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Eric Johnson

Sustainability in the Chemical Industry

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Eric Johnson
Atlantic Consulting
Obstgartenstrasse 14
8136 Gattikon (Zurich)
Switzerland

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Abstract Sustainability programs have been adopted by many large, publicly-owned chemical companies in Europe, Japan and the US, and even by large companies in China and India. These programs aim to improve the industry's image and public trustworthiness, which sank to historic depths in the late 1980s or early 1990s and are still relatively low. In practice, sustainability is about public relations, which has been renamed stakeholder relations, and risk management.

This book reviews the history and status of sustainability programs in the chemical industry. At its core is a survey of the world's 29 largest chemical companies – how they do or do not put sustainability into action. (Six of the 29 do not put it into action, as the book explains.)

It also covers: how academics, investors and the general public define sustainability (their definitions differ from the chemical industry's); sustainability's brands as well as its limitations, and the problem of 'greenwash'. It answers the questions: is sustainable necessary, does it pay, and is there a non-sustainable option? Finally, it recommends some guidelines for companies adopting or expanding sustainability.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image

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Chapter 1
Foreword: Why this Book?

Abstract This desire to research and write this book grew out of the author's long-standing interest and involvement in the chemical industry as a journalist and analyst. A review of existing literature showed major gaps in public knowledge of this topic, which led to the determination that further study is needed.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image • Literature review

"The public is challenging our license to operate." These were the words a senior executive at ICI – once a colossus of the chemical industry – uttered to the this book's author in the late 1980s, not long after the 1986 "Schweizerhalle" fire that had killed so many fish in Europe's River Rhine. Not unlike the 1969 fire in Ohio's Cuyahoga River that had galvanized American opinion, the Schweizerhalle disaster convinced many Europeans that "something must be done" about the environment. It also nominated a group to be tarred – rightly or wrongly – with the blame for nature's demise: the chemical industry.

How could it have come to this? Not so many years earlier, the chemical industry was cool. "Hi-tech" meant not iPads or Web 2.0, but processes such as Oxirane or Ziegler-Natta. "Better living through chemistry" was said proudly, not ironically. So, as both a chemist and an observer of the industry, I (the author) began to study corporate social responsibility, or sustainability. Both terms hardly existed at that point, but the concepts most certainly did.

In 2009 I finally found the time and budget to pursue the topic more deeply; this book is the result. What I found at the start – outlined below in this chapter – was a mish-mash of research. Perhaps most striking was that variability of the word "sustainability". Less striking (when one considers human nature) was the virulence with which some defend their definitions. When I suggested that sustainability was a form of public relations, some research colleagues were irked to the point of fury.

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My conclusion was that for the chemical industry,[1] sustainability or corporate social responsibility would best be defined empirically, by an examination of what leading companies actually do, rather than by a summation of what the literature says. This chapter presents that review and conclusion; the next chapter introduces that empirical investigation, which is the heart of this book.

1.1 Review of Existing Literature

To anchor this book in the literature, a survey was conducted of the academic literature on sustainability in general and in the chemical industry in particular. Summaries of the relevant papers are presented with the author's reaction following.

Clearly there are divergent views, but there are also a number of nuggets that are further developed in the course of the book.

1.1.1 The Poor Image of the Chemical Industry

Yes, the chemical company sometimes has a poor image. As this text [1] notes: "An experienced (European Union) parliamentary employee summed it up: 'The reputation of pesticide producers hovers somewhere between that of al-Qaida and seal killers.'"

He further notes that "Major producers such as Syngenta, BASF and Bayer have not succeeded enough in counterbalancing with objective arguments the emotional headlines generated by environmental NGOs about 'poison cocktails' in our food. As the political debate unfolded, global prices for corn, soy and wheat climbed to such dizzying heights that the United Nations had difficulty financing its World Food Programme – the perfect lead-in, really, for the argument that pesticides protect and increase harvests. And yet, the argument that pesticides make a significant contribution to feeding the world's growing population made little headway in the political debate. For, environmental groups are skilled at emotionalising political issues, as they did in Brussels. Testing fruit and vegetables sold at the supermarket in the European Parliament for pesticide residue ensures journalists' attention just as much a study on pesticides in wines. That the residues found were almost without exception below the statutory threshold, and thus harmless, was only mentioned in the details."

Reaction: The "al-Qaida" comparison is witty, but overdone. Still, it shows that the chemical industry has an uphill battle to win over public opinion.

[1] And probably for other industries as well, but this is the one I know best.

1.1.2 Sustainability as Public Relations

Applying a sustainability element to public relations will be critical to successful practice [2], contends the author, a specialist in the field.[2]

Reaction: This simple finding is critical, in that sustainability programmes are, by some, dismissed as "public relations". As this book shows, the characterization is accurate, but the dismissal is unwarranted. Indeed, if anything, sustainability (and corporate responsibility) show that a good PR department (or communications department) is more necessary than ever – regardless of what label it uses to identify itself.

1.1.3 Sustainability and the License to Operate

Cigarette companies have been major players in corporate social responsibility, often labeled as sustainability. This paper [3] presents a detailed, well-written history of their public-relations history, from trying to discredit and bury reports labeling smoking as harmful to opposing advertising restrictions. It concludes that "While CSR activities normally aim at gaining public respect, reputation or even admiration, tobacco companies have to accept that they are fighting on a different legitimacy battlefield. They are fighting for the mere right to exist. The tobacco industry finds itself on the lowest level of public acceptance and the lower the perceived legitimacy of a corporation the more skeptically its legitimation attempts will be observed by its relevant publics. Our analysis demonstrates that mainstream CSR efforts will hardly contribute to legitimize tobacco companies. Obviously, societal acceptance has to do with some basic trustworthiness of the corporation. Starting from a very low level of trustworthiness, tobacco companies see their CSR efforts exposed to a much greater scrutiny and a much higher level of negative expectations than companies in other industries. As demonstrated, these negative expectations work against mainstream CSR aspects and they are partly confirmed by the seeming continuation of former patterns of behavior. Can tobacco companies be good corporate citizens? Perhaps they can, but not by imitating mainstream ideas on CSR."

The same lead author picks up the issue again, this time with a different co-author [4], which he terms "organizational legitimacy" (i.e. the right to exist). The second paper is far more dense, theoretical and abstract.

Reaction: as well presented as the tobacco paper is, the conclusion seems flawed. "They are fighting for the mere right to exist" – so too, from time to time, are companies in the chemical industry. The idea that industries such as tobacco, alcohol, armaments, nuclear power or gambling are not part of "sustainability" or "corporate social responsibility" is backwards – in some ways, they are at the forefront.

[2] In the German-speaking world, the label "public relations" has not (at least yet) been turned on its head as it has in the English-speaking world. In the latter, "PR" is just as likely to be an epithet signifying spin and lies as it is to represent professional communications.

1.1.4 Sustainability as Religion

At some US universities, sustainability is preached by "sustainabullies" rather than taught, while heretics and backsliders are demonized [5]. For example, the author notes the Dartmouth Energy Pledge. "By signing the pledge, participants agree to take simple actions that, collectively over time, will have a discernible impact on the amount of energy we consume and greenhouse gas emissions we produce… These are small and simple changes, but until we make them we are still wasting precious energy."

Reaction: although the paper takes on tones of a paranoid rant, there is a valid point at its core. Campuses have always been (and probably always will be) radical minded. To call them "totalitarian" seems a bit of a stretch, but the idea of sustainability as religion is illuminating.

1.1.5 Sustainability Chartas

Over the years, a number of sustainability chartas have been produced, such as the "Sanborn Principles" or the "Hannover Principles". A number of them are profiled here [6].

Reaction: it is useful to know about these, but there is an unmistakable whiff of unintentional greenwash to them (that the author seems not to notice). It is not obvious that any of these charta have produced tangible results – other than the chartas themselves.

1.1.6 What Is Sustainability Reporting?

The basics of reporting are presented here [7], not for a specific sector but for industry in general.

Reaction: this is a useful review for readers not familiar with the topic.

1.1.7 GMO Introduction in Brazil, Thanks to Sustainability?

The introduction of genetically modified organisms to Brazil [8] was pioneered by Monsanto and DuPont, although this article focuses mainly on DuPont's lobbying, which it tellingly characterized as "corporate social responsibility". The paper gives at length a history of DuPont, of its business in Brazil and of the back-and-forth lobbying (between the industry and GMO opponents) that has ended in permission of GMO use.

Reaction: the documentation is interesting, but it leaves absolutely unclear the actual effect of DuPont's lobbying. It would be particularly interesting had the author contrasted the situation in Europe, where the introduction of GMO failed.

1.1.8 Sustainability Is Global and Local

The authors compare sustainability communications in Australia and Slovenia [9], finding that there are some global issues reported both places and some local issues that are emphasized in one more than the other. So they recommend that reporting guidelines (such as the Global Reporting Initiative) be flexible enough to allow for this variation in emphasis.

Reaction: As a long-time journal editor[3] I am accustomed to national comparisons that are rather artificial in design. Why Australia and Slovenia? Probably because the two authors are from those two places. Their findings are unremarkable.

1.1.9 Varying Definitions of Sustainability

This has been developed by a number of authors.

1.1.9.1 Corporate Social Responsibility Is Ill-Defined

According to a search covering the literature from 1970 to 2008 [10], the major gap in "CSR research is the absence of a single, agreed definition of the term CSR among researchers and practitioners even after a lapse of more than four decades since the emergence of the concept of CSR. The absence of clear definitional framework has become an impediment, causing slow progress and wrong interpretation of results in CSR area."

Reaction: This confirms what anecdotal evidence already suggested. CSR and sustainability mean very different things to different audiences, even to the researchers who study them.

1.1.9.2 Sustainability Is Left-Wing Politics

Sustainability is the heir to Rachel Carson, Paul Ehrlich and Barry Commoner, the vanguard of "The New Left", contends this paper [11]. Indeed, the tradition dates back further, he says. "For many of its proponents, the sustainability movement

[3] Of Environmental Impact Assessment Review.

continues a long American tradition encompassing the simple rural virtues extolled by Thomas Jefferson, the romance of nature sung by Henry David Thoreau, the wilderness movement inspired by John Muir's walks into the High Sierras, the national forestry policies crafted by Gifford Pinchot, and the robust outdoorsmanship exemplified by Teddy Roosevelt and the Boy Scouts. "Sustainability" connects to these antecedents, but has more direct roots in the turbulence of the 1960s and early 1970s, when middle-class reform mingled with upper middle-class radicalism. Moderate initiatives such as the civil rights movement, mainstream environmentalism, and the Great Society clashed or combined with the anti-Vietnam War movement and the campus based New Left and revolutionary student movements. All of these in turn blended with the nihilistic, antinomian popular youth culture of the Woodstock generation."

Reaction: this is a very broad ancestry, and not necessarily helpful. As this book shows, sustainability is more about two issues that are not "right" or "left" as such. Stakeholderism is advocated (and dismissed) across the political spectrum. Environmentalism has become a mainstream issue since the 1970s–1980s.

1.1.9.3 Sustainability Is Pollution Control and Conservation

Sustainability in industry, says this author [12], consists of controlling three things: contamination through the manufacturing process of the air, water, and soil; waste production during the manufacturing process; and resource consumption. A number of case studies are presented, whereby companies reduced emissions or waste.

Reaction: many would call this pollution control and efficiency, rather than sustainability.

1.1.9.4 Corporate Responsibility Is Sustainability

After making this initial assertion [13], the author goes on to outline a very abstract view of corporate responsibility. What are the managerial implications? "For creating an environmental strategy, this chapter suggests that business leaders and managers first adopt shared environmental values within the company. This enables the firm to then act and communicate its actions accordingly without being accused of green washing. After adopting the environmental values, actions and words in the single firm system level, the next challenge is to align them on the supply chain system level. In order to have a successful environmental strategy values, actions and words must be aligned, and therefore it is vital that managers, leaders and academics identify the strategy approach at issue. Alignment of values, actions and words enhances immunity to errors as the mismatch is likely to affect corporate success negatively. For maintaining and enhancing competitive advantage, the instrumental strategy is propounded, whereas for detecting and creating new competitive advantage, the awareness strategy is propounded."

Reaction: The premise is agreed, but much of this might suit a philosophy text.

1.1.9.5 Three Pillars of Sustainability

Written by a former senior manager at Hoechst [14], formerly one of Germany's largest chemical companies,[4] the author says that sustainability must be economic, social and environmental – some call this the "triple bottom line". He hints but does not elaborate much on the idea that much can be done with accounting techniques such as life-cycle assessment and social accounting.

Reaction: this view is generally accepted in the chemical industry, but still sorely lacking is a way to judge actual sustainability in any of these areas. Hoechst no longer exists: does that mean it was unsustainable?

1.1.9.6 An Academic View and Critique

The author starts by pointing out that there are more than 300 definitions of sustainability [15]. He then takes us on a winding discourse of perhaps a dozen of these, concluding that "conceptions of sustainability are unsatisfiable. The hard fact is that consumption, utility, welfare, well-being, abilities to meet needs, opportunities, and capacities sometimes decline. Herman E. Daly points out that we cannot bequeath utility to the future; we can only bequeath opportunities. It is up to future generations what they make of them. But utility, well-being, etc., decline for many reasons in addition to missed opportunities 35 Tornadoes strike. Earthquakes knock down buildings. Wars break out. Recessions happen. People get old. People make mistakes. These are unfortunate events, but a principle that demands that we avoid them cannot be satisfied. One might as well direct people not to make mistakes, not to grow old, and not to die. All those things would be good, but we cannot, at present, anyway, achieve them."

Reaction: Yes, academic definitions of sustainability are varied and examples of it might be impossible to prove. As this book will show, sustainability – as defined by the chemical industry – is substantially different to the academic definition.

1.1.9.7 Sustainability Science: 1

The author sees a new field of "sustainability science", which is a matter of efficiency and measurement [16].

Reaction: Yet another view, once again rather vague.

1.1.9.8 Sustainability Science: 2

Sustainability science, says this author [17] "includes the following components: goal setting, indicator setting, indicator measurement, causal chain analysis, forecasting,

[4] Along with BASF and Bayer.

backcasting, and problem–solution chain analysis." It addresses broad topics such as climate change, forestry, fishery, and energy conservation.

Reaction: this is hardly a science.

1.1.9.9 Sustainability Seen Similarly as in this Book

According to the author [18], CSR is made up of three broad layers:

- The most basic is traditional corporate philanthropy.
- The second layer of CSR is a branch of risk management. Starting in the 1980s, with environmental disasters such as the explosion at the Bhopal pesticide factory and the Exxon Valdez oil spill, industry after industry has suffered blows to its reputation. Big pharma was hit by its refusal to make antiretroviral drugs available cheaply for HIV/AIDS sufferers in developing countries. In the clothing industry, companies like Nike and Gap came under attack for use of child labour. Food companies face a backlash over growing obesity. And "Don't be evil" as a corporate motto offers no immunity: Google was one of several American technology titans hauled before Congress to be grilled about their behaviour in China. So, often belatedly, companies respond by trying to manage the risks. They talk to NGOs and to governments, create codes of conduct and commit themselves to more transparency in their operations. Increasingly, too, they get together with their competitors in the same industry in an effort to set common rules, spread the risk and shape opinion.
- The emphasis on opportunity is the third and trendiest layer of CSR: the idea that it can help to create value. In December 2006 the Harvard Business Review published a paper by Michael Porter and Mark Kramer on how, if approached in a strategic way, CSR could become part of a company's competitive advantage. That is just the sort of thing chief executives like to hear. "Doing well by doing good" has become a fashionable mantra.

Reaction: the article takes a similar view to that of this book. However, as an article, it is not detailed, and it does not focus on the chemical industry.

1.1.10 Don't Just Talk to Stakeholders, Listen to them, too

While this book chapter starts with a useful review of risk communication [19], it concludes that communication should be not just 1-way, but 2-way, that communication should be part of management and that risk should be taken seriously. A similar chapter [20], after an introduction of risk governance, counsels the same.

Reaction: the first conclusion might be useful to those business people who are relentlessly "on-message" and expect all their colleagues to do likewise. But otherwise this is not particularly helpful.

1.1.11 Dealing with NIMBY by Stakeholderism

The "Not-in-my-backyard" phenomenon, earlier known as "locally unwanted land uses" or LULUs, is well-described in this lengthy paper [21]. It concludes: "Regardless of the specific approach that is taken to siting a locally unwanted facility. current analyses of facility siting conflicts have made clear that greater attention has to be given to the social aspects of the problem. The resolution of siting issues will depend on incorporating into the siting process, in each instance, an element of accommodation to the broader underlying anxieties that fuel siting controversies. Generally, this means accepting the need on the part of potentially affected publics to question a technology's social implications and appropriateness, the fallibility of scientific and technical studies, and the trustworthiness of project proponents and government regulators. This latter point is particularly important. Public resistance to siting proposals involves more than just perceptions of the technology itself, a 'dread' of its potential impacts, risks, and social implications. It also involves the public's perception of the credibility and reliability of proponents, operators, and government regulators."

Reaction: the issues described – from a government planning perspective, of a nuclear-waste disposal site – are similar to those faced by some chemical operators. As this book will show, many companies tend to ignore this "fear factor" in their sustainability campaigns and reports.

1.1.12 Greenwash

1.1.12.1 Stakeholderism Can Be a Ruse

The authors here [22] describe a campaign by the tobacco industry to avoid having cigarettes regulated as a drug in the United States. Smokers were organized to tell "government to get off my back" at rallies and through letter-writing. After 7 years of lobbying and campaigning, the government withdrew its plans, which the authors attribute to the campaign. The authors conclude: "Unfortunately, the tobacco industry's use of front groups is not unique; other industries use front groups to fight measures designed to protect public health. Research on the background and funding of advocacy organizations could help identify industry front groups and make them less useful to their creators."

Reaction: Is this truly a ruse? Why would smokers want to have cigarettes regulated as a drug? Neither do I smoke nor would I encourage anyone to do so, but it is not clear that the proposed rule would have benefitted public health, nor is it clear why smokers and their suppliers should not have spoken up as they did – other than that the authors don't agree with them. There is some parallel here to greenwash, but I find it unconvincing.

1.1.12.2 Sustainability as Disavowal

Sustainability campaigns, such as the American Chemistry Council's "essential-2health" programme, are a disavowal of the truth, contends the author [23]. Disavowal is the official translation of the Freudian term "Verleugnung"; an informal translation would be that the industry is telling half-truths (not the same as outright lying, but similar in intent).

Response: the paper is useful in that it shows the evolution of the US chemical industry's public face. From a "better living through chemistry" approach (Fig. 1.1) that persisted well into the 1960s, the industry has returned to that theme yet again – i.e. pointing out the benefits it provides to society at large. The "Verleugnung" charge rings hollow, however: would the author really expect an industry, any industry, to spend its own advertising money to pillory itself? From the author's point-of-view, surely many, if not most, advertising campaigns are a form of Verleugnung.

1.1.12.3 Sustainability as Fraud

In a paper that starts with urban traffic policy, the author turns it into a dialectic on freedom and justice [24], and concludes that sustainability has taken the place in world thinking that formerly was occupied by the capitalist/socialist struggle of ideology. Among other discursions, he debates the merits of Schumpeterian "creative destruction".

He also questions the desirability of sustainability. To wit: "Would you be happy if, being young and in love, filled with enthusiasm and expectations, your beloved partner replied to your proposal to pursue a lifelong relationship by saying: "It's ok, I think we can have a 'sustainable' relationship and our ultimate goal will be to make it last as long as possible, no matter how we feel and what we do. Hence, don't ask me to change any of my routine and I'm not going to do anything to deal with my possible shortcomings." You would probably not appreciate such a response, unless you were so dejected and your life was so miserable that you couldn't even conceive any real improvement in your gloomy existence. Surely you would prefer a response along the lines of: "Yes, I am going to share my life with you and this relationship will help us both to realize a real improvement in our lives. Together we might even be better off, but what really matters is our emotional fulfilment. Our lifelong relationship will make us better human beings and we will fulfil our personalities and satisfy our everyday needs. We will even contribute to the welfare of others, albeit indirectly. We will pass on appropriate values to our children and we will look ahead to our relationship continuing and flourishing through generations". If we would be happier with the second answer, then why should we accept for ourselves and the rest of the world the dull perspective of "just sustainable" development? Why should we not strive for rewarding, marvellous, brilliant development or, even better, just for "development", without attributes? Admittedly, in real life one should allow that in relationships, after some years, "sustainability" may become the only possible solution for the mere conservation of a family ménage.

Fig. 1.1 A Union Carbide advert from Fortune magazine, 1962

However, even if the main priority is the dull sustainability of the relationship, any family counsellor would suggest to the partners that, in order to muddle through a sustainable relationship, they should find something new to pursue together, make new goals and eventually a new covenant between them."

Reaction: interesting, but far removed from the way sustainability is defined and applied in the chemical industry.

1.1.13 A Path to Sustainability for the Chemical Industry

1.1.13.1 Sustainability Is an EHS Programme

Four employees of Solutia (a spin-off from Monsanto) re-brand the environmental, health and safety programme at one site as sustainability [25]. They "present an account of sustainability related activities at Solutia's (and Monsanto prior to 1997) Indian Orchard (IO), MA, site. The Monsanto pledge is described along with examples of the impacts on IO's operations, employees and community. Descriptions of Solutia's metrics for environmental (i.e., eco-efficiency) and quality (i.e., asset effectiveness management) performance are presented. Two examples from actual operations at the IO site are provided together with some thoughts on their value and applicability towards enhancing sustainability. While the first example focuses on recovering and recycling raw materials (thus lowering the demand for fresh resources), the second example focuses on the benefits of adopting a "global" perspective to solving process challenges. Finally, current efforts at the site (including a plant wide energy utility assessment and thermodynamic footprint analysis) and some gaps in current sustainability practice are briefly described."

Reaction: Calling them sustainable perhaps makes them sound loftier, but these are pedestrian EHS activities.

1.1.13.2 Accounting Is the Answer

The author points to life cycle assessment (LCA) and accounting of ecosystem services [26] as key ways to bring about sustainability in the chemical industry. He adds that sustainability is "wicked". "A wicked problem lacks a definitive formulation, because the formulation depends on the formulator's idea of solving the problem. That this is the case for sustainability is indicated by the existence of multiple definitions representing multiple points of view, none of them being the completely correct one, and the fact that this situation has existed for decades and shows no sign of being resolved. For such problems, there are no right or wrong answers because new facets of the problem often manifest themselves as solutions are found and implemented. However, the answers can be better or worse. An example is the discovery of the indirect effect of land use on biofuel life cycles."

Reaction: This article demonstrates the broad range of thinking about sustainability in the chemical sector, i.e. definitions of sustainability vary considerably.

1.1.14 A 20-Year Path to Sustainability

The Australian chemical industry could transform itself within two decades, say the authors [27], from a "subversive and competitive attitude" with "standardized products" into one that has "partnerships among firms as well as with leading campaign groups" and makes "highly differentiated products aligned with green

consumerism". The path to this transformation, they add, is to be paved with collaboration by industry, government and academia.

Reaction: who would then make the "standardized" products that are the mainstay of the chemical industry? While it could be argued that one company might make such a transformation,[5] it is difficult to see how an entire industry could do so.

1.1.15 Stakeholderism Can Have an Economic Cause

Drawing on the Coase Theorem, the author [28] notes that disclosure can be more cost-effective than regulation. Then he presents numerous examples of companies that disclosed environmental information to the public, sometime more than was legally required. From an economic standpoint, he finds that "More information in not always better. The amount and type of information conveyed is important.

Reaction: this is an economic argument for stakeholderism. Informed regulation is cheaper and more effective than uninformed regulation. However, the case is made from a general economic perspective, i.e. disclosure is good for the economy at large. Whether it is good for individual companies is still debateable, and some of the examples cited suggest that in many cases, disclosure causes more problems (for individual companies) than it remedies.

