Utility. AEM’s membership is made up of more than 850 companies and represents 200+ product lines.

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