1.2 Needed: An Empirical Review

Are there really more than 300 definitions of sustainability? When reading the literature, it certainly can feel that way. However, when it comes to the sustainability programmes and reports operating within the chemical industry, even a brief inspection suggests otherwise.

Therefore, it was decided that for the chemical industry, sustainability or corporate social responsibility would be best be defined empirically, by an examination of what leading companies actually do, rather than by a summation of what the literature says. That empirical investigation is at the heart of this book, which is introduced in the next chapter.

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[5] Companies such as Monsanto, Syngenta and Zeneca transformed themselves away from being chemical companies.

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Chapter 2
Summary: Sustainability Is Advancing, with More Changes to Come

Abstract In practice in the chemical industry, sustainability consists of three activities – communications in a stakeholder style, celebrating environmental opportunities and rebranding of compliance. Sustainability is not always benign, it can cause more problems than it solves. Some general lessons already can be learned.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image

Sustainability is a significant trend in the chemical industry. Over the past 10–15 years, about 80% of the world's 29 largest companies have adopted some kind of sustainability program and organization, many of the smaller ones have followed, and the major industry associations are on board as well.

This book surveys that activity to determine, as the title suggests, what sustainability means and where it is headed. To get to those answers, the book also covers related questions, such as why did the industry turn to sustainability, does it pay and is it inevitable? These are summarized here and then detailed in the body of this book.

2.1 Sustainability in Practice: Communications, Regulatory Compliance, Risk Management

Based on a detailed review of the world's 29 largest chemical companies plus inspection of 10–15 others, in practice there are three main functions to sustainability. These are summarized as follows, with examples of each (Tables 2.1–2.3).

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Table 2.1 Example – Shell's 'stakeholder' approach to communications and external relations

Sustainability report, GRI compliance, audit	Responsible care	Consultation or dialogue	Partnership	Philanthropy
Sustainability report, based on IPIECA guidance, consistent with GRI G3 guidelines. A+ ranking, according to Shell's self assessment. External review by six experts, but not by auditors.	Member, with similar approaches taken to non-chemicals ops.	Global advertising campaign. Round Tables for sustainable palm oil, sustainable biofuels. Drilling program in Beaufort Sea. Social performance plans for sites.	$1.1 mln/year each to biodiversity projects with IUCN and Wetlands Int'l. $2 mln to Port Arthur Communities Fund.	$20 mln to community development in Niger delta. $170 mln in social investment. HIV/AIDs education. Shell foundation funded w $250 mln in 2000: poverty relief and economic development.

Table 2.2 Example – Dow's recognition of sustainability opportunities

Green processes	Green products
Water supply and conservation.	RENUVA soybeans to polyols.
Lower-energy propylene oxide process.	Glycerin-based propylene glycol.
Polyethylene from sugar cane. Landfill methane use. Methane feedstock research.	

- *A 'stakeholder' approach to communications and external relations*, i.e. voluntary reporting about non-financial performance. This includes: sustainability reports (often released concurrently with an annual report); Responsible Care programs; consultation and partnerships with stakeholders; and philanthropy. At its heart of 'stakeholderism' is the idea of putting a human face on the industry, making it accessible, understandable, unthreatening – one the public can trust rather than fear. 'Stakeholderism' is also about ceding some decision power to stakeholders.
- *Recognition (and even celebration) of the opportunities, not just the costs, of environmental and social protection.* In their sustainability reports and in other corporate communications, chemical companies are highlighting the environmental and social benefits of their products or processes. Biofuels, bioproducts and energy conservation are particularly popular at the moment.
- *A rebranding of regulatory compliance and risk management, with emphasis on their benefits to stakeholders.* These functions – regulatory compliance and risk management – do not necessarily report directly to a sustainability manager, but the functions are coordinated, as compliance and risks are subject to increasing measurement, reporting and management. In limited cases companies are committing to 'beyond compliance' measures, where corporate environmental or social targets exceed those required by law.

The first function is the core of what sustainability is and what sustainability departments do. The second and third functions surely would exist without the industry's turn to sustainability, albeit with different names and perhaps different forms.

Not everyone is pursuing sustainability. Of the 29 largest chemical companies, five show little or no interest: Basell/Lyondell, Formosa Plastics, Ineos, Kuwait Petrochemical and SABIC. They know what sustainability is, and they explicitly choose not to adopt it. That all of the five are either non-Western, privately-held companies or both is no coincidence.

All five will be worth watching in coming years, especially Kuwait Petroleum and SABIC. Recently, KPC has entered a major joint-venture with Dow Chemical, while SABIC has bought large operations that formerly were DSM Petrochemicals and GE Plastics. Dow, DSM and GE are all well-involved in sustainability, while KPC and SABIC mostly disavow it. Presumably, some accommodation will need to be found.

Table 2.3 Example – LG chemical's rebranding of compliance and risk management

Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
PSM, OHSAS and KOSHA compliance, training of staff and suppliers. Accident and injury indicators.	Eco-accounting and performance measurement ISO, OHSAS and KOSHA compliance. Global EHS standards. E&S audits. Emergency response to spills, accidents.	Indicators for: raw material and water use, waste generated, wastewater, recycling, and various pollutant emissions. Target of zero waste.	Product safety and liability Council est in 2002. Annual product liability report, and reviews. LCAs of batteries, electronics and a few chemicals.	Detailed reporting. In 2006 appointed more outside directors, greater autonomy to the Board of Directors and the Audit Committee. 'Management by principle' guidelines issued in 2004.	Fair Competition guide in 2006. Ethics hotline. Labor cooperation and health.

Table 2.4 Chemical industry stakeholders (in descending order of importance)

Stakeholders	Description
Regulators	Not just elected officials, who were considered stakeholders long before the term was coined, but bureaucrats as well.
Employees	Not just current ones, but prospective ones, especially students.
Local communities	Those surrounding industrial operations.
Eco- or socio-conscious investors and customers	Customers can be downstream companies, retailers or end-users of finished products (that contain chemicals or were manufactured with the use of chemicals).
Activists	These can be unaffiliated individuals, but more often they are larger groups, called non-governmental organizations (NGOs), such as Environmental Defense Fund, Greenpeace and WWF.

2.2 Sustainability Defined

In industry in general and in chemicals in particular, the word 'sustainability' is used interchangeably with labels such as 'corporate social responsibility', 'corporate responsibility' and 'corporate citizenship'. The old-fashioned term for it, 'public relations', is avoided, although the new-fashioned variant, 'stakeholder relations', is sometimes used.

Whichever phrase is used, the concept is about building or maintaining a company's or the industry's public goodwill. Conversely, it is about deflating or avoiding public ill-will. The public has been redefined as 'stakeholders' (Table 2.4), and now explicitly include the industry's employees and investors.

Sustainability's premise is that public goodwill brings advantages and public ill-will brings disadvantages. Usually this is couched in negative terms, i.e. if stakeholder opinion is sufficiently negative, the industry will lose its 'license to operate'. Losing the license to operate means events such as having products banned, onerous regulations or liabilities imposed, or permits denied. Negative opinion also can lead to less-extreme penalties: poor morale among employees, recruiting difficulties and investor avoidance.

Sustainability can be couched in positive terms, too. If stakeholder opinion is sufficiently positive, less products will be banned, morale will improve and so on.

2.3 Is Sustainability Inevitable, and Does It Pay?

Sustainability has delivered some successes, especially in deflecting or shaping regulations. It is impossible to put a return-on-investment on it, but for Western, public companies, it is inevitable that they must adopt at least some aspects of sustainability, because this is becoming the norm. For the chemical industry as a whole, sustainability is not inevitable; because five of its largest companies have not adopted it.

In the future, where sustainability's goodwill can and will be most fertilely sown is with the industry's most important stakeholders, its employees. To them it is a

godsend finally to hear that what they are doing is good, or at least not bad, and to have a comeback to their critics. Nobody says it better than Mitsui Chemical: practiced properly, sustainability is about becoming a 'good and trustworthy company' that is the 'the pride of its employees.' For chemical recruiters, sustainability is absolutely vital: especially younger workers want to work for companies that are seen positively by the general public.

This is more about philosophy than profit. Common sense suggests that good, trustworthy companies that are the pride of their employees will perform better than bad, untrustworthy ones that are the shame of their employees. But surely there are exceptions, and anyway, the nub of the question comes down to specifics: in a given situation, what constitutes good, trustworthy and so on.

With most other stakeholders, sustainability will be a rearguard action, aimed at preventing or muting ill-will. Activists or regulators will continue to view the industry with skepticism or cynicism, although as in the past, there are probably more victories to be had with regulators. Consumers, investors and the general public will be generally apathetic except in the case of a scandal, which sustainability is not really designed to prevent.

At the same time, sustainability is not harmless. With bad luck or poor application, it can lose serious money. For instance, engaging naively with activists – who often live off of controversy and conflict – can be walking into a trap. On the misguided advice of PR consultant SustainAbility, Monsanto in the late 1990s blithely 'engaged' its critics and managed to score a spectacular own-goal: it blocked access of its leading products to European markets for at least a decade.

This helps to refute a premise, often floated by sustainable-investment analysts, that 'sustainable' companies are more profitable than 'non-sustainable' ones. A more accurate statement would be that complying with regulations, environmental or otherwise, is generally more profitable than not complying. With some notable exceptions,[1] again this would seem to be common sense. Crime does not pay; it is difficult to run a chemical plant from jail. And research bears this out: analysis of 65 US companies (including 11 pharmaceutical and chemical firms) showed that companies with average or good environmental records financially outperform those with poor environmental records. Between the average and the good there was no significant difference.

2.4 Sustainability's Limits

There are two inherent barriers to sustainability programs, one internal and one external.

The internal one is a fundamental conflict of sustainability with three corporate institutions: legal departments, corporate communications and top-down decision making. The first two have troubles with sustainability's notions of giving the industry

[1] For instance, bribing to win government contracts, paying taxes in countries with lax enforcement or, in a merchant bank, strictly separating investment analysis and deal-making.

a human face, of communicating too openly about incendiary topics such as cancer or proposed product bans. Exposes us to liability, say the lawyers; makes us look weak, say the communications pros. Those who make decisions from the top (as this industry generally does) usually recoil from the idea of granting decision power to stakeholders.

The external barrier is one of so-called greenwash, which means trying to present a product, a company or an industry as more green (friendly to the environment) that it actually is. Greenwash comes off as insincerity, precisely the perception that sustainability is meant to decrease, not increase. Obviously, the line between greenwash and sustainability is blurred: what the industry sees as an accurate communication may be seen by critics as greenwash. If the line were clear, of course, greenwash would cease to be a problem.

2.5 Are the Causes for Sustainability Obsolete?

Sustainability started in the late 1980s or early 1990s as a reaction to decades of industry-public conflict, as a way to improve the industry's battered public image in Europe and North America.

In the meantime, the industry's public image has improved somewhat; surely this is due in part to sustainability. However, there is still a long way to go. The industry's image is still poor, public ill-will is high, and new sources of conflict continue to arise: a current sampling would include: the EU's chemical licensing regulation, REACH; dioxin contamination in the US State of Michigan; PFOA; and the controversy and potential ban of bis-phenol A from certain applications.

2.6 Making Sustainability Sustainable

Sustainability's biggest challenge is its inherent conflict with legal departments, corporate communications and top-down decision making (see Sustainability's limits, p. 20). If companies are seen to be spiking or spinning uncomfortable news and decisions, flip-flopping on core values or overselling modest achievements, they may destroy more trust than they build. It will not be easy to reconcile sustainability with legal and communications concerns, but it is worth trying.

For companies adopting or expanding sustainability, this study comes to five other recommendations:

- *Study your stakeholders, and take them seriously* – some of them, for example your employees, may be more interested than you think, while others, for example the general public or investors, may be far less interested than you think. Be careful not to belittle what you see as their ignorance (and they see as your arrogance), and try to let facts speak for themselves.

- *Be responsive, not necessarily responsible* – listening to your critics is a major step in itself, and it can go a long way toward building trust. It need not mean that you must agree with them, admit false guilt, make changes that are anathema to you or single-handedly save the planet.
- *Remember the risks* – as the Monsanto example shows, sustainability can backfire. So too, can chasing fads such as biofuels, which went from media-darlings to media-dragons in a space of months. Beware of arrogance and of defining other people's ethics or morals.
- *Ditch the word sustainability* – it is misleading to the general public, which defines it as something completely different. Terms such as corporate responsibility, corporate social responsibility or corporate citizenship better describe the concept and are used by many chemical companies already.
- *Consider a safety culture* – an admission that chemicals are potentially very dangerous, but if handled safely, offer benefits generally greater than their risks. This approach seems to work for other dangerous products – say, automobiles and electricity – without turning their producers into pariahs. And it is a statement most chemical industry managers probably could agree to.

Sustainability's best examples so far may be the largest Japanese chemical companies. Compared to European and North American competitors, their programs seem less concerned with mission statements, grand strategies and unsupported statements than with getting down to it: building public goodwill.

Chapter 3
Introduction: Sustainability's Bandwagon Has Left the Station, But Where Is It Headed?

Abstract A short summary of what the book covers.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image

Sustainability is the new rock and roll. Sustainability is the new black. Yes, sustainability is trendy, and not only among the fashion-conscious. The relatively uncool chemical industry was one of its pioneers, and many of its companies have embraced it.

Yet for all that, what have they embraced? Surely not the initial definition proposed in 1987 by the United Nation's Brundtland Commission [1], which said sustainability describes economic activity that meets 'the needs of the present without compromising the ability of future generations to meet their own needs.' Noble as this concept may be, it is impractical: sustainability could be achieved only in hindsight, and, given the earth's inherent propensity for change, it is downright unnatural.

So it is no surprise that sustainability programs, as currently practiced by the chemical industry, are not actually about sustainability (as defined by Brundtland or academics). Primarily, sustainability is about a change in the industry's approach to the external world: to regulators, to greens, to neighbors, to investors and to the general public. As opposed to the adversarial approach that characterized the 1970s–1980s, sustainability is a kinder, gentler, 'stakeholder' approach to social/political conflict. It also is an effort to rebuild the industry's long-suffering public image.

In current chemical industry practice, sustainability generally refers to three activities:

- A 'stakeholder' approach to communications and external relations
- A rebranding of regulatory compliance and risk management, with the emphasis on their benefits to stakeholders
- Recognition (and even celebration) of the opportunities, not just the costs, of environmental and social protection

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All of these are very much grounded in the industry's history of conflict with stakeholders, so that is where this book begins. Then it looks at how sustainability is defined – by academics, by the public, by investors and by the chemical industry in practice. We examine the three 'sustainability' activities in depth, the range of how they are applied, how they are branded, the difference between sustainability and 'greenwash', and their relative performance – i.e. has sustainability paid off?

The book finishes with a look at sustainability from a company's point-of-view, addressing the questions: Is there a non-sustainability option? Should you become (or stay) sustainable? We conclude that some sustainability is inevitable for Western, public companies, but that it still needs work to deliver what it aims to achieve.

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Chapter 4
Why the Chemical Industry Turned to Sustainability

Abstract Environmental problems triggered the chemical industry's journey toward sustainability. It was as much the reactions to the problems, as the problems themselves, that spawned sustainability's "stakeholderism". Initially, sustainability was about keeping a license to operate and conciliation with industry opponents.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image • History

For about the past 50 years, the chemical industry's relationship with the general public has been characterized by conflict over its safety and environmental impacts. Over that time, the industry's image has tarnished badly (Fig. 4.1): an industry once viewed favorably is now seen by a large proportion of the western public as dirty, dangerous, secretive and exploitive. In the UK, for example [1], only two industries have lower public approval: nuclear-power generators and cigarette makers.

The loss of reputation had two main causes. One was the occasional environmental problem such as the "Silent Spring" controversy that led to a ban of DDT in 1972; the explosion in Flixborough in 1974; the exposure of deformities and disease caused by a former dumpsite at Love Canal in the late 1970s; the accidental release of toxic chemicals to air in 1976 in Seveso, again in 1984 in Bhopal and the release to the Rhine River in 1987 in Schweizerhalle. Making matters worse was the perception that the industry was being dishonest or uncaring in its response to problems.

The other cause was a wave of environmental regulations that swept over the chemical industry (and over other industries as well). Regulation damaged the industry's reputation in two ways: (1) proposing and enacting a regulation makes the regulated behavior (say, emitting pollutants) more generally known, i.e. presumably fewer people would be aware of, say, hazardous wastes, were they not regulated; (2) most environmental regulations have been of the so-called "command and

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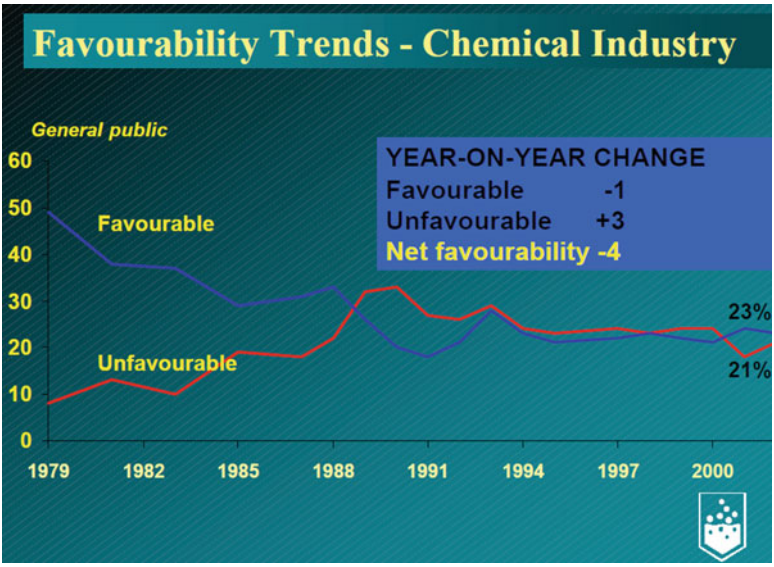

Fig. 4.1 Headed down – UK public opinion of the chemical industry, 1979–2002

control" type that are inherently adversarial, pitting regulators against the regulated. Under command and control, regulation tends not to be a negotiation, but a battle.

The chemical industry's main response to regulation was to join the battle, fronted by two main arguments: (1) this regulation is not necessary, and (2) implementing the regulation will cripple our competitiveness, destroy jobs and hurt our customers. Time and again, the battles were lost by the industry and won by the regulators. This strengthened a public image of the industry as "bad guys" and the regulators as "good guys", which was only reinforced when, in retrospect, the regulations appeared to be necessary and did not seem to have crippled competitiveness, destroyed jobs and hurt customers.

By the late 1980s, many in the chemical business felt they were on the ropes: the industry's public image was at an all-time low, and it was seen to be a whipping boy or scapegoat for over-eager regulators and critics. Companies openly talked of their fear of losing their license to operate.

Some in the industry saw an alternative in embracing sustainability. Rather than battle the regulators, their sympathizers and other critics as enemies, some companies began trying to work with them as "stakeholders". Some adopted sustainability in desperate defense, as Shell did in the 1990s in response to its Brent Spar debacle. Some adopted sustainability in offense, as DuPont did in the 1980s to turn the imminent ban on CFCs to its competitive advantage.

In the following subsections we look at this history in more detail. In the next section, we look at how sustainability is defined by other groups, and in the section after that, we examine how this sustainability approach to public relations and regulation has spread more broadly throughout the industry.

4.1 How the Chemical Industry Upsets the Public

Environmental problems have dogged the industry for years. So, too, has a perception that the industry has been dishonest or uncaring in its response to them. Even when this is not true, the industry can come away with a damaged reputation and huge liabilities – as the dilemma of Love Canal makes clear.

4.1.1 Environmental Problems

There are four main problems by which the chemical industry upsets the public: disasters, non-sudden pollution, non-sudden damage and politically incorrect products.[1]

Although we list these individually and in descending order of perceived importance,[2] these events synergistically influence public opinion. The more upsets of any type that are perceived, the more likely public perception is to be negative – largely irrespective of whether the upsets are of equal significance or of different types. A company associated with, say, a disaster, a pollution upset and an unpopular product, probably gains itself a generally negative image, whether or not the upsets are related.

4.1.1.1 Disasters

Considering the materials handled in the chemical industry, it should not be surprising that now and again, accidents happen. Indeed, accidents involving chemicals (probably more with users than producers) happen most every day, as a browse of the US Chemical Safety and Hazard Investigation Board's website[3] shows.

Now and again, however, the industry has caused or been blamed for a disaster – an accident of significantly larger impact and notoriety. Some of the most notable disasters are:

- *Explosions* – such as the 1947 explosion in Texas City, the 1974 one in Flixborough or the 2005 one where the Jilin petrochemical plant exploded, sending a slick of benzene and nitrobenzene down the nearby Amur River.

[1] We recognize that these tend to be touchy subjects, so we point out that they are mentioned to provide understanding, not to berate the industry. This is about explanation, not about assigning guilt.

[2] Perceived importance to the author – which surely could be argued.

[3] http://www.csb.gov/index.cfm?folder=CIRC&page=index.

- *Leaks* – perhaps the best-known is that at Love Canal, where emissions from a closed hazardous-waste dump appeared to cause deformities and disease. Although Hooker Chemical (later acquired by Occidental Chemical) had operated and closed the dump properly, the company in particular and the industry in general were still vilified.
- *Sudden releases of toxic chemicals* – the most notorious are probably two releases to air, in 1976 in Seveso and in 1984 in Bhopal, and a 1986 one to water (the Rhine River) in Switzerland.

Disasters become embedded in public memory and political debate, and they can inspire hatred of the presumed culprits.[4] For instance, on every anniversary of the Bhopal release, protesters in the town parade through the streets bearing an effigy of the-then Union Carbide[5] CEO, Warren Anderson, which they finally burn. They see the release of methyl isocyanate that killed thousands of local residents not as an accident, but a crime.

All these disasters were widely covered in the media, and they are now part of popular history. All of them led to public protests against the companies involved, and were used as criticisms of the industry in general. Most of them, directly or indirectly, prodded legislators or regulators to pass new regulations, and they motivated companies to change operating practices.

4.1.1.2 Gradual (Non-Sudden) Pollution

Pollution from a production site that is or has been legal, and has not involved any accidental discharges, can still lead to upsets. Examples of legacy pollution upsets and the involved companies are:

- Dioxins in Michigan's Tittabawassee River from Dow Chemical
- Perfluorooctanoic acid (PFOA) water-supply contamination in West Virginia from Du Pont
- Polychlorinated biphenyls (PCBs) contamination of ground and water in Alabama from Monsanto
- Possible groundwater contamination at Bonfol, Switzerland, from a hazardous-waste dump formerly used by the predecessors of Ciba, Clariant and Novartis
- Ground contamination of numerous sites in the former East Germany, from its former state-owned chemical industry.

[4] One of the best recent examples of such a disaster (albeit not involving the chemical industry) is the 11 September 2001 attacks on New York and Washington by Al Qaida.

[5] The US company that owned a majority stake in Union Carbide India Ltd, which produced and leaked the toxic gas.

4.1.1.3 Gradual (Non-Sudden) Damage

Chemicals in use can sometimes create unexpected, undesirable side-effects. There are many examples; some prominent ones are:

- Asbestos, which was widely used in insulation of various types, causes asbestosis and other serious ailments. Since the mid-1980s it has been largely banned in new uses, and many existing installations of asbestos have been removed.
- CFCs, chlorofluorocarbons, are a range of stable, non-flammable chemicals first synthesized in the 1920s that were used mainly as propellants, refrigerants and fire extinguishing agents. In the 1970s. CFCs were found to be catalyzing the destruction of the earth's stratospheric ozone layer, so in 1987 they were banned under the Montreal Protocol.
- DDT, a pesticide, was banned first in the US and later globally, because of its adverse impacts on several types of birds, especially bald eagles. The events leading to a ban were sparked by publication of Rachel Carson's *Silent Spring* in 1962. The book is seen by many as milestone in the development of popular environmental consciousness.
- TBTs, tributyl-tins, are a group of biocides that were used in anti-fouling paints for water-exposed surfaces of boats. Anti-fouling means that the paints repel sea creatures from latching themselves onto (i.e. fouling) the underwater surface of a boat. TBTs also leach out of the paint into seawater where they then damage other marine organisms, so they have banned in this application, with final phase-out taking place this decade.

Non-sudden damage such as this threatens its producers in two ways: (1) restrictions or bans depress sales; and (2) liability costs can be significant. Asbestos claims have pushed into bankruptcy at least 50 companies that employed many thousands, including venerable giants GAF, Johns-Manville and WR Grace.

4.1.1.4 Politically Incorrect Products

Some products are regulated (or proposed for regulation) simply because they are politically incorrect. Perhaps the best examples from the chemical sector are plastic bags – which are taxed in some countries and banned in others – and PVC.

> Restrictions on PVC by cities and communities began in the German town of Bielefeld in 1986. Since then numerous restrictions have been enacted in Germany, and there are currently 274 communities and 6 Federal States which have confirmed their policies in writing. In the early 1990s many local authorities in Austria, The Netherlands and the Nordic countries also restricted PVC. In the late 1990s the trend spread to Spain, where 62 Spanish cities have been declared PVC free, and to the UK, Japan and the USA. Sweden was the first country to propose national restrictions on PVC generally; in 1995 the Swedish Parliament voted to phase out both soft and rigid PVC… [2]

Other examples (albeit not entirely from the chemical industry) are: excess packaging, which is prohibited under EU law; bans or boycotts proposed in several US cities on bottled water; and a proposed EU ban on patio heaters.

These sorts of regulations – which are hard to justify logically or legally – would be less likely if the industry's reputation were better, if the public were not already upset by disasters, pollution and damage. Its poor public image, which is largely fuelled by these upsets, makes the industry a convenient scapegoat.

4.1.2 Perception of a Dishonest, Uncaring Response

The chemical industry's response to environmental problems often has been characterized as dishonest, secretive, manipulative or uncaring. This has come up in most of the above-noted examples of disaster, pollution or damage.

A more recent example came in the politicking over REACH, the EU program for chemical licensing. A Liberal-Democrat European Member of Parliament, Chris Davies, argued in November 2005 in front of the European Parliament: "There have been two early casualties of REACH, the first of which is truth. Too many in the chemicals industry, and particularly its German lobbying arm, seem to believe that if you are going to tell a lie, then lie big."[6] After saying the industry is dishonest, Davies also claimed the European Commission was acting as a pliant tool of industrial interests[7]: in other words, the industry is also manipulative.

Aside from cases where such characterizations – dishonest, secretive and so on – are accurate, two factors can make the industry appear worse than it really is:

- *Natural consequence of conflict* – people in conflict often attribute base motives and behavior to their opponents, whether or not they are true. Indeed, in private conversations, industry representatives often accuse regulators or green activists of showing the same traits.
- *Fear of increased liability* – most industry representatives are keenly aware that they can "be hanged by their own rope", that is their own statements and data can be used as evidence to show that they are responsible for some environmental problem – even when they believe they are not responsible. So to limit liability, in emotional situations they sometimes make carefully worded statements or refuse comment, which appear cold and indifferent.

All of these factors may have been at play in a 2005 clash between the US EPA and DuPont. EPA levied a $10-million fine, its largest civil penalty ever, against DuPont as punishment for withholding information about PFOA [3]. DuPont accepted the fine while denying any wrongdoing [4]: "Our interpretation of the reporting requirements differed from the agency's [EPA]. The settlement allows us to put this matter behind us and move forward," said DuPont Senior Vice President and General Counsel Stacey J. Mobley. The company added: "The settlement closes this matter for DuPont without any admission of liability."

[6] This statement is particularly harsh in a European context, in that the "big lie" concept is often associated with Nazi Germany.

[7] This was the second of the "two early casualties" mentioned in Davies's quote.

Although EPA does not say so directly, its statements imply that DuPont was dishonest. As one environmental news website [5] headlined it: "DuPont to pay $16.5 million[8] for hiding (PFOA's) risks." The New York Times ran it as: "DuPont settles toxin case: It was accused of hiding data on dangers." Despite its rather hollow denial, by accepting the fine, DuPont appears to concede dishonesty.

Of course the matter is not closed for DuPont; the crux of it will come down to how dangerous PFOA is. DuPont says [4] that "to date no human health effects are known to be caused by PFOA." On the other hand, a risk-assessment led by EPA and approved by EPA's Science Advisory Board [6] concluded in May 2006 that PFOA should be classified as "likely to be carcinogenic".

That finding, plus the EPA fine, will be valuable to plaintiffs in various lawsuits claiming damages from DuPont over PFOA contamination of groundwater and alleged PFOA exposure through the use of Teflon[9]-coated cookware. One of the Teflon suits, filed in Miami, contends that DuPont suspected PFOA to be toxic as early as 1961. One of the lawyers suing DuPont over Teflon contends [7]: "DuPont lied in a massive attempt to continue selling its product."

Earlier in 2006, EPA "invited industry to commit to reducing its PFOA emissions and product content level by 95% by 2010 and to work toward elimination of emissions and levels in products by 2015" [8]. In late January 2006 [9], DuPont announced its agreement to this '2010/15 PFOA Stewardship Program'.

4.1.3 Reputation Versus Liability: The Love Canal Dilemma

The story of Love Canal is a classic example of the dilemma faced by companies that have upset the public. Put in extremis, companies have two unpleasant choices: (1) to risk their reputation in order to avoid liability; or (2) to risk liability in order to save their reputation.

4.1.3.1 Short Recap of the Love Canal Story

Love Canal is a former hazardous-waste dump filled in the 1940s by Hooker Chemical (which was subsequently acquired by Occidental Chemical). The dump was designed, operated and sealed according to modern standards, i.e. the wastes were contained within a clay liner. In the 1950s, the local government pressured Hooker to give the land up for a school to be built there. Construction was started but then stopped, and in 1957 the property was sold to a private developer who turned it into a housing district.

[8] The full settlement in the case was $16.5 million, of which the fine was $10 million.

[9] Teflon, the non-stick coating, is DuPont's brand name for PTFE. PFOA is used in manufacturing PTFE.

Development and use of the houses perforated the dump's clay seal, which allowed some of the hazardous chemicals to surface. By the mid-1970s, residents began complaining about contamination and its effects. By 1980, the US Federal Government declared Love Canal to be a state of emergency: nearly 1,000 homes were evacuated and public-access to parts of the area was blocked permanently.

4.1.3.2 Was Hooker Disreputable?

For several years in the 1950s, Hooker discouraged the local government from buying the site and made its dangers plain.

During that time, "Hooker had escorted (local government officials) to the Canal site and in their presence made eight test borings – into the protective clay cover that the company had laid over the Canal, and into the surrounding area. At two spots, directly over Hooker's wastes, chemicals were encountered 4 ft below the surface. At the other spots, to the sides of the Canal proper, no chemicals showed up….Hooker had gone out of its way to make sure that they *did* inspect it and that they did see that *chemicals* lay buried in that Canal" [10]. In the written documentation of the land sale to the local government, Hooker included a detailed caveat of the dump's existence. The company also supplied a map of the dump, telling the government that the central portion was the only safe place to build the proposed school; the rest should be kept covered and used as a park or playground.

When the government announced plans to resell the land for private development, Hooker representatives objected directly and clearly. According to official minutes of one such meeting, the government recorder noted that "they (Hooker) feel very strongly that subsoil conditions make any excavation undesirable and possibly hazardous." As local newspaper the *Niagara Gazette* reported, Hooker representative Arthur Chambers stated: "There are dangerous chemicals buried there in drums, in loose form, in solids and liquids." Another regional newspaper, the *Buffalo Courier-Express,* referred to Chambers's speech about this "chemical-laden ground" [10].

With this history in mind, Hooker's successor Occidental denied liability for the cost of evacuation and cleanup. Even a decade after the disaster began, in 1989, as the US EPA put it [11]: "Occidental persists in fighting numerous liability issues and is steadfastly refusing to accept responsibility for the costly relocation of Love Canal residents and for the other heavy costs the state incurred responding to the Love Canal disaster." Finally, after 16 years of litigation with state and federal government, Occidental was forced to pay $129 million in clean-up costs.

This payment was strictly for cleanup, not for penalties or fines (government lawyers had argued for punitive damages as high as $250 million). The ruling found that Hooker/Occidental had not shown reckless disregard for the safety of others. However, it also found that Hooker had been negligent in selling the site to the government, and that the company remained liable even after the site had been sold – hence it should foot the cleanup bill.

So no, Hooker was not disreputable. As one analysis [10] puts it:

> Despite the popular myth that Love Canal is the result of a single corporation's greed and heartlessness, the actual explanation is far more complex. It's clear to anyone who digs into this matter that Hooker may well have been the only party to the affair to behave responsibly. Hooker chose an exceptionally fine chemical dumpsite; it ceded the dump to the local government under circumstances in which the threat of condemnation was real and the reality of condemnation was already under way for adjoining properties; it warned the local government that the chemicals could kill and insisted that the government pass this warning on to any subsequent owner of the property; it urged the government not to construct the school or any other buildings directly over the Canal; it protested the prospect of any subsurface construction on the Canal. These warnings were repeatedly ignored, however, by the governmental bodies involved in desecrating this chemical tomb: the School Board, the City Planning Board, the city engineer, and the state Department of Transportation.

4.1.3.3 Solutions to the Love Canal Dilemma

Given that the dump had been sold and houses built even before Occidental acquired Hooker, when faced with evidence of contamination in the late 1970s, what should Occidental have done?

What they did, in fact, was to choose the first option of the Love Canal dilemma: risk their reputation in order to avoid liability. Even accounts sympathetic to the company concede that as the story played in national media, its "response was to stonewall. The company refused to provide even basic information requested by both the homeowners and the local news reporters." By not talking, the company seemed to confirm criticisms that it was greedy, heartless and criminal. Finally the company began to talk, but mainly in a defensive tone that (although perhaps justifiable) still appeared to suggest guilt.

After 16 years of litigation with state and federal government, Occidental was forced to pay $129 million in clean-up costs. This was far less than what the government had aimed for (government lawyers had argued for punitive damages as high as $250 million), and Hooker/Occidental was not proved disreputable.

Would Sustainability Have Been a Better Approach?

Would the second option of the Love Canal dilemma – risk liability in order to save reputation – have worked any better? As Chester Burger, a veteran public relations expert familiar with Love Canal, put it [12]:

> Public relations professionals familiar with the events believe that the entire Love Canal disaster probably wouldn't have happened if the true facts had been disclosed right at the beginning, and the public had been given proof that Hooker had acted properly, responsibly and safely. It was not an unfair press that caused the problem but an ill advised corporate management that remained silent in the hope that they would be vindicated in the courts of the law. The lesson that I extract from this is that in today's America, public opinion will always believe the worst about you unless you tell your side honestly, completely and speedily.

Burger made these remarks in 1983, before the words "stakeholder" and "sustainability" were coined, but he expresses a key premise of "stakeholder" thinking: that transparency, disclosure and discussion with "stakeholders" could defuse a disaster. His argument is that Occidental would have been judged less harshly in the court of public opinion than in a court of law.

The Case for Stonewalling

However, there is a case to be made for stonewalling.

As for liability: Occidental was convinced that it had done nothing wrong at Love Canal (i.e. wastes were disposed properly, the government was warned of the site's dangers). They believed that they were not liable for cleanup, and under laws at the time, this was probably true.

Indeed, the government had to litigate for years, and even to change liability law, to shift legal responsibility onto Occidental. Superfund legislation and implementation were inspired by the events at Love Canal: starting with Occidental, governments have tapped whatever companies they can to pay for expensive cleanups[10] [13], with far less regard than formerly to the notion of strict liability. To the government, eager to find money to fund the cleanup, Occidental was a sitting duck – better yet an obvious golden goose.

To Occidental, apparently the best way to avoid giving up its golden eggs was to be silent. From a liability standpoint, this position is difficult to contest. Any public admissions could well have increased liability.

At the same time, would public admissions have helped the company's reputation? Despite Burger's claim that it would, this is not clear. It is entirely possible that as many or more people would be outraged as those that would be assuaged. And even if Burger is at least partly right, the ultimate question is: would the avoidance of liability offset the loss of reputation?

Occidental gambled that it would, and arguably they made the right choice. This Love Canal dilemma is just as relevant to the chemical industry today as it was then – it is a prime mover behind some companies embracing sustainability (see the example of Shell, in Sect. 4.4.2, page 38).

4.2 How Regulation Has Harmed the Industry's Image

Over the past 50 years, a wave of environmental regulations has swept over the industry (and over other industries as well). Surely this has reduced the industry's negative impacts on human health and the environment; nonetheless, regulation has

[10] The so-called "deep pockets" approach to funding of environmental remediation. By this principle, parties associated with causing an environmental problem fund its remediation mainly according to their ability to pay (how deep their pockets are) rather than according to their strict liability.

concurrently made the impacts appear worse in two ways: (1) proposing and enacting a regulation makes the regulated behavior (say, emitting pollutants) better known, i.e. presumably fewer people would be aware of the pollutants were they not regulated; (2) most environmental regulations have been of the so-called "command and control" type that are inherently adversarial, pitting regulators against the regulated.

4.2.1 Regulation Recap

Starting in the late-1960s US, a whole body of environmental law and regulation has grown and spread around the world. A landmark event was the founding of the US Environmental Protection Agency (EPA) in 1970. EPA went on to administer one landmark regulation after another: NEPA (1969), the Clean Air Act (1970[11]), the Clean Water Act (1972), Toxic Substances Control Act (1976), Resource Conservation and Recovery Act (1976) and the "Superfund" Comprehensive Environmental Response, Compensation and Liability Act (1980).

These regulations were focused on how to operate manufacturing plants and how to handle their wastes. Subsequent regulation has focused more on safe use and disposal of chemical products.

4.2.2 Command and Control

So-called "command and control" was at the heart of the wave of regulation in the 1970s and 1980s. Under command and control, pollution abatement procedures are specified, permitted (or not), monitored and, in cases of violation, fined. For instance, a producer of organic chemicals typically must incorporate certain design features, operating and waste-disposal procedures to be granted permission to produce. A power generator is obliged to install scrubbers on his smokestacks before he starts operation, and so on.

Command and control yielded major benefits. Even its fierce critics concede that the wave of environmental regulation starting in the 1970s dramatically cleaned up the skies, the waters and the land. But the same critics bemoan the associated costs. Even its proponents concede that command and control is expensive[12] as well as inherently adversarial, pitting regulators against the regulated. Under command and control, regulation tends to be an ongoing battle.

[11] The original US Clean Air Act was enacted in 1963; however, it was not so much regulation as funding for research and some clean-up activities.

[12] Relative to other approaches to regulation, such as "performance", "economic" and "voluntary".

4.3 The Battle of Litanies: Regulators Versus Industry

Command and control has spawned an ongoing battle between regulators and industry. The regulators come armed with what researcher Bjørn Lomborg calls "the litany" [14]: "Our resources are running out. The population is ever growing, leaving less and less to eat. The air and the water are becoming ever more polluted. The planet's species are becoming extinct in vast numbers….The forests are disappearing, fish stocks are collapsing and the coral reefs are dying."

The litany has become conventional wisdom across broad swathes of western culture. *Time* magazine states that "everyone knows the planet is in bad shape." *New Scientist* warns that our polluting ways may relegate humans to "the dustbin of evolutionary history." In his book *Earth in the Balance*, former US Vice-president Al Gore concludes that "the violent collision between human civilization and the natural world" is so threatening that "we must make the rescue of the environment the central organizing principle for civilization." Or else.

Until the late 1980s, the chemical industry (and others) mainly responded with their own litany: (1) this regulation is not necessary, and (2) implementing the regulation will cripple our competitiveness, destroy jobs, hurt our customers and so on. As Chicken Little might have said, if you pass this law, the sky will fall in. A classic example comes from the automobile industry, as described by a prominent regulator, the State of California:

> Both General Motors and Ford claimed in the 1970s that if they were forced to introduce catalytic converter systems[13] across-the-board on 1975 models, the result would be "business catastrophe." Ernest Starkman, GM's President said "It is conceivable that complete stoppage of the entire production could occur." Ford testified that if the US Environmental Protection Agency did not suspend the catalytic converter rule, it would cause Ford to shut down [15].

The automobile industry lost this battle (although perhaps they bought themselves some time), because in the end automobile catalysts became mandatory. Again and again, similar battles were lost by the industry, won by the regulators. This may be because regulators simply had more power, but in any case, the perception emerged that industry was just being obstructive. This created a public image of the industry as the "bad guys" and the regulators as the "good guys", which was only reinforced when, in retrospect, the regulations appeared to be necessary and had not crippled competitiveness. As the State of California puts it:

> Today (2007), both companies (GM and Ford) are still in business and, not surprisingly, they claim credit for reducing automobile emissions by 96% since the 1960s…**The bottom line:** The industry's gloom and doom predictions have **never** come true. It was wrong before and it's wrong now. In fact, the industry's own statements belie the arguments that its executives made in court. Instead of fighting with California and the rest of the world, the industry should focus its efforts on complying with California's greenhouse gas regulations [15].

[13] Automobile exhaust catalysts, known in the US as catalytic converters.

A similar verdict was made in the 1980s about the chemical industry by Germany's Federal Environmental Agency. In the Agency's former headquarters in Berlin, some offices prominently displayed a copy of "Uwe Lahl's Rules",[14] which characterized the industry's response to proposed regulations as:

1. There is no problem.
2. The so-called problem is junk science, argued by critics who aim to destroy us
3. Although there is no evident problem, we are jointly studying this issue with regulators
4. In some rare cases there may be a problem, which will require years of further study
5. The proposed regulations will cripple the industry's competitiveness
6. We, the industry, have solved the problem – applause, please.

4.4 Losing the License to Operate?

By the late 1980s, some senior chemical managers felt they were on the ropes. Thanks to environmental upsets and regulation, the industry's public image was at an all-time low (it has improved slightly since then). It appeared to have become an easy target or scapegoat for over-eager regulators and critics. Moreover, some in the industry began to worry that the industry's license to operate was threatened; unless image improved, the public could force closure of a significant number of chemical operations.

4.4.1 A Poor Public Image

In Western society, chemicals were seen into the 1950s as a high-tech industry. Similar to today's "high-tech" sector of computing and telecommunications, it was viewed as progressive and even cool. Perhaps the image was best captured by DuPont's slogan launched in 1935: "Better Things for Better Living … Through Chemistry."

By the 1960s that image began to tarnish, and it steadily declined thereafter. By the 1980s DuPont dumped the "Through Chemistry" part of its slogan. Although precise figures vary from place to place, the fraction of the public that viewed the industry favorably fell, while the fraction that viewed the industry unfavorably rose (Fig. 4.1). The favorable fraction fell from a majority to a minority, at times being exceeded by the unfavorable. Part of this fall from grace is a general disillusionment with institutions that has taken root in the West, but chemicals and the industry have

[14] Uwe Lahl was and still is a senior regulator with the Agency.

been hit harder than most. As recently as 2002 in the UK, for example [1], only two industries had lower public approval than chemicals, nuclear-power generators and cigarette makers.

Recent popular fiction sometimes depicts the chemical industry and other chemical polluters as heartless, exploitative criminals. Some of the films to do this include: Fletch Lives (1989), A Civil Action (1998); and Erin Brockovich (2000). We suspect this is more an effect than a cause of the problem, but it nonetheless anchors an image of dirtiness, danger, lying and unprincipled greed.

4.4.2 Scapegoating, Loss of License

A poor reputation hurts the industry in three main ways. First it tends to become a "whipping boy" or scapegoat for hostility that is specious or undeserved (see "Politically incorrect products", page 29). Second, it discourages employees and hampers recruiting. Third, it could lead to society denying the industry permission to exist, i.e. cancelling the industry's license to operate.

So far, license denial happens in isolated cases, but the fear is that incidents such as the three examples described next could become a broader trend:

- *Denial of construction permits for a PVC complex* – in the mid-1980s a large PVC producer was denied permits to develop a site near Houston, after local residents organized to block the plant. Permitting officials – who supported the project – privately conceded that the company's and industry's image as dangerous and greedy made the crucial difference in blocking what technically was an unobjectionable proposal.
- *Denial of permits to expand a refinery* – in 2008 a ConocoPhilips refinery in Wood River, Illinois, USA, was denied permits to expand capacity after a challenge led by the Natural Resources Defense Council. The argument was that "air pollution from the refinery's flares, which relieve pressure in the refining process, was not being sufficiently controlled" [16].
- *Shell and Brent Spar* – in 1995 Shell Oil decided to dispose of a disused oil-production platform, called Brent Spar, in the North Atlantic by sealing it and then sinking it in deep water. Although this decision clearly was approved by all relevant regulators up to a very high level, environmental activist Greenpeace objected, saying the platform should be brought ashore and dismantled. As the dumping date drew near, Greenpeace protestors occupied the platform to prevent it being sunk. After 2 months of occupation, with daily media coverage culminating in a boycott of Shell filling stations in Germany, Shell capitulated, abandoning its plans to sink Brent Spar, which ultimately was disposed of onshore, as Greenpeace had demanded.

Although Shell had followed regulations and won regulatory approval, it was forced to change course (at an extra cost of perhaps $80–100 million), plus it took a rough ride in the general media and most likely in popular opinion. According to Greenpeace, Shell's revenues from its German retail operations were down as much as 50% for the period.

4.5 Sustainability: A Way to Keep the License, A Way to Influence Regulation

Shell's public lambasting over Brent Spar spurred it to embrace sustainability, and Shell is not an isolated case. Other companies and industries (for example, much of the mining sector) have also made "deathbed conversions" to sustainability as a defensive measure.

Other companies chose sustainability for offensive reasons, as a way to gain advantage from inevitable regulation. Rather than battle the regulators and critics as enemies, some companies began trying to work with them as "stakeholders". A good example here (and perhaps the first example of its kind) was DuPont's embrace in the 1980s of the imminent ban on CFCs that led to the Montreal Protocol.

The Shell and DuPont cases are detailed in the next two subsections. A final subsection discusses the reaction of regulators. All this begs the question: Did sustainability work? We come back to that in the section Evaluating sustainability: is it necessary, and does it pay?, starting on p 86.

4.5.1 Shell: Defensive, to Keep the License

Shell's adoption of "stakeholderism" and sustainability in response to Brent Spar[15] was a desperate attempt to regain credibility, to hang on to its license.

In foresight and hindsight, Shell insists that the best disposal option in terms of protecting the environment for Brent Spar was to sink it. Shell also maintains that Greenpeace massively overestimated the potential environmental effects of sinking the platform. Still, the incident pushed Shell to embrace its version of sustainability, as Shell UK Chairman James Smith wrote in a Greenpeace publication in 2005:

> Public outrage at Shell plans to sink the decommissioned Brent Spar in deepwater in the Atlantic shocked the organisation. Independent experts and the government had agreed this was the best option. Yet the controversy had damaged our reputation as a responsible business. Our understanding of the sensitivities, creativity in finding solutions and communications had been inadequate….We recognised that we needed to change our approach – not just to offshore decommissioning in the UK, but to how we conduct all our operations everywhere.
>
> We had learned that, while good science and regulatory approval are essential, they are not sufficient. We needed to engage with society – understanding and responding to people's concerns and expectations. We had to be clearer and more transparent about our plans and actions.

[15] Shell's response probably was also in response to protests against the environmental and social impacts of its operations in the Niger Delta. In November 1995 the Nigerian government executed nine protest leaders, including the famed activist Ken Saro-Wiwa, on trumped-up charges of incitement to murder. Some Western governments were outraged, and Greenpeace said: "Ken Saro-Wiwa was hanged today for speaking out against the environmental damage to the Niger Delta caused by Shell Oil through its 37 years of drilling in the region."

> So we made a commitment in our business principles to contribute to sustainable development. An annual Shell Report assesses our progress while Tell Shell provides an internet forum for people to question us and tell us what they think. Rigorous assessment of the environmental, social and health impact is now required before commencing all our new projects and major facility developments, including decommissioning. This involves systematic engagement with stakeholders….Working together with those with expert knowledge of the environment helps us to make better decisions [17].

4.5.2 DuPont: Offensive, to Turn Regulation into Advantage

DuPont's support of a global ban on CFCs was a case of adopting sustainability to turn regulation into competitive advantage.

As documented by former regulators Stephen Andersen of the US EPA and Madhava Sarma of the United Nations Environmental Program [18], although scientific and political concern about their ozone-depletion began in 1974 and the US had banned them in aerosols in 1978, efforts to ban all CFCs worldwide had stalled by the mid-1980s. DuPont (and other CFC producers) steadily either opposed regulation or called for further study. The 1985 discovery of the "ozone hole" in the stratosphere revived efforts for a ban, but the decisive event was in 1986, when DuPont, with a 25% CFC global market share, called publicly for limits on future production. Only a year later the Montreal Protocol was signed. Within 3 years the phase-out of CFCs was scheduled and irreversible.

DuPont's continued opposition to the CFC ban could have defeated the Montreal Protocol, contend Andersen and Sarma. So why did DuPont turn its previous opposition into support? Mainly it was motivated by a desire to boost profit by producing and selling patented, more-costly alternatives to off-patent, cheaper CFCs. "The alternatives…would not have found a market if the cheaper CFCs continued to be marketed" [18].

The reason behind DuPont's switch sounds much simpler in retrospect than it would have beforehand. The move could have backfired: other CFC producers could have continued to resist the ban (they soon followed DuPont's lead); the switch could make DuPont look greedily opportunistic (it did to some, but probably not many people); it could make DuPont or the industry appear dishonest to regulators[16] (again, perhaps to some, but probably not to many); or the momentum for a ban could have fizzled out for other reasons (this did not happen).

[16] See "Uwe Lahl's Rules" in Sect. 4.3, page 36.

4.6 For the Chemical Industry, Sustainability Is Conciliation

As pioneered by DuPont, Shell and others, sustainability is a conciliatory approach to regulators, to neighbors, to the general public, to employees and (sometimes) to critics, who are known as stakeholders. It displaces a more hostile, stonewalling approach to these groups. It is primarily about environmental impacts, and over the years it has come to include some social impacts as well. There is an offensive side and defensive side to sustainability, as the DuPont and Shell examples show.

Sustainability in the chemical industry is, at its heart, about public relations. By this we mean public relations in a broad sense, not just in a narrow sense of political "spin". And "sustainability" public relations need neither be cynical nor merely cosmetic.

As we will see in the next section, sustainability also is a slippery concept that means one thing to the public, another to academics and yet another to financial markets. The financial markets' view of sustainability is fairly close to that of the chemical industry's in practice, which is covered in the subsequent section.

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Chapter 5
How Others Define Sustainability

Abstract Definitions of sustainability vary dramatically. This chapter reviews the views of the general public, academics wand financial markets.

Keywords Sustainability • Definitions • Strategy • Communications • Public image

Sustainability is a slippery term that means different things to different groups. To the general public, it means showing concern for the environment. Theorists also see it that way, but they struggle to define that concern in any uniform, consistent way.

The financial community defines sustainability very differently. To professional investors, sustainability primarily means avoiding scandal; secondarily it means capitalizing on the opportunities of environmental and social protection. Over the past two decades, an entire subsector of the financial industry – sustainability analysis – has grown up to rank public companies on these factors. This perception of sustainability is shared to a great extent by the chemical industry.

In the following subsections, we present the views of the public, of academics and of financiers. In the next section, we look at how chemical companies put sustainability into practice.

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5.1 The Popular View of Sustainability

Soaring eagles, thriving polar bears, smiling third-world children – all these are possible if we recycle our empties and turn out the lights when we leave the room. And while we're at it, let's rock for "a climate in crisis" at the next Live Earth[1] concert.

Clearly, popular views of sustainability are not particularly rigorous. Neither is the advice offered by some public agencies. For instance, a sustainability guidebook issued by the US State of Washington [1] urges residents to use renewable energy and to buy locally, although the benefits of these are highly debatable, along with offering chestnuts such as "plan for the long-term" and "deal with local problems". A website published by the UK's Cornwall County Council [2] claims that 4×4 automobiles are not sustainable, "because 4×4s and SUVs[2] are generally heavier than conventional cars, they need bigger engines, which tend to produce more carbon dioxide. Although 4×4's kick out a lot of pollution they are by no means the worst. Some small cars are worse in terms of fuel efficiency."

The best definition of how the general public views sustainability is: showing concern for the natural environment and human health. "Trying to do the right thing" might be another phrase for it, with an emphasis on the trying. Whether or not the action really is the right thing is secondary and often blithely presumed.

Probably the largest area of debate surrounds the notion of sacrifice. Must we sacrifice economic growth or personal consumption to protect the environment? According to a 1990 survey of typical Americans [3], two-thirds believed that "economic growth, environmental protection and the health and happiness of people can be accomplished without sacrificing any one of them." About one-fifth of those surveyed believed there must be trade-offs (and presumably the remaining tenth are undecided).

The chemical industry faces an uphill battle to appear sustainable to the general public. Not only are many chemicals inherently dangerous, many are dreaded (seen as potentially catastrophic, dangerous to future generations, involuntary and uncontrollable) or unknown (the dangers are hidden, delayed in time or simply not yet recognizable) – and sometimes all three.

One of the few industries the public sees as even less sustainable than chemicals is nuclear power. Whatever its safety record, the public consistently ranks it highly

[1] The Live Earth concert on 7.7.07 was, according to its organizers, "a monumental music event that brought that brought together a global audience to combat the climate crisis." Live Earth staged concerts in major cities – plus special broadcast events in places including Antarctica – featuring older acts such as The Police, Genesis, Bon Jovi and Madonna with younger acts Kanye West, Kelly Clarkson, Black Eyed Peas and Jack Johnson. Live Earth's 24 h of music across seven continents "delivered a worldwide call to action and the solutions necessary to answer that call" http://www.liveearth.org/. Cynics might see the concert as a marketing campaign for its performers and for its "official partners" such as eBay, Pepsi, Smart cars and other youth-oriented brands.

[2] Sport utility vehicles.

on dread and unknown. As one expert on environmental risk points out, laypeople see atomic energy as far more dangerous than, say, bicycles or power tools, even though experts judge the latter to be more likely causes of individual harm.

5.2 The Theoretical (Academic) View of Sustainability

Academics, like the general public, also see sustainability as showing concern for the natural environment and human health, but they struggle to define that concern in any uniform, consistent way. This is not for lack of trying. A search of the keyword "sustainability" on Scopus, the world's largest abstract and citation database of scholarly research, cites 21,394 articles written since 2000.

A key difficulty is the slipperiness of the concept itself. The best-known definition was the one proposed in 1987 by the United Nation's Brundtland Commission [4], which said sustainability describes economic activity that meets "the needs of the present without compromising the ability of future generations to meet their own needs." As one research project [5] summarizes: "Sustainable development simply means development that genuinely sustains and improves economic, social and environmental wellbeing with no major trade offs, locally and globally, now and in the future." Taken at its word, this definition is almost irrelevant, akin to the "how-many-angels-can-dance-on-the-head-of-a-pin" questions that occupied medieval scholars. It is impractical: sustainability could be achieved only in hindsight, and, given the earth's inherent propensity for change, it is downright unnatural.

Another concept often associated with sustainability is the "precautionary principle". As defined in the "Wingspread Consensus" [6]:

> …While we realize that human activities may involve hazards, people must proceed more carefully than has been the case in recent history. Corporations, government entities, organizations, communities, scientists and other individuals must adopt a precautionary approach to all human endeavors. Therefore, it is necessary to implement the Precautionary Principle: When an activity raises threats of harm to human health or the environment, precautionary measures should be taken even if some cause and effect relationships are not fully established scientifically. In this context the proponent of an activity, rather than the public, should bear the burden of proof. The process of applying the Precautionary Principle must be open, informed and democratic and must include potentially affected parties. It must also involve an examination of the full range of alternatives, including no action.

As such, the precautionary principle – which boils down to the nostrum "be careful" – is as slippery as sustainability itself, but it does underpin one practical application: assessing environmental trade-offs. A well-known example is the UK government's Stern Report [7], which concluded that the world should invest more now in preventing global warming to avoid greater losses in future. Trade-off assessments can be done by a variety of methods such as contingent valuation, cost-benefit analysis, life-cycle assessment or risk assessment.

Other than this summary, academic notions of sustainability are not detailed further in this book, because either they are not actually about sustainability or they are impractical. Still, we would also note that the gulf between how sustainability is defined in theory and in practice may be confusing to many observers.

5.3 The Financial Market View of Sustainability

To the financial community, sustainability primarily means preventing scandal. The words sustainability and responsibility are used interchangeably, e.g. "sustainable" companies are "responsible" companies or sometimes "socially responsible" companies. Sometimes sustainability also means capitalizing on business opportunities believed to be environmentally beneficial.

Within the financial world, sustainability is defined by the sustainability ratings industry. In the following two subsections, we describe that industry and how it defines sustainability in more detail.

5.3.1 The Sustainability Ratings Industry

Sustainability ratings of public companies, including chemical companies, are published regularly by the sustainability ratings industry. An example of rating criteria are presented in Table 5.1. Ratings are intended to guide investors trying to identify sustainable or responsible companies. Sustainable or responsible investing is a significant force in financial markets: it accounts for 3–5% of public equity in the developed world, and that proportion probably will double by 2015.

Some of the more prominent ratings firms are: Calvert, Centre Info, Ethical Investment Research Service (EIRIS), Ethos, Innovest, INrate, KLD, SiRi, Sustainable Asset Management (SAM) and Vigeo. Two of these, EIRIS and SAM, supply the research for two sustainability share-index families, the FTSE4Good indices and the Dow Jones Sustainability indices.

Sustainability ratings are based on information reported by the rated companies. To promote and guide this reporting, ratings companies and asset managers have created two UN-sponsored projects: Principles for Responsible Investment[3] (PRI) and the Global Reporting Initiative.[4] Money managers who have signed up to the PRI reportedly look after $13 trillion in assets.

5.3.2 Sustainability: Avoid Scandal, Pursue Eco-Opportunities

In the world of sustainability ratings, sustainability primarily means preventing scandal. Sometimes it also means capitalizing on business opportunities believed to be environmentally or socially beneficial. We examine these meanings in the

[3] http://www.unpri.org/principles/.

[4] www.globalreporting.org/.

Table 5.1 An example of corporate sustainability assessment criteria

Dimension	Criteria	Weighting (%)
Economic	Codes of conduct/compliance/corruption and bribery	5.5
	Corporate governance	6.0
	Risk and crisis management	6.0
	Industry specific criteria	Depends on industry
Environment	Environmental performance (eco-efficiency)	7.0
	Environmental reporting[a]	3.0
	Industry specific criteria	Depends on industry
Social	Corporate citizenship/philanthropy	3.5
	Labor practice indicators	5.0
	Human capital development	5.5
	Social reporting[a]	3.0
	Talent attraction and retention	5.5
	Industry specific criteria	Depends on industry

From sustainability asset management, which does the ratings for the Dow Jones sustainability index
[a]Criteria assessed based on publicly available information only

following two subsections. As it turns out, these definitions inform the chemical industry's view of sustainability – which we explore in the next section.

5.3.2.1 Avoiding Scandal

Scandal – from the sustainability viewpoint – is an event that brings the rated company into disrepute. It can be environmental (contamination of groundwater), social (use of slave labor) or ethical (bribery to win business). Most sustainability ratings do not rate financial performance as such; this is left to mainstream financial analysts.

Within the industry and among investors, there are various opinions as to what a scandal is and how scandals should be weighted against one other. A few sectors are considered by most ratings companies to be fundamentally scandalous: armaments, tobacco, pornography and in some cases nuclear power.

For the remaining companies, ratings focus on three main questions about a given company: Did you have a recent scandal? Have you made or are you making amends for past scandals? Do you have systems in place to prevent future scandals?

5.3.2.2 Pursuing Environmental Opportunities

Sometimes companies are rated as sustainable, simply because of they are in a sector deemed to be beneficial to the environment: such as renewable fuels, water treatment or recycling. This is less widespread than the "avoiding scandal" approach, and the method appears to be far less rigorous.

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Chapter 6
How Chemical Companies Define Sustainability, in Practice

Abstract The core research of the book is outlined here, first the method and then the major findings.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image

Within the chemical industry, sustainability began as a conciliatory approach to relations with the public – regulators, neighbors, the general public, employees and some critics – who have been renamed as stakeholders. Sustainability displaces a more hostile, stonewalling approach to these groups. It began with communication and sometimes discussion of environmental impacts, and over the years it has come to include social impacts as well.

There are both defensive and offensive sides to sustainability. The defensive side is aimed at boosting the industry's negative image and at avoiding liability: put more bluntly, this means avoiding scandals. The offensive side is aimed at optimizing competitive advantage through regulation: put more bluntly, this means engaging with regulators, rather than fighting or stonewalling them, to shape regulations.

Sustainability has been built into the organization and operations of many chemical companies. As such, there are three main functions to sustainability:

- A "stakeholder" approach to communications and external relations, i.e. voluntary reporting about non-financial performance.
- A rebranding of regulatory compliance and risk management, with emphasis on their benefits to stakeholders. In limited cases this extends to "beyond compliance" measures, where corporate environmental or social targets exceed those required by law.
- Recognition (and even celebration) of the opportunities, not just the costs, of environmental and social protection.

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At the same time, not all chemical companies have adopted sustainability, and among those that have, the emphasis can vary considerably.

This chapter details the preceding paragraph, based on research of the world's 29 largest chemical companies. In the first section, we describe that research. In the following four sections, we inspect: sustainability within the corporate organization; approaches to stakeholders; rebranding of compliance and risk; and celebration of green opportunities. In the final section, we briefly address the idea of economic sustainability.

In the next chapter, we examine the idea of sustainability "brands" among chemical producers.

6.1 Research Method

Because sustainability is about public relations, we based our research on public information, primarily on the sustainability reports and websites published by most chemical majors, supplemented by some private discussions. The premise is that sustainability is what these leading companies (Table 6.1) say it is.

Sustainability is not always called by its name. It is also called "corporate responsibility", "corporate social responsibility", "corporate citizenship" or sometimes just "environmental". In practice, these mean pretty much the same thing, so in our research we have looked for the sustainability concept, whether or not the precise name was applied.

6.2 Sustainability Within the Corporate Organization

How are chemical companies organized for sustainability? Our research looked for four manifestations of sustainability within the majors' organizations: permanent staff devoted to the issue; guidelines or a charter; awards and associations. We also looked for legacy issues (past or present problems in public relations) that might influence the company's approach to sustainability.

A summary is presented in Table 6.2; legacy issues and manifestations are discussed in the following five subsections.

6.2.1 Legacy Issues

Legacy is a polite name for products or events that have scandalized a company. Twelve of the 29 companies researched have identifiable legacy issues, some of them relatively minor.

Table 6.1 Research target – the world's 30 largest chemical companies, by revenues

Company	HQ country	Ownership
United States (7)		
Chevron	US	Public
Dow Chemical	US	Public
DuPont	US	Public
ExxonMobil	US	Public
Huntsman Corp.	US	Private, Huntsman family
Lyondell Chemical[a]	US	Public
PPG Industries	US	Public
Europe (10)		
Air Liquide	France	Public
Akzo Nobel	Netherlands	Public
Basell	Netherlands[b]	Private
BASF	Germany	Public
Bayer	Germany	Public
Evonik/Degussa	Germany	Foundation
DSM	Netherlands	Public
Ineos	UK	Private
Shell	Netherlands	Public
Solvay	Belgium	Public
Japan (5)		
Mitsubishi Chemicals	Japan	Public
Mitsui Chemicals	Japan	Public
Shin-Etsu Chemical	Japan	Public
Sumitomo Chemical	Japan	Public
Toray Industries	Japan	Public
Other(7)		
China Petroleum and Chemical (Sinopec)	China	State controlled
Formosa Plastics	Taiwan	Privately controlled
KPC	Kuwait	State controlled
LG Chemical	S Korea	Public
Petrochina	China	State controlled
Reliance	India	Public
SABIC	Saudi Arabia	State-controlled

[a] Was acquired by Basell at the end of 1997

[b] Headquarters in the Netherlands, but owned by a US company, Access Industries, which is privately held by a Russian

In most cases, the legacies appear to have affected on why and how the company has adopted sustainability. DuPont started sustainability in as a reaction to its public difficulties with CFCs. Shell adopted sustainability after its public humiliation over disposal of its Brent Spar platform (see Scapegoating, Loss of License, p. 38). Solvay focuses much of its sustainability program on gaining public acceptance of its chlorine and chlorine-derivative products, which have been pilloried in Europe for many years. Shin-Etsu devotes a large part of its current efforts to apologizing and making amends for a 2006 explosion.

Table 6.2 Chemical companies profiled for sustainability

Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
United States							
Chevron	US	Public	Ecuador – environmental impact and cancer claims	VP for policy, government and public affairs, Rhonda Zygocki	The Chevron Way – a charter about communities, environment, human rights and ethical practice	Website says DJSI, but not on current DJSI list Human Rights Equality Index 100% rating	WBCSD, National Petroleum Council report on energy supply and demand
Dow Chemical	US	Public	Asbestos and Bhopal[a] Tittibawassee River contamination Agent Orange litigation	VP, Sustainability, Neil Hawkins Chief sustainability officer, David Kepler. Within matrix org, numerous other sustainability staff	Sustainable development principles	DJSI Various other awards	WBCSD
DuPont	US	Public	CFCs PFOAs	VP and chief sustainability officer, Linda Fisher. Sustainable growth council, chaired by CEO	Core values: Safety and health; environmental stewardship; Respect for people; ethical behavior	Business Week "Top Green Company" 2005 Various other awards	WBCSD
ExxonMobil	US	Public	Alaskan oil spill	Ten Board committees tasked with responsibilities	Statement of corporate citizenship	10 of 10 score from Governance Metrics Int'l	
Huntsman	US	Private, Huntsman family			Commitment to sustainability	Various local awards to plants and sites	

Lyondell Chemical[b]	US	Public			"Basic elements" statement of aims. No mention of sustainability issues except "be ethical". Vague statement about sust on website		
PPG Industries	US	Public	Contamination in Lake Charles area, probably not of national attention		Several broad statements on website	Previously in DJSI	Member of Climate Northeast Partnership
Europe							
Air Liquide	France	Public		Xavier Drago, Sustainable Dev Director. Anne Lechevranton, VP, Corp Communication	"Principles of Action", 2006 statement about protecting environment, integrity, transparency and anti-corruption	Ethibel Sustainability Index since 2005	Observatoire sur la Responsabilité Sociale des Entreprises (ORSE)
Akzo Nobel	Netherlands	Public		Sustainability Council in Board of Mngmnt. Gen Mngrs have sust targets. Sust "focal points" in all biz units. Director of sustainability, Andre Veneman. Media contact, sustainability, Marc Michelsen	Statements of values, business principles and commitments	DJSI, previous listing in FTSE4Good. Best in class in Storebrand SRI ranking	WBCSD

(continued)

Table 6.2 (continued)

Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
Basell	Netherlands[c]	Private					
BASF	Germany	Public	Poison gas, slave labor in the 1940s	Sustainability Council, led by Board Member Harald Schwager. Regional steering comms and Sustainability Center to coordinate. Project teams handle specific programs. Climate protection officer, Ulrich von Deessen. Chief compliance officer	Issue framing, to identify and rank "issues of interest" to society and BASF	DJSI Global 100[d]	WBCSD
Bayer	Germany	Public	Poison gas, slave labor in the 1940s	Corporate Sust Board since 2004, Sustainable Dev Planning Group, Environment Sustainability Dept. Head of Enviro and Sustainability, Chair of Climate Program, Wolfgang Entrup	Policy on climate change	DJSI FTSE4Good Advanced sustainable performance index Storebrand best in class rating Low-carbon leaders	WBCSD

Evonik/ Degussa	Germany	Foundation	Poison gas, slave labor in the 1940s		Global code of conduct	FTSE4Good Various local awards to plants and sites	WBCSD Ecosense Euro Corp Social Responsibility Alliance
DSM	Netherlands	Public		Vice chair of Board, Jan Zuidam, chairs Corp SHE Committee. SHE Council reports to it. Dept of Corp Sustainabillity	"What we believe in" principles. Vision 2010: retain top rankings in SHE and sustainability, leadership in biotech, improvement of eco-footprint, more diverse/int'l staff	DJSI Formerly in FTSE4Good	WBCSD China Bus Council for Sust Dev World Economic Forum Leaders for Nature
Ineos	UK	Private	CFCs, PVC and chlorine		Excellence in safety, health and environmental performance is our top priority and we are open and honest about such performance, which we publish locally and nationally, as required		

(continued)

Table 6.2 (continued)

Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
Shell	Netherlands	Public	Brent Spar	Sust Dev and HSSE Executive Group, chaired by CEO	Business principles	Global 100	
			Niger Delta	Social Responsibility Committee. Sust dev targets account for 20% of bonus scorecard			
Solvay	Belgium	Public	PVC and chlorine, F-gases		Commitment of responsibility, innovation, durability, proximity		
Japan							
Mitsubishi Chemicals	Japan				Review to strengthen CSR is underway		WBCSD
Mitsui Chemicals	Japan	Public		CSR and Corporate Communications Division est in April 2007. 334 staff "CSR Supporters" named	Broad aims built into "Grand Design" and 2007 "Action Guidelines". Staff training on guidelines	Various specific awards, but none for sust as such	WBCSD
Shin-Etsu Chemical	Japan		Naoetsu plant explosion	CSR Promotion Committee, chaired "by Managing Director, Kiichi Habata	CSR Vision and Basic Policies. Environmental Charter	FTSE4Good	
Sumitomo Chemical	Japan	Public				DJSI (part of Sumitomo Corp)	WBCSD

Toray Industries	Japan	Public	CSR committee, chaired by VP. CSR operations group est in 2006, within strategic planning. Training and promotion throughout corp	Corp Mission and Principles CSR guidelines set up in 2004 "10 basic environmental rules'	DJSI KLD Global Climate 100	
Other						
China Petroleum and Chemical (Sinopec)	China	State controlled				WBCSD China Bus Council for Sust Dev
Formosa Plastics	Taiwan	Privately controlled				
Kuwait petro-chemical (KPC)	Kuwait	State controlled		HSE Vision of excellence. No explicit mention of sustainability or stakeholderism		WBCSD
LG Chemical	S Korea	Public		Core values – a vague statement of growth and value creation	Various specific awards, but none for sust as such	Korea Bus Council for Sustainable Dev Korea Assn of Enviro Friendly Companies

(continued)

Table 6.2 (continued)

Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
Petrochina	China	State controlled			Not a single document as such. Perhaps UN Global Compact serves as guidelines		
Reliance	India	Public			Our Vision – statement of economic, financial and socio-enviro aims Company-wide sustainability strategy in development		WBCSD, joined in mid-2007
SABIC	Saudi Arabia	State-controlled					

[a] Legacies of the former Union Carbide, which was acquired by Dow in 2001
[b] Was acquired by Basell at the end of 1997
[c] Headquarters in the Netherlands, but owned by a US company, Access Industries, which is privately held by a Russian
[d] BASF is classified as a "materials" company, not a chemical company

6.2.2 Corporate Organization for Sustainability

Thirteen of the 29 companies have an identifiable organization dedicated to sustainability. In nearly all cases, ultimate responsibility rests with a member of the management board, the board of directors or a vice president. Sustainability teams tend to be built into or around three existing functions: environmental management, public relations and/or strategic planning.

Companies such as Dow, DuPont, Akzo Nobel, BASF, DSM, Shell and Toray have built sustainability deep into their organizations, with some responsibility in most business units. Often this is a part-time responsibility; in this sense sustainability is managed similarly to "initiatives" such as quality-improvement or cost-cutting. At Shell, 20% of bonuses are predicated on sustainability targets.

Five of the companies surveyed – Basell, Ineos, Formosa Plastics, Kuwait Petrochemical and SABIC – have little to no interest in sustainability. Not surprisingly then, they have no sustainability organizations.[1] Mitsubishi is just getting started with sustainability, and probably will have an organization soon.

The remaining ten companies almost certainly have some sustainability organization. However, either they choose not to report about it or we were not able to find it in the public domain.

6.2.3 Guidelines or Charter (and Definitions)

All but 6 of the top 29 publish some guidelines or charter about sustainability, although not always using that specific word. Not surprisingly, the six are those that show little interest to date in sustainability: Basell, Ineos, Formosa Plastics, Kuwait Petrochemical, SABIC and Mitsubishi.[2]

Their choice not to have a charter is conscious. Clearly, they know what sustainability is, and they explicitly choose not to adopt it. SABIC, in its 2007 annual report, defines sustainability succinctly and well: "Our understanding of CSR is clear and straightforward: CSR is about committing to open and transparent business practices based on ethical values and respect for employees and other stakeholders, society at large, and the environment." Although the company went on to say in the same report that it is developing a sustainability policy, this is not yet evident.

Ineos puts a fine point on its rejection of sustainability. On its website, it says: "Excellence in safety, health and environmental performance is our top priority and we are open and honest about such performance, which we publish locally and nationally, as required." A sustainability approach would be to publish *voluntarily*, not just as required.

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[1] Formosa Plastics shows no interest in sustainability, but its US subsidiary does. Formosa Plastics publishes a sustainability report.

[2] Mitsubishi is just getting started with sustainability, and probably will issue guidelines or a charter soon.

The remaining 24 publish broad statements about their commitment to sustainability. Sometimes these are "motherhood statements", written by advertising agencies, that tend to hyperbole. Readers of this book might think Dow Chemical is a leading chemical company, and they might think that is impressive in itself, but Dow goes further, claiming that "we strive to constantly improve those things essential to human progress. From the clothes we wear to the food we eat. From the homes we live in to the furnishings, fixtures and fittings that adorn them …." It is hard to read this and not be reminded of the claims of a restaurant chain, Hard Rock Cafe, to be saving the planet by recycling some waste, using electric-start ovens and trash compactors [1].

A less over-the-top and surely more accurate statement is that of Korea's LG Chem, which says it will "work tirelessly to be a company that is respected by the general public through sustainability management giving balanced consideration to environmental, social and economic factors." Other than the "tirelessly", this sounds realistic and sensible.

Meanwhile, several companies offer their definitions of sustainability, which we find to be fairly similar to the definition we present in this and the preceding chapters, for example:

- DSM – DSM's Corporate Values (Valuable Partnerships, Respect for People and Good Corporate Citizenship) mean meeting the ever more stringent regulatory requirements and societal expectations that grant us our license to operate.
- Mitsui Chemical – Corporate Social Responsibility means becoming "a Good and Trustworthy Company" that earns the trust of its stakeholders and the pride of its employees.
- Huntsman – Sustainability is founded on the principles of transparency and respect in order to build trust with our stakeholders. Such transparency involves: (1) Identifying key environmental, social, and economic issues affecting our business and the locations where we operate; (2) Disclosing our performance – both the successes and the failures.[3]

6.2.4 Awards

About two thirds of the top 29 companies report awards for sustainability or environmental performance. These come in two basic types: "good neighbor" awards from local or regional governments; and high rankings from sustainability analysts who serve the financial markets.

[3] Huntsman goes on to list two other elements: (3) Committing to continuous improvement by establishing long and short range improvement goals; and (4) Being accountable for our performance by tracking and reporting progress towards the goals identified in our improvement plans. As we shall see, there is some question as to whether these are part of sustainability or not. Nonetheless, there is a clear consensus that sustainability means reporting, or as Huntsman puts it, disclosure.

Some of the more prominent ratings firms are: Calvert, Centre Info, Ethical Investment Research Service (EIRIS), Ethos, Innovest, INrate, KLD, SiRi, Sustainability Asset Management (SAM) and Vigeo. Two of these, EIRIS and SAM, supply the research and make the selections for two sustainability share-index families, the FTSE4Good indices and the Dow Jones Sustainability indices (DJSI).

6.2.5 Associations

Just over half of the companies report membership in sustainability associations such as the WBCSD, the World Business Council for Sustainable Development.

Association membership can serve several functions: signal to stakeholders that the company is committed to sustainability; provide to the company information and guidance, through joint research and discussion; advertise as a third-party the company's efforts or programs; and organize some engagement with stakeholders.

6.3 Stakeholder Approach to Communications

One function of sustainability in the chemical industry is a "stakeholder" approach to communications and external relations, i.e. voluntary reporting about non-financial performance.

Stakeholding can be an incredibly broad concept. According to the Stakeholder Engagement Manual [2], stakeholders are "any group or individual who can affect, or is affected by, an organization or its activities. Also, any individual or group that can help define value propositions for the organization."

For this book, we take a more limited view. We see stakeholders as people or groups that take a direct interest in a company's environmental or social performance. Obvious stakeholders are: regulators, employees (and potential employees), local communities, activists and eco- or socio-conscious investors and customers. In the first subsection to follow, we discuss this definition in more detail.

Our research looked for five manifestations of approaching these stakeholders: sustainability reporting, Responsible Care, consultation or dialogue, partnership and philanthropy. The findings are presented in Table 6.4 and in the following subsections under the heading "How are stakeholders engaged?".

6.3.1 Defining Stakeholders (or, Who Reads These Sustainability Reports?)

When sustainability started in the 1980s, stakeholders were obvious: they were the people protesting outside the plant gate. Indeed, a whole branch of public relations, known as crisis management, has emerged to deal with this sort of situation. Senior

Table 6.3 Chemical industry stakeholders (in descending order of importance)

Stakeholders	Description
Regulators	Not just elected officials, who were considered stakeholders long before the term was coined, but bureaucrats as well
Employees	Not just current ones, but prospective ones, especially students
Local communities	Those surrounding industrial operations
Eco- or socio-conscious investors and customers	Customers can be downstream companies, retailers or end-users of finished products (that contain chemicals or were manufactured with the use of chemicals)
Activists	These can be unaffiliated individuals, but more often they are larger groups, called non-governmental organizations (NGOs), such as Environmental Defense Fund, Greenpeace and WWF

managers at many companies are trained on what they should say and how they should act under the circumstances. But this is more about survival[4] or crisis management than sustainability. Indeed, sustainability is meant to prevent such protests in the first place.

So not surprisingly, when sustainability was starting, much attention was given to "activists" – people or groups that would organize protests. Over time, chemical companies have broadened their definition to four additional groups as well (Table 6.3).

Activists have slipped in priority for two main reasons. First, chemical companies realize that the other groups are more important to them. For instance, Greenpeace embarrassed Shell over disposal of the Brent Spar only because it was able to spur the outrage of the media and of Shell's customers. Greenpeace has shown similar dedication to many other causes that never capture the general public's attention. Second, by definition, many activists view "sustainable chemical production" as a oxymoron. To some extent, they were founded expressly to oppose chemicals, and their continued funding (by contributions from the public) depends on confrontation. Sustainability only works if both the company and its stakeholders grant each other some legitimacy and listen to each other – at least a bit.

[4] As the case of former Hoechst chairman Wolfgang Hilger shows. In February 1993, one of the company's reactors at a site near Frankfurt (not the main one in the town of Hoechst itself) exploded, showering an area about 1,200 × 300 m with chemicals. At least 40 residents needed medical treatment. The company tried to downplay the seriousness of the incident and denied the danger of the chemicals, which began to look ridiculous when clean-up workers sent by Hoechst showed up wearing protective suits and masks. Hilger, who was on holiday at the time of the explosion, did not cut his holiday short, and he apologised to the public only after nearly 2 weeks of sharp criticism by residents, media, and environmental ministries at state and national level. Even then he was showed little or no contrition, and so over time he lost support within Germany's industry and financial community. Hilger survived in his job for nearly a year; in the spring of 1994 he was forced into retirement. Within weeks of taking over, Hilger's successor Jürgen Dormann declared a 'new start', implicitly condemning Hilger's approach.

Perhaps as many as half of the 29 companies surveyed – including BASF, DSM, LG Chem, Mitsui, Solvay and Shell – have undertaken research to determine specifically who their stakeholders are or should be. LG Chem and Mitsui publish matrices showing their stakeholders in detail. Many of the 29 monitor how their reporting is used and solicit feedback on reporting from their stakeholders. A few even report this feedback: for instance, in its 2008 sustainability report, Solvay devotes a page to comments from six stakeholders: two customers, an employee, a local resident, an eco-conscious investment house, and an activist.

Somewhat ironically, both the local resident and the activist complain that Solvay reported too much. As the resident put it: Solvay's "report contains too much information, sometimes detailed or superfluous, on too many topics. A table showing all the projects to be accomplished by 2008, with quantified targets together with the results already achieved, would constitute a clearer "contract" between Solvay on the one hand and those with whom the Group has business dealings or who live locally, on the other."

This over-reporting tendency has been identified by others, including Akzo, BASF, DSM and Shell. It is one reason why those companies and a number of others have moved to "issue-focused" reporting. DSM, for example, after a sustainability policy review in 2007, began to organize its reporting around four key issues: "climate and energy, health and well being, functionality and performance,[5] and emerging economies.[6]"

Still, most of the sustainability reports reviewed for this study tend to be tedious, overblown and self-congratulatory. And the issue-focused ones tend to be the worst in the last two respects. With no hint of irony, some of the world's largest polluters proudly proclaim that they are helping to save the planet.

Which raises a final issue: "Who reads this stuff, anyway?" Faced with a stack of sustainability reports from chemical companies, this question was posed by a reviewer of this book. Good question, and the short answer is that sustainability reporting is similar to financial reporting. Many readers are internal, i.e. within the company itself. And a sustainability report often is the source of advertising and other corporate communications. External readers are a relatively few "opinion leaders" who then disseminate the content further.

6.3.2 How Are Stakeholders Engaged?

Our research examined the top 29 chemical companies for five manifestations of approaching stakeholders: sustainability reporting, Responsible Care, consultation or dialogue, partnership and philanthropy. The findings are presented in Table 6.4 and discussed in the subsections thereafter.

[5] Which means eco-efficiency.

[6] Which means that DSM is working to high environmental and social standards in the developing world.

Table 6.4 Approach to stakeholders

Company	HQ country	Sustainability report, GRI compliance, audit	Responsible care	Consultation or dialogue	Partnership	Philanthropy
United States						
Chevron	US	Corporate Responsibility report since 2001	Chevron Phillips Chemical rejoined in 2007	$119 mln in community engagement	Angola Partnership $25 mln.	Discovery Channel Education Partnership
		Benchmarked and largely compliant with GRI guidelines		Stakeholder engagement training	NGO leadership workshops	Vocational training in Bangladesh and Indonesia. HIV/AIDS project. Disaster aid in Philippines
		Audited by Lloyd's Register		Corp-wide program for Environmental, Social and Health Impact Assessment started in 2007	Indonesian biodiversity project. Operation Clean Sweep to reduce plastic waste	Indicator for community investment
Dow Chemical	US	Corporate Report in 2007, combines stakeholder with economic performance reporting	Member	Corporate Environmental Advisory Council, since 1991 [2]		Ambassador of Environment. Loan guarantees to WaterHealth Int'l. Habitat for Humanity. Total philanthropy in 2007: $54 mln.
		Separate GRI reports were issued from 2002 to 2006. Pending in 2007. Dow is considering audit, but has not yet implemented	Applied Responsible Care Guiding Principles to global operations in 1999	Community relations assessment for all major sites by 2015		

DuPont	US	GRI report is extracted from other corporate reports. GRI principles applied "where feasible". Appears to be broadly compliant, but not audited	Member, Community Advisory Panels at "almost every DuPont site around the world"	Biotech and Health Advisory Panels. Former developed Bioethics Guiding Principles	Environmental Defense Fund, t o develop standards of care for nanotech	$22.7 mln in donations
ExxonMobil	US	Corporate Citizenship Report, following IPIECA and API guidance, consistent with GRI G3 guidelines. Audited by Lloyd's Register	Member	Extractive Industries Transparency Initiative, Voluntary Principles on Security and Human Rights. Best Practices in External Affairs – community consultations. Citizen Engagement Forums. Opinion Leader Dialogues. Employee forums. ESHIA for new sites	Supported local NGOs and associations in Angola, Indonesia	Support to education, Africa Health Initiative, local health care, local economic development. Employee volunteering. $206 mln in community investment (unclear split between capital spending and giving). At least 10 biodiversity preservation and restoration projects

(continued)

Table 6.4 (continued)

Company	HQ country	Sustainability report, GRI compliance, audit	Responsible care	Consultation or dialogue	Partnership	Philanthropy
Huntsman Corp.	US	No	Member, original signatory in 1988. Open days and events at various sites			Local support of education, disaster relief and community volunteering. Huntsman Family foundations have donated several $100 mln to cancer research, education and other causes
Lyondell Chemical[a]	US	No	Member. Active CAPs and visiting programs, including "Global Care Day"			Support of education, local communities, matching-gift program
PPG Industries	US	Reporting as part of website. Benchmarked against GRI guidelines	Member, original signatory in 1988			Onsite wildlife conservation projects
Europe						
Air Liquide	France	Sustainable Development Targets and Indicators. Not benchmarked to GRI, but uses many of its indicators. Audited by Mazars & Guerard and Ernst & Young	Member in some countries and sites			Sponsors healthcare, education, environmental actions. €1 mln/yr at group level. Aim to create corporate foundation in 2008

Akzo Nobel	Netherlands	Sust reports since 2004. GRI G3 A+ in 2007. Audited by Ernst & Young	Member. CAPs, Open Days and local publications	Employee survey and forums In 2007 engaged with Amnesty Int'l, World Resources Institute and WWF		Community program started in 2005 – volunteering and support
Basell	Netherlands [b]		Member			
BASF	Germany	"Facts and Figures" report, plus supplements on website. GRI G3 A+ compliant. Not audited, but checked by GRI	Member. Competence Center for group with four staff, reports to Schwager. Expert groups and audit team. 66 CAPs at BASF sites	Leadership feedback. Employee surveys	Developed eco-evaluation software for textile dying with UNEP and UNIDO	€75 mln supporting communities, education, sport and culture. Volunteer support
Bayer	Germany	Sustainable Development Report, GRI G3 A+, audited by Ernst & Young Carbon Disclosure Project	Member. BayKomm HQ in Leverkusen	External and employee surveys. Survey of Sustainable Dev Report readers – what topics they want to see		"Bayer Cares Foundation", "Science and Education Foundation". Support for education, health, sport, local communities, water conservation. "International Children's Painting Competition on the Environment." Billion-Tree campaign, anti-malaria projects. €1 mln/yr support to UNEP for enviro education

(continued)

Table 6.4 (continued)

Company	HQ country	Sustainability report, GRI compliance, audit	Responsible care	Consultation or dialogue	Partnership	Philanthropy
Evonik/ Degussa	Germany	Corporate Citizenship Report, not explicit GRI link, but addresses much of the guidance. Audited by PwC	Global Charter member. Open days at various sites	Employee survey		Degussa Foundation supports education, research and conservation. Local cleanup days
DSM	Netherlands	"People, planet and profit" report. GRI G3 guidelines B+ rating. Audit by KPMG Sustainability	Member	Employee Engagement Survey. Stakeholder assessment study	Supports UN World Food Program with tech advice, $1 mln of hi-nutrient products, volunteers Groundwater cleanup in Toansa, India	€2.5 mln support of education, culture, sport and social projects. Torch projects for local communities
Ineos	UK		Member			
Shell	Netherlands	Sustainability Report, based on IPIECA guidance, consistent with GRI G3 guidelines. A+ ranking, according to Shell's self assessment External review by six experts, but not by auditors	Member, with similar approaches taken to non-chemicals ops.	Global advertising campaign. Round Tables for Sustainable Palm Oil, Sustainable Biofuels. Drilling program in Beaufort Sea. Social Performance Plans for sites	$1.1 mln/yr each to biodiversity projects with IUCN and Wetlands Int'l. $2 mln to Port Arthur Communities Fund	$20 mln to community development in Niger Delta. $170 mln in social investment. HIV/AIDs education Shell Foundation funded w $250 mln in 2000: poverty relief and economic development

Solvay	Belgium	Towards Sustainable Development reports, 2004–2008. Guided by GRI	Member. Open days, info packs, complaint lines, public emergency plans. Good Neighbor Program	Policy of "dialogue and strategic choices with stakeholders" Employee survey, triennial. Sponsor of "Greenfacts"	Support to local communities, education
Japan					
Mitsubishi Chemicals	Japan	No report, but a webpage of "Corp Citizenship Activities"	Member		Education and culture sponsor. Promo of recycling, waste disposal, green businesses
Mitsui Chemicals	Japan	CSR report since 2005. GRI and Japan govt guidance used. No audit, however, "third-party comments" from two academics included	Member. Public tours at various sites, "Public Relations" newsletters. Detailed in CSR report	Explicit stakeholder focus – relations shown in CSR report. CSR survey of suppliers. Meetings with local communities at two plants	Disaster relief, community volunteering, cleanup projects, "wonders of chemistry" sponsor for schools. Culture, education sponsor
Shin-Etsu Chemical	Japan	Environmental and Social Report. Broadly to GRI guidelines, but not benchmarked or audited	Member Third-party audits since 2006	Reaction to Naoetsu explosion. CEO renounced 50% of pay for 6 months as apology	Donation campaign for UN High Commission for Refugees. Volunteer programs, and support for sport, culture, health

(continued)

Table 6.4 (continued)

Company	HQ country	Sustainability report, GRI compliance, audit	Responsible care	Consultation or dialogue	Partnership	Philanthropy
Sumitomo Chemical	Japan	Corp Social Responsibility Reports, 2004–2007 (EHS Report from 1998 to 2003)	Member. Open Days			Donations to WHO anti-malaria project. Local volunteering. Support to local communities, culture
		Although labeled CSR, report is entirely about the environment	Audits of individual sites			
Toray Industries	Japan	Corp Social Responsibility report	Member. Dialogue w local communities as part of CSR program	Broad stakeholder dialogue plan adopted in 2005		Contributes 1% of ordinary income to "social" activities: education, culture, disaster relief
		GRI compliant and benchmarked, but not ranked. Third-party review by Aarata Sustainability Certification				
Other						
China Petroleum and Chemical (Sinopec)	China	Sustainable Dev Report, first in 2007. GRI G3 guidance applied. ERM reviewed report		Stakeholder Communications map		Poverty and disaster relief. Support for cataract patients, education, health care, culture and sport
Formosa Plastics	Taiwan		Formosa Plastics US is a member			
KPC	Kuwait					Donations to handicapped

LG Chemical	S Korea	Enviro reports since 2003, switched to Sustainability report in 2006. GRI G3 A+ certified. Audited by KMAR	Member. Separate annual report since 2003. RC Committee reports to CEO. RC assessment	Survey of stakeholders in 2006. Their requests are included in 06 Sust Report "Voice of the customer" program detailed in Sust report		"Twin Angel" gift matching, volunteering, cleanup day, support of elderly, disabled. Poverty relief to children, education grants. Chemistry education. Cultural event and community group sponsor
Petrochina	China	Corp responsibility reports started in 2006 (English and Chinese). Benchmarked to GRI guidelines. Not audited		Government and media are explicitly recognized as stakeholder. Efforts to boost media relations in 2007. No clear channels to NGOs		Poverty reduction, agriculture aid, education, disaster relief, Olympics and voluntary works. China's Green Carbon Fund for sequestration

(continued)

Table 6.4 (continued)

Company	HQ country	Sustainability report, GRI compliance, audit	Responsible care	Consultation or dialogue	Partnership	Philanthropy
Reliance	India	Corporate Social Responsibility Report (started in 2005). A+ conformance to GRI G3 principles. Covers all manufacturing. Audited by Ernst & Young	Member	With key stakeholders: survey questionnaires; one-on-one forums; and an open dialogue. Planning "detailed roadmap" for 2008	Gujarat Safety Council, promoting safety culture	Dedicated teams support healthcare, education, economic development in local communities. Village Awareness programmes. Mostly through foundation Greenbelt created outside Jamnagar refinery
SABIC	Saudi Arabia	Corporate social responsibility and SHE sections of annual report	Joined in the US in 2007			$27 mln of donations in Saudi Arabia and Europe

[a] Was acquired by Basell at the end of 1997

[b] Headquarters in the Netherlands, but owned by a US company, Access Industries, which is privately held by a Russian

6.3.2.1 Sustainability Report, GRI Compliance, Audit

Of the 29 leading chemical companies, 24 issue some kind of sustainability report. Nearly all of these show some conformance to the reporting guidelines published by the Global Reporting Initiative (GRI).[7] Japanese companies seem to show the least explicit conformance with GRI, although they nonetheless cover many GRI-recommended issues.[8]

While most reporters show conformance to GRI, opinion is split about auditing. Of the 24 that published, 9 had their reports audited and 4 had them reviewed. According to a member of GRI's Technical Advisory Committee who works in sustainability at one of the 29 chemical majors (that does not audit), auditing is seen by many as needlessly expensive. "The basic premise (of sustainability reporting) is to be accurate, so why audit? Why not take the auditing fees and use them to help a community build houses? I would feel better about it, and so would my company."

6.3.2.2 Responsible Care

Nearly all of the leading companies are in Responsible Care. Of the 29, all the US, European and Japanese ones are in Responsible Care, and so are four of the seven from other regions.

Responsible Care was started in 1985 as an initial response to the industry's public relations problems, and over time it has become a subset of corporate sustainability. It is a community relations program for production sites that involves identifying and then engaging stakeholders to resolve problems and avoid conflict. Two of its "fundamental features" are those of sustainability: (1) open communication on health, safety and environmental matters with interested parties, both inside and outside the industry, and (2) the development of indicators against which improvements in performance can be measured.

6.3.2.3 Consultation or Dialogue

One of sustainability's core concepts is that companies should solicit opinions of its stakeholders. As DuPont puts it: "We will promote open discussion with our stakeholders about the materials we make, use and transport and the impacts of our activities on their safety, health and environments. We will build alliances with governments, policy makers, businesses and advocacy groups to develop sound policies, laws, regulations and practices that improve safety, health and the environ-

[7] Global Reporting Initiative, or GRI, is a non-profit foundation that was started and initially run by the United Nations. It is now funded by governments, charities and companies. GRI issues reporting guidelines, the latest version is called the G3.

[8] That most reports conform at least roughly to GRI is no surprise, because GRI is mostly a codification of reporting experience.

ment." Ideally, consultation should happen before conflict ignites; indeed, it should help prevent conflict. Consultation with local communities is built into Responsible Care, and consultation with other stakeholders is being tried fairly widely.

Responsible Care recommends the operation of CAPs, or Community Advisory Panels, at production sites. Of the 29 companies studied, four report active CAPs, and probably more than that are unreported – we would estimate at least half of the companies are convening them.

One of the most active community consultations (albeit not through Responsible Care) is reported by Shin Etsu Chemical. After an explosion at its Naoetsu plant, company employees personally went through the surrounding neighborhoods to apologize and to offer help. President and CEO Chihiro Kanagawa apologized at two press conferences, saying: "I am very concerned about the conditions of those people who were injured in this accident, and our company will do its best to see that they will be able to receive the best medical care possible. In addition, we will do our utmost to support the families of those who were injured, and will do our best to assist the local residents who were troubled by the need for an emergency evacuation and in other ways." Kanagawa also announced a personal apology: as a symbol of his regret, he voluntarily took a 50% pay cut for the subsequent 6 months.

For stakeholders other than local communities, 18 companies report consultation or dialogue with them, or at least plans to do so. Nine companies recently conducted surveys of stakeholders; 6 of these were of their own employees. Several companies have formal programs to talk to activists: Dow convenes a Corporate Environmental Advisory Council; Akzo Nobel "engages" with the WWF; Shell participates in 'Round Table's for Sustainable Palm Oil and Sustainable Biofuels. Although not reported explicitly, we estimate that at least one half of the companies talk to eco-conscious investment analysts; this probably is the second-most consulted stakeholder group.

The most-consulted stakeholder group, we estimate, is regulators. In sustainability publications this is a black hole, reported indirectly, if at all. For example, the European and the US industries consulted and lobbied heavily over EU chemicals licensing, the REACH regulation, but this is left unsaid. The only mention of REACH is by companies who report that they are prepared for it and that they are implementing it.

Reliance is an exception; it reports directly about consulting with regulators. The issue is plastic wastes. As the company explains: "Our industry faced a setback in 2006, when various states in India imposed restrictions on the usage of thin polyethylene bags. Usage of polyethylene bags was blamed for causing pollution in water bodies and clogging of sewerage networks due to choking of drains. We believe that plastics, if disposed and managed properly, are harmless and do not pollute the environment. To demonstrate the environmental friendliness of polymer products, we along with Indian Centre for Plastics in the Environment (ICPE), have initiated a programme to recycle polymer waste and established a public-private partnership with a municipal corporation to construct and operate the recycling facility. We are also working towards assessing environmental impacts of polymer products throughout their lifecycle. The results of this study would help correct this perception."

The Western oil producers among the 29 leading companies – Chevron, ExxonMobil and Shell – all report on consultation for oil projects. Chevron and

ExxonMobil report that they have introduced integrated ESHIA (environmental, social and health impact assessment) systems. To a great extent these are required by law in the West, and the systems do not appear to apply to chemical projects.

6.3.2.4 Partnership

Partnership is a step beyond consultation. The idea is that a company agrees to tackle some environmental or social problem together with an outside group. Seven of the 29 companies reported a partnership of some type, two of them (Chevron and ExxonMobil) clearly in the oil sector.

Of the five partnerships in chemicals, one stands out as a project where the company is clearly taking a financial and reputational risk. DSM is voluntarily working with regulators for its site in Toansa, India, to investigate and remediate groundwater contamination. DSM claims to be at most only partly responsible for contamination, but in a spirit of good citizenship, is working to resolve it anyway. The risks here are: (1) financial – DSM may be forced to foot a substantial cleanup bill; and (2) reputational – if the regulators try to make DSM pay, and DSM declines, this surely will harm the company's image.

6.3.2.5 Philanthropy

Only three of the 29 companies – Basell, Ineos and Formosa Plastics – do not report philanthropic activity. The rest report such activity, often prominently. Typical recipients are: education, health care, local community infrastructure, conservation projects as sport and culture sponsorships. Most of it is directed to social stakeholders, the rest to environmental ones.

6.4 Rebranding Regulatory Compliance and Risk Management

The second sustainability function of chemical companies is to rebrand regulatory compliance and risk management, with emphasis on their benefits to stakeholders. They are rebranded in a positive light, because their initial, internal brand is negative – regulations and risk management usually are costs to a company.

In some cases this amounts to more than rebranding; some companies go "beyond compliance" to exceed regulations required by law.

Our research looked at the leading 29 chemical companies for six manifestations of rebranding: operating safety, environmental management systems; environmental commitments and indicators; product (or process) safety; governance; and other (a catch-all for everything else). The findings are presented in Table 6.5 and discussed in the six subsections that follow.

Table 6.5 Rebranding of risk and regulatory compliance

Company	HQ country	Operating safety	Enviro mgmnt system
United States			
Chevron	US	Target of zero accidents	Operational Excellence Management System
		Corporate indicator for safety	Corp-wide program for Environmental, Social and Health Impact Assessment started in 2007
Dow Chemical	US	Corporate indicators for safety, accidents and leaks	Little or no mention in 2007 corporate report
DuPont	US	Target of zero injuries and accidents. Several corporate indicators	"Highest standards for the safe operation of facilities and protection of environment, employees, customers and people of the communities in which we do business." Benchmarked externally as meeting or beating expectations

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
Targets on climate change, energy efficiency and biodiversity Indicators: emissions, energy, and spills		Committed, managed, with several updates in 2007 Chevron Hotline (for whistle-blowing on ethical issues) Business Conduct and Ethics code	Indicator for diversity
UN Global Compact, signed in 2007	Dioxin, furan and PCB – exposure studies in Michigan. Security and Prosperity Partnership on chem. Assessment and management	Committed, managed. Codes of business conduct, financial ethics	
Target on energy efficiency, 25% cut, 2005–2015. GHG targets: 2.5% cut/yr/ weight of product, 2005–2015; by 2025, plateau of absolute emissions, 1 GW of solar cells, 400 MW of other renewable energy; by 2050, 50% of energy consumption from "non-carbon emitting" sources	In-house LCA capacity $10 mln support to Sustainable Products & Solutions Program, UC Berkeley. Public safety assessment for all products by 2015[a]		
UN Global Compact, endorsed in 2001	$1 mln to Global Crop Diversity Trust	Committed, managed. Business Conduct Guide	Supplier diversity – TEMPO
Target cuts for 2004–2015: GHGs 15%, water use 30%, air carcinogens 50%, plus fleet fuel efficiency. Target of zero waste and emissions. Other indicators: energy use, renewable energy, land conservation, GHGs, hazwastes[b]	Product stewardship with review on 2–4 year cycle LCA capacity	Anti-bribery policy	Employee diversity policy. Human rights policy. Rejection of child labor, forced labor

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
ExxonMobil	US	12 indicators	Environmental Business Planning system for each site
Huntsman Corp.	US	Target of zero accident and injuries. Several corp indicators. 14 US sites joined OSHA Voluntary Protection Program	EHS vision, policy and standards. Implementation of standards throughout corp is measured. Target: 100% standards implemented by end 08-Audits at each site every 3 yrs. ISO 14001
Lyondell Chemical[d]	US	Vision of zero accident and injuries. Several corp indicators	Policy of compliance and good management (operational excellence)

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
Energy efficiency up 10%, 2002–2012. VOC and NO_x emissions down 5%/yr. Cut hydrocarb flaring 50% over several yrs. Indicators: 20 ones for spills, emissions (including GHGs) and energy. Standards for water use	Sponsors Stanford U's "Global Climate and Energy Project". LCA and risk assessment capacity	Committed, managed. Transparency agreements monitored. Three indicators tracked. Standards of Business Conduct, Controls Integrity Mngmnt System, Ops Integrity Mngmnt System. Extractive Industries Transparency Initiative – anti-corruption	Global Women in Mngmnt Program. Anti-malaria & AIDS programs
Target of "no harm to the environment". Indicators: GHG and other air pollutants, wastewater, waste, haz waste. US ops to cut GHG intensity 18%, 1990–2012[c]	Product stewardship networks		
Five-yr corp improvement plan mentions GHG and energy reductions – no firm targets			
Rubicon (Geismar) pledges to eliminate aniline and benzene emissions, part of US EPA's NPEP voluntary reductions			
Ultimate goal of preventing pollution at source. Voluntary use of infrared cameras to detect fugitive emissions	Compliance with HSDS requirements	Statement of commitment "to operating our businesses with the highest principles of integrity, ethics and corporate responsibility." Ethics code, conduct policy, compliance hotline	

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
PPG Industries	US	Several indicators and ongoing programs	EHS Process. ISO 14001
Europe			
Air Liquide	France	Goal of zero accidents. Indicators of accidents and accident frequency	Industrial Mngmnt System rolled out to 99% of group by end 2007. ISO 9001 and 14001 certifications
Akzo Nobel	Netherlands	ISO, Responsible Care, OHSAS standards. Internal and external audits. Several indicators	

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
US ops to cut GHG intensity 18%, 1990–2012.[c] As part of US EPA Climate Leaders, to reduce total global GHG emissions by 10% from 2006 to 2011. 25% energy eff increase, 2006–2016. Part of US EPA's NPEP program, to voluntarily cut mercury emissions. Indicators: waste and haz waste	Joined Coatings Care, a stewardship program of US National Paint and Coatings Assn. Supply chain and transport risk mngmnt	Committed, managed Global code of ethics, ethics hotline	
At group level, nine indicators of energy and water consumed, GHGs emitted. Other emission and consumption indicators for specific processes and transport		Committed, managed. Codes of conduct introduced at about half of operations	19 indicators of employee "sustainability". Goals to raise hiring of women, training, and performance reviews
Targets to raise energy efficiency			
"Carbon strategy" to be revised in 2008. Indicators: carbon, water and energy consumption, emissions of GHGs, NO_x and SO_x at some sites., VOC, ODSs, wastewater, waste and haz waste	Eco-efficiency evaluation of product portfolio. Sust policy for suppliers	Committed, managed. Risk mngmnt framework. Code of conduct. Integrity mngmnt. Complaints system	Broad employment policies of diversity, training, development and compensation. Indicators for employee health. Sustainability and eco-efficiency training

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
Basell	Netherlands[e]	Several corp indicators	ISO 14001.
BASF	Germany	Target for 2002–2020: cut transport accidents 70%; lost time and occupational disease cut 80%	Little or no mention in 2007 corporate report
Bayer	Germany	Managing Safety Initiative and ArguS. Several indicators	Integrated HSE system, compliant to ISO 14001, EMAS and other standards. HSE audits started in 2005
Evonik/ Degussa	Germany	Target of zero accidents. Goal for 2014: max 1.5 accidents/mln hrs	ESHQ policy. TechniData EPM and SuRe systems introduced in 2004 to collect and stndrdise data

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
Corporate life-cycle carbon balance published 2008. Targets for 2002–2020: cut 25% energy use and GHG/t of product; cut 60% heavy metals, 80% organics, 80% N discharge to water; cut 70% air pollutants Halt gas flaring by 2012	Socio-eco-efficiency evaluation of product portfolio. Internal and external LCA capacity. Eco-efficiency label. Risk profiling of sites, with periodic audits. Supply chain profiles. Product stewardship	Committed, managed	Qualitative goal to hire more women, non Germans. Goals: >70% senior execs with int'l experience. Training and work-life balance
UN Global Compact signatory. Climate Program: "Bayer Climate Check" software; business unit cuts of 5–25%, 2005–2020. Targets: cut 10% organic carbon and N discharge to water; 30% cut in VOCs; max ODS emissions; and waste. Indicators: energy and water use	Sustainable procurement. Stewardship, products reviewed through their life cycles	Committed, managed	Internal comms about anti-corruption, compliance, human rights and working conditions. Commitment to employee rights, diversity. Human rights, child labor audit or supply chain
Goals 2004–2014, cut: energy-GHG 20%; water use 20%; waste 20%. Indicators: air emissions of CO_2, SO_x, NO_x, VOC, particulate, heavy metals; water and energy consumption; wastewater COD, waste and hazwaste. Corp material flow balance	Supply chain audits. Corp guidelines on genetic engineering and nanotech	Committed, managed. Global Code of Conduct	Global Social Policy. UN Human Rights Declaration, ILO Core Labor Stndrds Social Accountability Standard 8000

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
DSM	Netherlands	Target: 50% cut injuries, 2005–2010	Implementing policy to use same standards globally
		Corp indicators	
Ineos	UK	Aim of zero injuries. Publishes injury indicator	
Shell	Netherlands	Goal: no harm to people. Corp indicators and standards. In 2007 started corp wide road safety standard	Systematic approach to managing HSE. ISO 14001. HSE mngmnt system, w global enviro stndrds. Biodiversity action plans. Protected areas commitment
Solvay	Belgium	Health & Safety Charter, 2002. OHSAS 18001 being implemented. Several indicators. Auditing of distribution companies	EMAS and ISO 14001 certified
		Exposure assessments. Uniform hygiene stndrds	Energy audits. Enviro improvement plans at each site

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
UN Global Compact signed in 2007 Targets for 2010: energy efficiency up 2%/yr; 15% GHG cut 2005–2008 "Planet" indicators: energy use; emissions of GHGs, dust, VOC, COD, NO_x, SO_x, N_2O; enviro complaints and penalties	UN Global Compact Sustainability Issue Tracker Code of Conduct for suppliers, with questionnaires and some audits. Target to cover 90% by 2011. Starting to track carbon footprints of products. LCA capacity	Whistle-blowing hotline	Employee health-awareness campaign., human rights, Indicators: diversity, training, turnover, absenteeism. "Employer of choice" program. Research and reporting on animal testing
Target: GHG 5% cut, 1990–2010[f]; end continuous flaring "Ambition" for each operation to be in lowest 25% for GHG emissions Indicators: emissions of GHG, SO_x, NO_x, VOC, flaring, energy intensity, spills, external perception of enviro performance	International Alert for political risk, peace building	Committed, managed. Code of Conduct, w employee training. Whistle-blower hotline	Employee rights, human rights. Targets: 20% women in senior mngmnt, 50% native senior managers. Indicators on diversity, labor relations, corruption and favorability
Indicators: air and water emissions; EuroChlor Sust Dev variables. Environmental Release File	Solvay Sustainability Screening. Product stewards I each biz unit Vinyl 2010 project. Recycling. Carechem24 program. Local health assessments	Committed, managed. Corp governance policy published in 2003. Ethical Values guidelines	Work-life balance

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
Japan			
Mitsubishi Chemicals	Japan		Compliance is a top-management priority
Mitsui Chemicals	Japan	Several corp indicators. Developing company-wide prevention, education program	
Shin-Etsu Chemical	Japan	Group Environmental and Safety Meeting. Several corp indicators. Major review following explosion	Group Environmental and Safety Meeting. Emergency response system expanded
Sumitomo Chemical	Japan	OSHMS certified in 2007 for entire company. Several indicators. Process safety review committee	ISO 14001 and 9001

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
		Some commitment and management, since 1999. Code of ethics and of conduct	Employment of disabled
Targets: GHG emissions at 90% of 1991 level; industrial waste at 1% of total waste, VOC reductions Indicators: eco-efficiency, toxicant emission, air pollutants, incidents	Product safety dept est in Jan 2006	Committed, managed. Detailed report	Targets for employee health. Training and gender diversity. Rehiring of retirees. Employment of disabled
Targets for 2010: cut GHGs 66%, 1990–2010; less than 1% waste to landfill.[g] Corp material flow balance. Indicators: energy use; emissions of CO_2, soot, NO_x, SO_x, HCl, wastewater, waste, recycling Environmental accounting introduced		Committed, managed. "Enhancement of governance is most important task of CSR" Compliance Pledge, with whistle-blowing	Performance-based pay and promotion. Child-care leave
Targets 2002–2010, cut: toxicants[h] emissions 50%, waste to landfill 47%,[i] energy consumption 6.5%, CO_2 6%	Safety information database	"Compliance" message in website, Compliance Committee. Compliance hotline	"Relationship with Society" rules
Indicators: toxicants to air and water; emissions to air of SO_x, NO_x, soot, dust, VOCs, GHGs; to water for COD, N, P; use of water, energy	Ecopoint calculations for each site		

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
Toray Industries	Japan	Unified SHE mngmnt system Numerous indicators	Unified SHE mngmnt system. ISO 14001. Risk mngment system
Other			
China Petroleum and Chemical (Sinopec)	China	OHSA 1800 certified	HSE management system. ISO certified
Formosa Plastics	Taiwan		
KPC	Kuwait		

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
Goal of zero emissions	Product safety dept est in 2006	Committed, managed. Focused on upgrading internal controls	"Advancement of Women" project. Work-life balance program. Human rights promotion
Targets, cut: GHGs 15%, 1990–2010, toxicants 55% from 2000, landfill waste to 5%. Energy efficiency up 2%/yr. Increase recycling	Detailed safety review and audit procedures	Risk mngment system Corp Ethics and Compliance Code of Conduct. Whistle-blower hotline	
Indicators and interim targets: SO_x, NO_x, dust and VOC to air, BOD and COD to water	LCA capacity		
Environmental efficiency indicators being developed	Promotion of recycling		
Environmental accounting introduced	Supply chain compliance		
Material balance for company			
UN Global Compact, joined in 2004. Indicators: emissions of GHGs, COD, VOC, to soil and groundwater, other aqueous effluents; resource efficiency; complaints		Plans to improve and to accept supervision from stakeholders	Assistance fund for employees Complaint box. Indicators: training, retention, complaints. Anti-corruption rules. Performance reviews, holiday policy, pension. Non-discrimination, diversity
		Discussion included in annual report	
			Training programs aimed at developing Kuwaiti tech & management talent

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Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
LG Chemical	S Korea	PSM, OHSAS and KOSHA compliance, training of staff and suppliers. Accident and injury indicators	Eco-accounting and performance measurement. ISO, OHSAS and KOSHA compliance. Global EHS standards. E&S audits. Emergency response to spills, accidents
Petrochina	China	Safety campaign throughout company. Accident and injury indicators. Target is zero injuries and accidents	Began to establish a uniform, corp-wide HSE system in 2007. Guidelines issued and training conducted
Reliance	India	Conducts annual benchmarking, which is made public. Created HSE center of excellence. Safety education for contractors	Integrated management system for environment, quality and health. Compliant to ISO 14001, ISO 9001, OHSAS 18001

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
Indicators for: raw material and water use, waste generated, wastewater, recycling, and various pollutant emissions. Target of zero waste	Product safety and liability Council est in 2002. Annual product liability report, and reviews. LCAs of batteries, electronics and a few chemicals	Detailed reporting. In 2006 appointed more outside directors, greater autonomy to the Board of Directors and the Audit Committee. "Management by principle" guidelines issued in 2004	Fair Competition guide in 2006. Ethics hotline. Labor cooperation and health
UN Global Compact, signed in 2007 Compliance with waste disposal regulations. Zero pollution target		Broad statements of commitment and management. Internal financial risk control system started in 2006, audited by PwC. Also started western-style accounting. Codes of ethics for employees and senior managers introduced in 2005	EEO policy, and compliance with Chinese labor laws. Policies on emp health, training
Reports 35 core indicators specified in GRI G3 guidelines. Includes: energy, water use and discharge, GHGs and other air pollutants, waste generation, recycling	Supports Indian Centre for Plastics in the Environment, recycling operation, together with municipalities. Enviro assessment of polymers across lifecycle Developing LCA capacity	Committed, managed. "Best governance" policy and guidelines. Very detailed reporting. Code of ethics and policy against insider trading	

(continued)

Table 6.5 (continued)

Company	HQ country	Operating safety	Enviro mgmnt system
SABIC	Saudi Arabia	"One of our most important social responsibilities is to ensure that every single employee has a safe and healthy place to work"	Some ops have been ISO 14001 certified. Some compliance audits

[a]Available at http://www.dow.com/productsafety/finder/
[b]As submitted to US Toxic Release Inventory
[c]As part of the "Climate Resolve" program organised by the US Business Roundtable
[d]Was acquired by Basell at the end of 1997
[e]Headquarters in the Netherlands, but owned by a US company, Access Industries, which is privately held by a Russian
[f]Claims to be only major oil and gas company to target an absolute decrease in GHG emissions
[g]It is unclear what this precisely means
[h]As listed on the PRTR, Pollution Release and Transfer Register (similar to the US Toxic Release Inventory)
[i]Toxicant and landfill targets appear to be in reaction to regulation

Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other
Energy indices for most sites			"We are a Saudi Arabian company, and we are keenly aware of our responsibilities to the Saudi people and state. We are proud of our heritage and believe that it is our duty to help our country to develop. In this spirit, we are increasing the number of Saudi nationals …"

6.4.1 Operating Safety

Nearly every company reports indicators, typically number of accidents and lost work time. Even the three that do not report them publicly – Mitubishi, Formosa Plastics, Kuwait Petroleum and SABIC – almost certainly track them internally. Eight of the companies have a public goal of zero injuries, although none has tied this to a deadline.

BASF, Evonik and DSM have specific, interim safety targets with deadlines. Of the three, only Evonik also has an explicit target of zero injuries.

6.4.2 Environmental Management System

Reporting on environmental management falls into three broad approaches. First there are the "updates" from US, European and Japanese companies (about 12 in all), that report ISO certifications and other tweaks to ongoing pollution-control. Second, there are detailed reports from SABIC and four of the Asian companies, telling how they are bringing their systems up to world-class levels. Finally, there are "been there, done that" reports from Akzo Nobel, Dow, DuPont and BASF that hardly mention classic environmental management as such.

This third approach can be explained, we believe, by the shift to issue-focused sustainability reporting (see section Defining Stakeholders (or, Who Reads These Sustainability Reports?)). Stakeholders have probably indicated that they believe environmental management at these companies to be adequate, therefore that they prefer reporting to be focused on other, more burning issues.

6.4.3 Environmental Indicators and Targets

Almost all of the 29 companies report some environmental indicators, such as air or water pollutants, waste generated, energy consumed. Reliance seems to go the farthest, reporting 35 indicators, while ExxonMobile weighs in at 20. Shin-Etsu and Toray both report a corporate material balance, showing an input of resources and an output of products and pollutants for the entire company.

BASF has taken a related tack on this: in early 2008 the company published a corporate carbon footprint. Instead of calculating GHGs emitted only within the company, BASF estimated the net GHG emissions caused by its products over their lifetimes. This was a negative number, thanks mainly to BASF's production of insulation and catalysts, which generate a lot of carbon savings. Other companies are known to be considering publishing similar footprints.

Just over half of the 29 companies report environmental targets. This includes six commitments to the vague, non-binding UN Global Compact, but it also covers a raft of specific, quantitative goals: for instance, for 2004–2015 DuPont's targets are to cut GHGs by 15%, water use by 30% and carcinogen emissions by 50%. Most of the targets are not voluntary, as best we can infer. Either they are required by regulation (GHG cuts, Japanese producers' waste generation and toxicant emissions), threatened by regulation (hydrocarbon flaring or mercury emissions) or they are economically motivated (such as energy efficiency).

Of companies in the US, where GHG reductions are largely not mandatory, Chevron, Dow, DuPont and PPG have GHG reduction targets that appear to be partly voluntary. However, given the likelihood of GHG regulations in the US, this is arguably a reaction to pending regulation, or it may reflect reductions in regions that are regulated, or both.

DuPont, LG Chem and Petrochina are the only companies to set targets of zero waste, albeit not to a specific timetable. If this is genuine, then it clearly goes beyond compliance, but it is very ambitious. DuPont and two US contemporaries, 3M and Monsanto, began talking about zero-waste in the 1990s, and although all three still report on waste reductions, both 3M and Monsanto seem to have lost their zero-waste commitment somewhere along the way. To its credit, DuPont still proclaims it,[9] but it is difficult to see if or when this would ever become reality.

6.4.4 Product (or Process) Safety

Of the 29 companies, 15 report on product stewardship efforts of some kind.

Most of those have developed capacity to conduct life-cycle and/or risk assessments. Sometimes this is clearly defensive. Reliance is defending plastic packaging in India, Solvay is defending PVC. Often it is offensive – companies are using LCA and carbon footprinting to promote their products (see Recognition/Celebration of Green Opportunities, p. 97).

A number of the companies report how they are prepared to implement REACH, the EU's chemical licensing program, which will involve risk assessments of 25,000–30,000 compounds. We have not noted all these cases in Table 6.5, because REACH is mandatory. This is not stressed, and there is little or no mention of the industry's opposition to the regulation before it was enacted.

Reporting on currently controversial products or processes is mixed. On the one hand, Dow and Solvay report on (and sponsor) research on chlorinated compounds and PVC, and DSM reports on animal testing. On the other, there is little or no

[9] DuPont says it also is committed to zero emissions. Given that some of its products are inherently emissive (e.g. propellants) this seems hard to take seriously, but presumably it applies only to production.

mention of current controversies such as: bisphenol A, genetically modified organisms, perfluorooctanoic acid (PFOA) or phthalate plasticizers.

6.4.5 Governance

Corporate governance is a generic sustainability issue for public companies. Its public prominence rose rapidly early this decade in the wake of scandals at Enron, Tyco, Parmalat, Worldcom, Xerox and others, which led the US Congress to pass the Sarbanes-Oxley Act in 2002. Sarbanes-Oxley, and good corporate governance, are meant to prevent: financial incompetence, interest conflicts and misleading or fraudulent financial reporting.

In the scandal-ridden years around 2000, no prominent chemical companies were seriously accused of bad governance. Despite this (or perhaps because of this), nearly all the industry's leading 29 report on this topic. Typical issues are having independent members on the Board of Directors (i.e. those without conflicts of interest) and on adequate checks and balances being built into corporate decisions. The most detail is given by companies in Japan and "other" regions, who presumably are bringing practices up to standards now common in Europe and the US, and by companies also in the oil business – which has a mixed reputation of governance in its developing world operations.

Of the 29, 18 report having an employee code of conduct or ethical guidelines. Many of them also offer "whistle-blower" hotlines, where employees can anonymously notify senior management of misconduct.

6.4.6 EEO, Diversity, Economic Impact

Rebranding also occurs for a number of other issues that, like governance, are not specific to the chemicals but to business in general. Mostly these center around how employees are hired or treated: training, work-life balance, human rights or fair compensation. The most common issue, reported on by 11 of the 29, is workforce diversity, in terms of gender, nationality and race.

SABIC is the lone rebel here. Saying it is the company's "duty to help our country to develop. In this spirit, we are increasing the number of Saudi nationals" employed. This is less discriminatory than it might seem; because although it is headquartered in Saudi Arabia, SABIC is known to employ a relatively low percentage of Saudis.

Seven of the 29 companies also report on their economic impact, i.e. the number of people they employ, the amount of spending they do, and how that breaks out by community or area. We have left this element out of our analysis, because we have

left out profit-motivated activities in general. Although we understand the value of jobs to a community, we believe that: (1) the leading companies mostly employ people to do profitable work, not to be good neighbors to them; and (2) if it were not the leading companies employing them, these people would be still employed, simply by other companies.

6.5 Recognition/Celebration of Green Opportunities

The third function of sustainability is to recognize or even celebrate the opportunities of environmental and social protection. Of the 29 leading chemical companies, 24 of them do this, and they clearly are celebrating. As one text from DSM gushes: "This [green surfactants] business was one of the first to turn potentially challenging restrictions into constructive opportunities to develop new, more ecologically-friendly alternatives that deliver better results for our customers."

As a whole, the 29 companies devote more reporting to green opportunities (Table 6.6) than to the other sustainability functions, stakeholder communications or rebranding.

And what are they celebrating? Mainly lower energy, lower GHG emission, bio-based products and processes. DuPont, Akzo Nobel, Toray and LG Chem go one step further: they all have portfolio targets for green products, i.e. they aim to achieve a certain percentage of revenue from them.

Most of the celebration is pretty simplistic. For instance, bio-products are simply presumed to be better than their alternatives. A few of the companies, however, are approaching eco-competition more analytically. BASF, for example, is promoting a series of its products based on its SocioEcoEfficiency Analysis, SEEBALANCE, method.[10] This approach draws on the capacity for life-cycle assessment already being built in the company (see Product (or process) Safety, p. 95). Other companies thought to be examining this approach are: Dow, DuPont, Akzo Nobel and Bayer.

[10] For details, see The Environment Report, May 19, 2008 http://www.environmentreport.org/story.php3?story_id=4025.

http://www.corporate.basf.com/en/sustainability/oekoeffizienz/seebalance.htm?id=P8BK7CVC5bcp3l5.

Table 6.6 Recognition/celebration of environmental/social protection

Company	HQ country	Green processes	Green products
United States			
Chevron	US	Sequestration project proposed in Australia	Biofuels R&D
Dow Chemical	US	Water supply and conservation	RENUVA soybeans to polyols
		Lower-energy propylene oxide process	Glycerin-based propylene glycol
		Polyethylene from sugar cane. Landfill methane use. Methane feedstock research	
DuPont	US		Goals for 2015: $2 bln revenues by 2015 in products that cut GHGs, $8 bln in non-depletable resources. 30–40 specific products mentioned. 2015 target: introduce 1,000 new products or services "that help make people safer"
ExxonMobil	US	Involved in carbon capture and storage. Improved combustion tech. Water conservation	Automotive plastics and tire tech. Lithium-ion battery films. Higher economy motor oils
Huntsman Corp.	US	Green chemistry	Green chemistry: a variety of products listed, some for each division
Lyondell Chemical[a]	US		
PPG Industries	US		Ecological Building Solutions – for architects and designers. Pool care, inks and other items
Europe			
Air Liquide	France	60% group R&D devoted to energy efficiency, new energy and cleaner production. Target for new patents	Fuel cells and hydrogen-power for automobiles

Akzo Nobel	Netherlands	Low-carbon power	Aim to hike "eco-premium" products from 18% revenues in 2007 to 30% by 2015. Long list of existing eco-premium products
Basell	Netherlands[b]		
BASF	Germany	"BASF Success" – a environmental services supplier[c]	GHG and energy conservation: insulation, catalysts, automotive plastics, biodegradables, etc. Eco-efficiency label
Bayer	Germany	€3 bln in climate-related R&D or investment, 2008–2010. Hg removal from fluegas	Jatropha-based biodiesel. Polycarbonate to replace glass. Drinking water pipe coatings
Evonik/Degussa	Germany	Direct synthesis of H_2O_2. Energy-saving processes	Solar silicon. Biodegradable peracetic acid and H_2O_2 formulation. Silane tire additives
DSM	Netherlands	Reduced fly ash and COD in China ops. Energy conservation. Fermentation route to Vitamin B2	Plastics to lightweight autos, build windmills and sewers. Biomaterials. Energy saving enzymes
Ineos	UK		
Shell	Netherlands	R&D on carbon capture and storage. Coal gasification, renewable electricity. Packaging: wt reduction, eliminate PVC	Additives and lubes for fuel economy. Biofuels Hydrogen fuel. Low-temp detergents
Solvay	Belgium	To treat incinerator emissions and residues, geomembranes, bleaching	Mild biocides and cleaners, long-life products, lightweighting
Japan			
Mitsubishi Chemicals	Japan		Medicines. Pollution control equipment
Mitsui Chemicals	Japan	Unspecified target to develop non-fossil-fueled processes. NO_x removal	Adult incontinence products – i.e. diapers
Shin-Etsu Chemical	Japan	Promotion of zero-emission technology	"Our products … support a life of affluence".[d] Green procurement

(continued)

Table 6.6 (continued)

Company	HQ country	Green processes	Green products
Sumitomo Chemical	Japan		
Toray Industries	Japan	Water desalination and treatment	"Ecodream" started in 2005, to double sales of eco-friendly products by 2010 Lightweighting, biodegradables. Polylactic acid Benchmarking of products for environmental benefits
Other			
China Petroleum and Chemical (Sinopec)	China	Low-effluent biodiesel technology	Biofuels
Formosa Plastics	Taiwan		
KPC	Kuwait		
LG Chem	S Korea	Small CDM project started	Eco-product development system. Won 60–70 ecolabels in 2006. REACH and RoHS compliance
Petrochina	China	Carbon sequestration projects. Energy conservation and pollution reduction projects	"Sustainable" supply of energy. Wood-based biodiesel. Bioethanol
Reliance	India	Two CDM projects underway, four more in planning. Business "cell" formed to find more. Capture of coal-bed methane	Cleaner fuels, pre-colored yarns, PET as glass container replacement, PET recycling
SABIC	Saudi Arabia	Five projects registered with the UN Clean Development Mechanism	

[a]Was acquired by Basell at the end of 1997
[b]Headquarters in the Netherlands, but owned by a US company, Access Industries, which is privately held by a Russian
[c]Similar to, for instance, Ciba Services – offering analytical and administrative services, such as REACH registration, to third parties
[d]That is to say a good, dignified life

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Chapter 7
Sustainability 'Brands'

Abstract Based on the analysis presented in the previous chapter, sustainability brands are defined: apologetic, defensive, good citizen, indifferent, iron-fist-in-velvet-glove and striver.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image • Corporate branding

Based on the definitions of sustainability practice from the previous section, we now look at sustainability brands. In the first two subsections, we classify the 29 leading chemical companies according to six brands, and we discuss the possible reasons for the variations. We then briefly look at sustainability "crusaders", and we conclude with the limits to sustainability, which we explore more deeply in the next chapter on so-called greenwash.

7.1 How the Leading 29 Chemical Companies Stack Up

From the preceding analysis of how the 29 leading chemical companies practice sustainability, for each company we have summarized its sustainability approach and classified it under one of six sustainability brands (Table 7.1).

The brands emerged by inspection, i.e. they became apparent as the research was considered in its entirety. They refer not only to a company's sustainability reporting, but to the overall image of the company as perceived by the author. Although strictly speaking, brands are meant to speak for themselves without explanation, some further explanation is provided (Table 7.2).

Obviously, these brands are subjective (as brands are), and they may change. Two especially interesting cases to watch will be Kuwait Petroleum and SABIC.

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Table 7.1 Sustainability brands of leading companies

Sustainability brand	Company	Summary of sustainability reporting	Detail of sustainability reporting
Apologetic			
	Shell	Issue-focused, but on topics where Shell is clearly significant. Plentiful indicators with few commitments. External review	Focus on legacy issues of Nigeria, energy and climate policy – with special attention to external opinion. Admission of real and potential conflicts: Beaufort Sea, Nigeria, Sakhalin
Defensive			
	Solvay	Focus on chlorine-fluorine legacy. Many indicators, few commitments. Not audited or reviewed	Focus on environment, safety and product risk: especially with respect to legacy issues of chlorine and fluorine. Local community relations and opportunities emphasized (although some of the opportunities seem invented for the report). Very detailed reporting, few commitments. Less of a global issue focus. Not audited or reviewed
Good citizen			
	Air Liquide	Issue-focused, plentiful indicators and commitments. Audited	Broad focus on a range of issues: safety, environmental management and indicators, employee development and diversity, green processes. Very quantitative: 126 indicators and 8 objectives. Nothing about consultation, partnership or product stewardship
	Huntsman Corp.	Enviromental-compliance-focus	Sustainability is about the environment. Focus on ensuring compliance of a far-flung network of sites, many of which have come from acquisitions. Some moves beyond compliance, with voluntary participation in US EPA NPEP to cut emissions and US OSHA voluntary safety programs. Considering voluntary GHG reductions, but no targets announced yet. Very active in philanthropy, yet this is branded as social responsibility and handled through family foundations
	Mitsui Chemicals	Issue-focused, numerous commitments, quasi-audited	Broad, detailed reporting with several environmental commitments
	PPG Industries	Enviromental-compliance-focus, some commitments	Focus on climate change and green opportunities. Voluntary commitments to GHG reductions and selected emission reductions. Benchmarking of reporting versus GRI guidelines, but reporting limited in scope. Little or no social reporting. Stakeholder statements are completely absent

	Shin-Etsu Chemical	Local-issue-focused, detailed reporting. Two major targets, not audited	Focus on legacy of 2006 explosion, apology and measures to prevent future incidents, on governance and environment. Detailed reported, broadly on GRI guidelines, two significant targets, not audited. Stakeholders not mentioned, but implied strongly
	Sumitomo Chemical	Enviromental-compliance-focus, some commitments	Focus almost entirely on environment, with nods to compliance. Detailed environmental reporting and targets, some of which appear to be mandatory
	Mitsubishi Chemicals[a]	Minimal recognition	Reporting done only on various parts of website, not in a formal report. Focus on compliance and community relations
Indifferent			
	Basell	Minimal recognition	No visible statements about sustainability as such. Brief statement about environmental compliance
	Formosa Plastics	Minimal recognition in Taiwan, compliance focus in the US	No acknowledgement of sustainability, almost no acknowledgement of its components. Formosa Plastics US does report on corporate citizenship and issue an annual EHS report. Focus is on compliance and indicators
	Ineos	Minimal recognition	Mention that safety and environmental compliance are priorities. No nods to stakeholderism
	KPC	Minimal recognition	No acknowledgement of sustainability, almost no acknowledgement of its components
	Lyondell Chemical	Minimal recognition	Very little reporting or action related to sustainability, other than membership in Responsible Care and a few vague statements on its website
	SABIC	Recognition of only compliance and social responsibility. Implied skepticism of stakeholderism	Focused on social responsibility. Importance of safety and environmental compliance acknowledged. Unabashed nationalism

(continued)

Table 7.1 (continued)

Sustainability brand	Company	Summary of sustainability reporting	Detail of sustainability reporting
Iron fist in a velvet glove			
	Dow Chemical	Issue-focused, some commitments, but not audited	Focus on risk management and green opportunities. Guarded about legacy issues and GRI scope. Several GHG targets. Sound management of compliance taken as a given – e.g. environmental management systems hardly mentioned (presumably because they are known to be world-class)
	DuPont	Issue-focused, numerous commitments, but not audited	Roughly equal focus on smaller-footprint targets, green opportunities and stakeholder engagement. Guarded about legacy issues and GRI scope. Sound management of compliance taken as a given – e.g. environmental management systems hardly mentioned (presumably because they are known to be world-class). Several commitments to voluntary targets
	ExxonMobil	Oil company, best-in-class reporting. Issue-focused, some commitments, audited	Broad, structured approach to environmental, social and governance engagement. Detailed, audited reporting. Some voluntary commitments. As with Chevron, focus is on oil industry
Striver			
	Akzo Nobel	Issue-focused, best in class reporting, Audited	Main focus on green opportunities, followed by climate change, other environmental and employee issues. GRI-compliant, detailed reporting with modest emphasis on stakeholderism. No firm commitments. Reporting explicitly aimed at primary audience of investors
	BASF	Best in class in reporting, commitments. Issue-focused	Focused on environmental, safety and employee issues, opportunities. Detailed reporting and numerous, significant commitments. Well-anchored within the organization. Hot topics such as GMO, pesticides or chemical safety not addressed
	Bayer	Best in class in reporting. Several commitments. Issue-focused	Focused on environmental and social issues, major emphasis on climate change (as do others). Modest emphasis on opportunities. Much attention to pharma and pesticide issues. Detailed reporting with several commitments

Chevron	Oil company, best-in-class reporting. Issue-focused, some commitments, audited	Linked mainly to its primary business – production and refining – as opposed to its chemical operations. Focus on employee diversity, developing country issues and impacts of major projects, also on oil industry issues such as spills and climate change
China Petroleum and Chemical	Oil company, compliance focus	Focus on fundamentals: governance (anti-corruption), compliance with environmental and labor laws, training and development of employees. Benchmarked to GRI, with commitment to UN Global Compact
DSM	Issue-focused – probably most among the companies surveyed. Plentiful indicators and commitments. Audited	Focus on opportunities, climate change and social issues. Numerous commitments and indicators. Detailed reporting fairly compliant to GRI. Stakeholderism is acknowledged, but formal implementation is only starting
Evonik/Degussa	Environment and opportunity focus, numerous indicators and commitments. Audited	Focus on opportunities, environment. Corporate material balance appears to be unique. Emphasis both on environmental management and a number of 2014 voluntary goals. Corporate organization is unclear, little attention to stakeholderism. Audited, but not GRI compliant as such
LG Chemical	Issue-focused, Best-in-class reporting. few commitments, audited	Exhaustive, audited reporting within GRI guidelines, focused on compliance and governance. Aimed at "best in class" practice of sustainability. Detailed analysis of stakeholder engagement. No apparent environmental targets, other than "zero waste"
Petrochina	Oil company. Compliance focus	Focus on fundamentals: governance (anti-corruption), compliance with environmental and labor laws, training and development of employees. Benchmarked to GRI, with commitment to UN Global Compact
Reliance	Best-in-class reporting. Issue-focused, few commitments, audited	Aimed at "best in class" practice of sustainability. Particularly detailed emphasis on governance, economic development and environmental management, reflecting status and demands of Indian business. No apparent environmental targets
Toray Industries	Issue-focused, best in class reporting, numerous commitments. Reviewed	Addresses all main areas of sustainability, including an explicit stakeholder dialogue program and wide-ranging internal organization. Numerous indicators and commitments, some of which are mandatory

[a]Mitsubishi Chemicals is becoming a good citizen. It is only starting, but this appears to be the company's aim

Table 7.2 Sustainability brands, numbers, and some explanation

Brand	Number within the top 29	Explanation
Apologetic	1	Shell has been buffeted by scandals: Brent Spar, Nigeria and over-reporting of reserves. Its approach has been to say "sorry, I'll try to do better" repeatedly
Defensive	1	Solvay has been embattled for years about halogen chemistry and its impacts. The company has circled its wagons, in as positive a way as possible, to defend itself
Good citizen	7	These companies have adopted some aspects of sustainability, mainly the environmental side, in a relatively no-nonsense, low-key way
Indifferent	6	Minimum recognition is their approach to sustainability. Ineos appears even to disrespect stakeholderism
Iron fist in velvet glove	3	As the brand name suggests, these companies are soft on some issues and hard on others. Dow and DuPont are guarded, perhaps defensive, on some legacy issues, ExxonMobil on its Alaskan oil-spill legacy and (at least until recently) on climate change. Within Germany, BASF might be in this group, too, because of its perceived political clout
Striver	11	These are the best-in-class, including (perhaps surprisingly) both Chinese companies. "Best in class" does NOT mean these companies create the least environmental impact – merely that they are strivers at sustainability

Recently, KPC has entered a major joint-venture with Dow Chemical, while SABIC has bought large operations that formerly were DSM Petrochemicals and GE Plastics. Dow, DSM and GE are all well-involved in sustainability, while KPC and SABIC mostly disavow it. Presumably, some accommodation will need to be found.

7.2 Why the Variations in Branding?

From inspection we have identified four main variables in sustainability brands of the leading 29 companies:

- *Legacy issues* – scandals of the past can and do profoundly affect how companies approach the present and future. Shell is probably the most obvious example, but there are numerous others.
- *Cultural differences* – the two Middle Eastern companies, Kuwait Petroleum and SABIC, are based in countries that dismiss climate change and are not particularly supportive of open communication. (China, too, is not supportive of open communication, so it is somewhat surprising that its two companies in the 29 are strivers in sustainability.)

- *Private owners* – of the four privately controlled companies in the 29 – Basell, Ineos, Formosa and Huntsman – the first three are indifferent to sustainability, while the fourth is an adopter. The difference appears to be the view of the owner.
- *Stakeholder expectations* – as some companies move to issue-focused sustainability (see Defining Stakeholders (or, who reads these sustainability reports?) p. 61), variations according to varied stakeholder expectations increase.

7.3 What About Sustainability Crusaders?

A seventh type of sustainability brand can be found in the chemical industry, albeit not among the leading 29 companies, that of a *sustainability crusader*. At least two companies embody this brand: The Body Shop, a UK-based cosmetics manufacturers; and Ecover, a Belgian-based maker of cleaning products.

Ecover and The Body Shop are militant. Not only do they say that buying their products will save the planet, but also that buying conventional products from more conventional competitors will ruin the planet. To them, sustainability is not so much about public relations, but about environmental and social impact (similar to the way the general public and academics view sustainability, see "How Others Define Sustainability", p. 43).

None of the leading 29 chemical companies is a sustainability crusaders. Many of them present some of their products as save-the-planet (see Recognition/Celebration of Green Opportunities, p. 97), but they rarely or never attack their competitors as Ecover and The Body Shop do.[1] We think it unlikely that any of the 29 would become sustainability crusaders, mainly because large chemical companies do so much business with their competitors. Although they compete, they nearly always avoid vicious criticism. Secondly, for those with serious legacy problems, legacies easily could, we suspect, be too strong a contradiction for the crusader stance to be credible.

7.4 The Limits of Sustainability

The chemical industry originally turned to sustainability, because its public image was so poor that it was susceptible to scapegoating (see Scapegoating, Loss of License, p. 38). Ironically, if taken too far, sustainability could lead to the same thing. As we discuss in the next two subsections, fear of liability and a credibility gap set limits on sustainability.

[1] Or did, in the case of The Body Shop. The company was acquired by L'Oreal, a much more conventional chemical/cosmetics company, in 2006.

7.4.1 Fear of Liability

Product liability strikes fear in the hearts of many chemical managers, and for good reason. It has killed some companies and crippled others. Damages for asbestosis and related diseases have pushed into bankruptcy at least 50 companies that employed many thousands, including GAF, Johns-Manville and WR Grace. Dow Corning was forced into bankruptcy by liabilities related to silicone breast implants. And there are other, broader liabilities, for example CFCs cutting a hole in the ozone layer. CFC producers were not held strictly liable (i.e. they were not sued for damages), but they were held responsible.

Fear of liability and sustainability are enemies. Another word for sustainability is responsibility, another word for responsibility is liability; so fear of liability can be translated to fear of sustainability. This leads to an inevitable clash: as a potential liability arises, a company's lawyers advise management to clam up and not give the opponents any ammunition, while its sustainability advisors (presumably) tell management to engage with the stakeholders.

Well, which are they, opponents or stakeholders? In practice, this may be difficult to decide. The Love Canal Dilemma (see Reputation Versus Liability: The Love Canal Dilemma, p. 31) still exists. However, as the examples below show, two industry leaders are trying to apply sustainability to some potentially large liabilities.

7.4.1.1 DuPont and PFOA

With respect to its potential liability over PFOA, DuPont has taken a hard line (see Perception of a Dishonest, Uncaring Response, p. 30). Although this may be legitimate, it lacks the tone of sustainability and stakeholderism.

At the same time, the company has taken some elements of a sustainability approach: (1) mainly, it publishes a web page "Information on PFOA",[2] and (2) in its 2007 GRI report, it publishes a half-page of "additional information" about PFOA. Both are weak, in that a reader without prior knowledge would realize neither the depth nor the detail of the conflict surrounding the issue. The GRI report is particularly weak, in that almost no context to the conflict is provided.

Another weakness is DuPont's downplaying of the situation's gravity. Its "Information" website says: "Based on health and toxicological studies, DuPont believes the weight of evidence indicates that PFOA exposure does not pose a health risk to the general public." This seriously begs the question as to why DuPont would voluntarily agree to phase out PFOA. Moreover, given that the Science Advisory Board convened by the US EPA concluded that PFOA is "likely to be carcinogenic" to humans [1], DuPont's statement – while perhaps accurate – surely is misleading.[3]

[2] http://www2.dupont.com/PFOA/en_US/.

[3] One activist organization, The Environmental Working Group, expresses a far more scathing view at http://www.ewg.org/node/26670.

Conclusion: sustainability is playing some role in DuPont's approach to the PFOA issue, but fear of liability appears to have the upper hand.

7.4.1.2 Dow Chemical and Dioxin Contamination in Michigan

Dow faces considerable liability due to dioxin/furan contamination in the region around its Midland, Michigan complex.[4] This had led to serious conflict: local residents have filed a lawsuit against Dow; and the US EPA has fought for years to force Dow to remediate more areas at a quicker pace.

The conflict with US EPA turned particularly sharp and public in May, 2008. Under pressure from Dow, US EPA officials in Washington forced their Regional Administrator for the region including Midland, Mary Gade, to resign. Gade had been pushing Dow to speed up and widen its clean-up program. Upon resigning, Gade announced: "There's no question this is about Dow. I stand behind what I did and what my staff did. I'm proud of what we did." In defense of its "go-slower" position, a Dow spokesman said: "There is all of this mystique about dioxin. Just because it's there doesn't mean there is an imminent health threat" [2].

How sustainably has Dow communicated all this? Dow's latest Corporate Report ignores the issue; and although its main website does have a detailed section on dioxins,[5] the conflict in Michigan is not mentioned. By clicking on what is essentially a footnote on the main website, there is a link to a "Dioxin/Furan Issue" website,[6] which covers the issue in great detail. Unlike DuPont's PFOA website, it would allow readers without prior knowledge to get a broad, deep overview of the issue. Dow states its disagreements clearly, but it nonetheless reports the views of local residents pretty directly.

Conclusion: at least at a local level, sustainability is playing a significant role in Dow's public relations about dioxin contamination in Michigan. At the same time, the company has strong-armed the EPA and downplayed local concerns.

7.4.2 Credibility Gap

Two elements of sustainability create a credibility gap for chemical industry.

First is the use of the word sustainability. As noted above (see How Others Define Sustainability, p. 43), this is simply not the right word for public relations or stakeholder relations. To skeptics, it can appear deliberately misleading.

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[4] For an overview, see The Environment Report, 19 May 2008 at http://www.environmentreport.org/story.php3?story_id=4025 or The Chicago Tribune at http://www.chicagotribune.com/features/lifestyle/green/chi-epa-official-resigns_webmay02,0,4655733.story?page=1.

[5] http://www.dow.com/commitments/debates/dioxin/index.htm.

[6] http://www.dow.com/facilities/namerica/michigan/dioxin/.

Second is the relentless positivism – or arrogance – of much sustainability reporting. Most of the top 29 companies, especially the ones taking an "issue-focused" approach to sustainability, paint an unfailingly positive picture while avoiding unpleasant issues. They claim to be saving the planet,[7] yet appear oblivious that they are some of the world's largest polluters. (Notable exceptions are the companies that are indifferent to sustainability, most of the Japanese companies and, to some extent, Shell and DuPont). Arrogance is not illegal, but in the event it invites disbelief, satire and perhaps ridicule – and it is hardly conducive to building trust.

Arrogance and positivism, of course, are the cornerstones of most corporate communications. Annual reports often are exercises in self-congratulation. Corporate image campaigns always are. But sustainability, by definition (see Guidelines or Charter (and definitions), p. 59), is not supposed to be that way. As DuPont Chairman Chad Holliday says: "There's also something else that comes with 200 years of history – humility. As a company we have been through many experiences that remind us that we don't have all the answers. When you have been making thousands of different products for more than two centuries, there are bound to be legacy issues. DuPont has them. We accept that society expects transparency and responsiveness on such issues, and we are committed to both in order to earn and keep the public's trust."

This credibility gap can be worsened by so-called Greenwash, which we discuss in the next chapter.

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2. Chicago Tribune (2008) EPA official ousted while fighting Dow. Michael Hawthorne, 2 May 2008

[7] In a speech given in October, 2006, Chairman Chad Holliday said DuPont is constantly challenging itself with the question: *Are we doing the right things to build a stronger company, help solve the world's toughest challenges, and build a brighter future for people and our planet?* http://www2.dupont.com/Sustainability/en_US/Newsroom/speeches/coh_101006.html.

Chapter 8
The Thin Green Line: Between Sustainability and Greenwash

Abstract 'Greenwash' is a potential backlash of sustainability. It ranges from outright lying to spinning sympathy out of ordinary compliance.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image • Greenwash

Sustainability can be perceived as insincere. Ironically, this is a perception that sustainability is meant to decrease, not increase. Insincerity in this respect is often called greenwash, i.e. trying to present a product, a company or an industry as more green (friendly to the environment) that it actually is. Greenwash comes in five main forms: lying, spinning of words and science, celebrating compliance, celebrating green products and processes, and green endorsements. These are discussed in the five subsections below.

Greenwash can be different things to different stakeholders – which makes it problematic. For instance, celebrating green products and processes is surely welcome to many employees, but can come off as insincere to local communities or activists. And it doesn't help that perceptions of what is green can vary widely.

There is a deeper undercurrent to the problem of greenwash, which stems from the ultimate schism between stakeholderism and capitalism. The question 'how profitable and sustainable a company should be' is addressed in the next section (see Is Sustainability Profitable, and Should It Be?, p. 128).

8.1 Lying

Lying about environmental or social impacts is not a major issue for the chemical industry. Even its harshest critics rarely suggest that the industry or its individual companies are lying.

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The minor exception is that some chemical products are falsely labeled as green. A recent survey [1] of 1,018 consumer products concluded that ten of them (slightly less than 1%) made false claims, e.g. one claimed erroneously to be 'Energy Star' certified and another to be 'certified organic'.

8.2 Spinning Words and Science

To spin, in modern English, means to present an issue or event in a misleading way. It is not lying, because 'spin doctors' are careful to stick to the truth, yet to present facts selectively. For example, Dow is accused of spinning about the Bhopal disaster [2], and DuPont is accused of spinning about PFOA and CFCs.[1]

8.2.1 What's in a Word or a Picture?

There is a tendency for industry lobbying groups to give themselves inflated names such as The Alliance for Corporate Responsibility or The Alliance for Responsible Science, and for companies to give inflated job titles. One of Dow's critics sends this up in a mock press release [2] that quotes a fictional Covelle Saranex, 'Corporate Vice President for Environment, Health, Safety, Responsibility, Philanthropy, Ethics, Decency, Citizenship and Social Concerns, as well as a polymer engineer currently active in the development of 17 varieties of synthetics.'

Another approach is to name a lobbying group an 'Institute' that lends it a phony aura of objectivity.

Finally, in advertising or other communications, sometimes inflated images are used. Shell, for example, ran advertisements (Fig. 8.1) showing flowers coming out of what looks like a petrochemical-refining complex.

8.2.2 The Quest for Sound Science

In conflicts over environmental policy, a typical spin tactic is to dismiss industry-critical statements or positions as 'junk science', or to call for 'sound science' a code word for an industry-favored outcome.

At best, this is anti-stakeholderist. It is akin to saying that your opponents are either too stupid, too biased or both to think scientifically, but that they should accept your self-proclaimed 'scientific' opinion. At worst, this is downright deceptive. 'Sound science' has been championed notoriously by industries opposed to global

[1] http://blog.aflcio.org/2007/12/02/greenwash-the-21st-century-environmental-whitewash/.

Fig. 8.1 A Shell advertisement that has been called greenwash

warming regulations and by the tobacco industry, which previously funded 'The Advancement of Sound Science Coalition' to lobby against rules on second-hand smoke. Their misuse of the term 'sound science' has tainted it, according to a Gresham's Law of common speech.[2]

The irony of 'sound science' arguments is that they often are not about science, but politics. For instance with the issues of PFOA, plastics waste and biofuels, the real debates are about: What, if anything, should be public policy, who should pay and who should benefit?

8.3 Celebrating Compliance

Sometimes companies trumpet the benefits of complying with environmental or social regulations.

For instance, many of Europe's leading chemical companies (see How Chemical Companies Define Sustainability, in Practice, p. 49) in their sustainability reports describe how they will implement REACH, the EU's regulations for chemicals licensing. This can come off as insincere, because the same companies mostly opposed REACH's introduction. In their defense, we note that this also could come off not as insincere, but pragmatic.

[2] Gresham's Law, an economic axiom, says that bad money drives out good money.

Another example is the labeling of various products as CFC-free. Terra Choice [1] says this is 'irrelevant', because 'CFCs have been banned for almost 30 years.' We are less certain: surely many consumers do not know of the total ban on CFCs, yet they still might want reassurance that CFCs are absent in products they buy.

8.4 Celebrating Green Products and Processes

Most leading chemical companies celebrate their green products and processes (see Recognition/Celebration of Green Opportunities, p. 97). Sometimes this is perceived as greenwash, usually due to one or all of the following objections.

8.4.1 Objection: It Is Not Really Green

Opinions vary as to which products are processes are green. Weighting of environmental impacts varies from one group to the next. Some products are considered to be unnecessary, even in green format (extreme examples are organic cigarettes or eco-hairspray[3]). And opinions change, thanks to the law of unintended consequences. CFCs once were considered to provide great social benefit, because they replaced inflammable, higher-toxicity alternatives. The perceived benefits of biofuels have diminished as the public has begun to consider their alleged effects on hunger and land-use.

Ecolabels are meant to solve this sort of disagreement, by providing standard definitions of what is green. They do provide definitions, but rarely are these standard – often one ecolabel disagrees with the next. And not just in detail, but in fundamental principles: for instance, the US Energy Star ecolabel aims to reward 80% of products in a given product group; the EU Ecolabel aims to reward only the top 20%.

8.4.2 Objection: It Is Not Additional

Green products or processes may be developed not out of altruism, but to make a profit. In other words, they are non-additional.[4] This is probably acceptable to most stakeholders, but some complain that green actions are insincerely presented as altruistic.

[3] In the 1990s the author was involved in establishing EU Ecolabels for hairsprays. Some activists argued that hairsprays were unnecessary products, thus fundamentally ineligible for ecolabels. Unnecessary? Surely hairsprays' main users, middle-aged and elderly women, would disagree, but they do not have a significant voice among eco-activists.

[4] The idea of additionality comes from the Clean Development Mechanism of the United Nations Framework Convention on Climate Change.

8.4.3 Objection: It Is Only for the Money

If a company gives up a celebrated product due to unprofitability, its previous celebration can be seen as greenwash. When Shell sold off most of its solar-energy businesses, one newspaper titled it as 'Big Oil talks clean but spends dirty' [3].

This touches on a deeper point raised sometimes by activists: Which comes first, sustainability or profit? (See Is Sustainability Profitable, and Should It Be?, p. 128.)

8.5 Green Endorsements

Companies sometimes entice activists – usually greens – to endorse their sustainability programs. This is usually in exchange for a membership, partnership or consulting fee to the activist. For example, two such endorsers based in the UK are public-relations firms Forum for the Future and SustainAbility.

Of course these endorsements are not necessarily greenwash. However, the appearance of an interest conflict suggests that they could be.

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Chapter 9
Evaluating Sustainability: Is It Necessary, and Does It Pay?

Abstract Sustainability is not necessary, as proven by the significant number of chemical companies that have declined to adopt it. However, for more developed-world, public chemical companies, at least some nod to sustainability is probably required. Sustainability's return-on-investment' is difficult to quantify, which is not the same as saying there is no ROI.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image • ROI

No, sustainability is not necessary. Five of the 29 leading chemical companies – Basell, Ineos, Formosa Plastics, Kuwait Petrochemical and SABIC – have little to no interest in sustainability. In coming years, as these companies play a bigger role in the West, they may be sustainability's bellwether – either moving towards it or leading others away from it.

Whether sustainability pays is harder to answer. We have not the data to calculate a return on investment (nor does anyone else, we believe), but in the following subsections we discuss: academic studies of sustainability's benefits are inconclusive; sustainability makes for a more attractive employer; sustainability as a way out of crisis; how stakeholders react; sustainability successes; sustainability failures; is sustainability profitable (and should it be); and what about beyond compliance?

9.1 Academic Studies of Sustainability's Benefits Are Inconclusive

"The majority of stakeholders are largely ignorant of corporate sustainability management." Moreover, "stakeholders' interests and expectations are highly fragmented, contradictory and primarily issue specific."

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These are the crushing findings of a review of academic studies of sustainability [1] led by Professor Ulrich Steger of the International Institute for Management (IMD) in Lausanne. We have not come across any other studies that address the issue directly.

9.2 Sustainability Makes for a More Attractive Employer

In recent sustainability reporting, six of the 29 leading chemical companies – Akzo Nobel, BASF, Bayer, DSM, Evonik and Solvay – stress that they are listening more to their employees through surveys, forums and so on, with the aim of creating more attractive employment.

DSM, for example, reports that 65% of employees surveyed "recommend DSM as a great place to work." Dow notes that its largest audience for its sustainability reporting is its own employees, and figures this is probably true for most other sustainability companies. Internal communications departments at a two large specialties producers (slightly too small to make the leading 29, but surely within the top 75) report that employees are continually asking to hear good news about their companies' environmental and social performance.

This is not quantitative proof, but we speculate that the greatest demand for and consumption of sustainability comes from employees (and potential employees). Either they want to feel good about what they do, or at minimum not feel bad about it.

9.3 Sustainability as a Way Out of Crisis? Not Obvious

Although public opinion of the chemical industry has improved in recent years, this is not obviously connected to sustainability. As the two examples below show, the Love Canal dilemma still exists, although sustainability might soften the blow in some cases.

9.3.1 What If Love Canal Happened Today?

Another way to address this is to revisit the Love Canal dilemma (see Reputation Versus Liability: The Love Canal Dilemma, p. 31). If Occidental Chemical had practiced sustainability, would the consequences of Love Canal have been different? Different, probably, but perhaps worse. We suspect Occidental would have had to pay for the cleanup sooner rather than later. Perhaps its image would have been better, but this is not certain.

Put another way: if Love Canal were to happen today, to a sustainable company, would they come out of it better than Occidental? We are skeptical. The closest analogies to hand are Dow's problems with dioxin contamination in Michigan and DuPont's legacy of PFOA contamination. Dow and DuPont themselves both question the value of sustainability in these situations (see Fear of Liability, p. 110).

9.3.2 Hoechst and Its Unsustainable Chairman

As noted earlier (see Defining Stakeholders (or, who reads these sustainability reports?), p. 61), after a 1993 explosion that rained potentially carcinogenic chemicals onto neighbors of a manufacturing plant, former Hoechst chairman Wolfgang Hilger behaved in an "unsustainable" way. He stayed on holiday, the company at first declared the chemicals to be less hazardous than they were and he apologized only after intense public criticism. At the company's annual meeting two months later, he moodily denied responsibility and appeared unrepentant, even defiant [2].

About a year later, Hilger was forced into retirement. There were other factors behind his exit, but the main one was his poor public relations.[1] Hilger's successor, Jürgen Dormann, openly criticised Hilger's tactics and was much more engaging of the media and the public. This did not spare the company considerable clean-up costs (which it would have had to pay anyhow), but it did seem to boost its ailing public image and employee morale.

9.4 How Stakeholders React to Sustainability

"Stakeholders…are highly fragmented, contradictory and primarily issue specific," says the IMD study [1]. Indeed, we wonder how many actually think of themselves as stakeholders.

The closest we have seen to a broad stakeholder survey is one conducted in 2007 by KPMG and SustainAbility [3]. Its most interesting finding, in the context of this book, is the makeup of stakeholders. Of 2,279 respondents surveyed: about 75% were business people, consultant and academics. Regulators and activists accounted for only 10% of readers, while the rest were investment raters (6%) and other.

What this boils down to is that most stakeholders recognize themselves only in the face of a threat. When threatening events occur, stakeholders come out of the woodwork, but it would take serious effort to identify them in advance.

[1] Hilger's apparent disregard of public opinion was long-standing, and was shared by his predecessor, Rolf Sammet. Asked what he did during World War II at an early-1980s press briefing with British journalists, Sammet replied that he spent much of it bombing London.

Nonetheless, there is still value to sustainability reporting. It is similar to financial reporting. Many readers are internal, i.e. within the company itself. And a sustainability report often is the source of advertising and other corporate communications (including crisis communications). External readers are a relatively few "opinion leaders" who then disseminate the content further.

9.5 Sustainability Successes

By inspection, we have identified some successes that might be attributed to sustainability (Table 9.1). These are discussed in the following subsections.

9.5.1 Easing Regulation

In each of the following three cases, regulation was perceived to be inevitable. Sustainability was used to make the regulation more industry-friendly.

9.5.1.1 Montreal Protocol

As described above (see DuPont: Offensive, to Turn Regulation into Advantage, p. 40), when a ban on CFCs appeared inevitable, DuPont's adopted sustainability to turn regulation into competitive advantage.

It is entirely possible that DuPont (and other fluorocarbon producers) might be able to pull off a similar coup with replacements to PFOA-based products, but it is too early to say with certainty.

9.5.1.2 EU Packaging Directive

In the 1980s, to encourage recycling, the German government imposed take-back regulations on plastic packaging. This was a landmark move in producer responsibility (that has since been applied to many other sectors). However, it was also very costly, at times without generating environmental benefit.

Germany's subsequent attempt to spread the so-called "green dot" system to the rest of Western Europe was countered by the plastics industry with a major "sustainability-driven" campaign, coordinated by a trade association then named APME, now PlasticsEurope. Green-dot did spread to other countries, but not all, and in a much milder form. Much of subsequent policy-making in the area was and continues to be influenced by the plastics industry approach, which is to assess the overall environmental impacts of waste disposal rather than simply to set ever higher recycling targets.

The cornerstone of this was the EU Packaging Directive, which, instead of copying German legislation, is more accommodating of industry views.

Table 9.1 Sustainability's successes and failures

Success	Failure
Montreal protocol	Monsanto and GMO in Europe
EU Packaging Directive	BASF, Monsanto, Syngenta and IAASTD
Kyoto-based regulations	REACH
Industry-friendly LCA standards	EU Ecolabels
Emission reduction project	Zero waste
Responsible care	

9.5.1.3 GHG Reductions

The link to sustainability is more tenuous than in the preceding two examples, but clearly, the chemical industry has had a favorable position in greenhouse-gas regulations.

Unlike other major industries, European chemical producers have not been pulled into the EU's Emissions Trading System (ETS); they have been allowed a self-regulation scheme, except for steam crackers and some nitrogen-based plants,[2] which will come under ETS over the next few years. Even so, regulators are working closely with the industry in a relatively "stakeholder-ish" way to do this.

Meanwhile, chemical companies have profited from carbon credits. In an initial auction of emissions reductions held by the UK's environmental ministry, chemical companies Ineos, DuPont and Rhodia sold 43% of the credits. Chemical companies in China (often assisted by Western partners) have been some of the largest beneficiaries of the Clean Development Mechanism created under the Kyoto Protocol.

9.5.2 Industry-Friendly LCA Standards, and Life-Cycle Thinking

In the early 1990s, the European chemical industry was subject to recurring attacks from activists, echoed in the media, about disposal diapers (nappies), PVC and the chlorine chain, and plastic waste. The products were characterized as environmentally harmful, the industry as greedy and uncaring.

Thanks in part to sustainability-style engagement by the chemical industry, these so-called "product policy" debates have been moved into the framework of life-cycle assessment (LCA) or at least so-called "life-cycle thinking". Regulators in Europe, the US and Japan have been very receptive to this approach.

Life-cycle thinking has undermined the arguments of activists. As Greenpeace argued in response to a UK-government sponsored review of PVC in 2001: "The new

[2] Which were high emitters of N_2O, one of the more potent greenhouse gases.

UK Government life cycle analysis (LCA) of PVC and alternatives has been unable to find a way to address the main issue surrounding the use of the material – the impact of toxic pollutants generated throughout its life cycle. This means the LCA adds little information of use to the current debate on policy measures needed to reduce the environmental impact of PVC." [4]

At the same time, industry representatives (not just chemicals, but a number of manufacturing sectors) have worked, sustainability style, to create ISO standards (series 14040) for LCA. One of their most important accomplishments has been to peer-review as part of the ISO standard; the cost of this makes ISO-certified LCA generally too expensive for activists.

9.5.3 Emission Reductions: MSRI Project of Dow and NRDC

In the late 1990s, Dow Chemical and the Natural Resources Defense Council, an activist, conducted the Michigan Source Reduction Initiative at Dow's Midland complex. For 2 years, activists worked with Dow to identify and implement pollution- and waste-reduction projects [5].

The Initiative generated $5.3 million in annual savings from $3.2 million in one-off investment. Nonetheless, concludes NRDC:

"Despite the success of the project, NRDC and the local environmental activists believe it will be difficult for Dow to commit to applying the lessons from Midland at its other plants. Not surprisingly, the reason is financial. Even though the project saved the company money, the dollar figures were low by Dow standards, so the company may well make more money by investing resources elsewhere. Which suggests a hard but important lesson for environmentalists: in order for industry to implement pollution prevention, it must not only be profitable for the company to do so, it must be more profitable than other potential investments available to the company."

"Another important lesson from the project has to do with the need for institutional change within Dow, and presumably other such corporations. Dow's decision to work with NRDC and the activists in this project was courageous, and the company deserves credit. But it's clear that for such efforts to get off the ground, a variety of institutional barriers will need to be overcome. For example, the company must create meaningful rewards for mid-level managers who identify and implement environment-friendly policies, and it must learn to place greater institutional value on environmental savings when making investment decisions."

9.5.4 Responsible Care

Responsible Care is a program for chemical plants to communicate with and reach out to local communities. It is a success by definition, because one of sustainability's aims is to engage with local communities.

Whether Responsible Care does an optimum job is more debatable. Proponents say it should be more structured, and critics say it "is among the newest and most sophisticated of the resources by which polluting industries keep ordinary citizens at bay." [6]

9.6 Sustainability Failures

By inspection, we have identified some failures that might be attributed to sustainability (Table 9.1). These are discussed in the following subsections.

9.6.1 GMO 1: Monsanto in Europe

The most obvious failure of sustainability was to block genetically modified food (often known as genetically modified organisms, or GMO) from the European Union. At present, production and import of GMOs in Europe is mostly banned, to some extent by government regulations and also by refusal of many retailers to sell them.

Ironically, GMO had been approved in April 1996 by the European Commission for import, storage, processing (and consumption) in the EU. Trials of local production had started, and then Monsanto, advised by public relations consultant SustainAbility, began to engage stakeholders – i.e. the general public.

At first Monstanto and SustainAbility started an advertising campaign (at a reported cost of $2 million) asking the public to begin a discussion about GMO's pros and cons. The campaign raised the profile and news value of GMO enormously, and offered its critics a large, sitting target. According to Simon Propper, now managing director of Social Environmental Context, a corporate responsibility consultant, the campaign "was a total gift to the environmental pressure groups." [7]

The pressure groups, which probably could never have afforded on their own what amounted to free publicity from Monsanto, did not waste their chance. They painted GMOs as "Franken-foods" that would harm people and the environment. They rolled out Monsanto's environmental legacies (none of which were related to GMO). They portrayed Monsanto as heartless and greedy, particularly because of the terminator technology.[3] Thanks to Monsanto's advance publicity, all this was reported widely.

[3] With terminator technology, GMOs terminate future generations, in that their seeds are genetically engineered to be sterile. This prevents a GMO from seeding a subsequent generation, thus protecting the natural environment from artificial genetic modification. GMO-opponents generally ignored this, pointing out that "terminated GMO" require farmers to buy seeds every year from Monsanto – alleged proof of its greed.

As public and regulatory opinion soured by late 1998 or early 1999, SustainAbility resigned its Monsanto mandate, cleverly blaming Monsanto, saying the company was not taking its opponents seriously enough and that it was talking down to them [8]. SustainAbility's chairman, John Elkington, said Monsanto is "happy to invite the outside world in to discuss, but there is still a barrier to really listening to what people are saying." [7] Elkington, who noted that he personally believes in the environmental benefits of biotechnology, said that the criticism of GMO shocked him [8].

By October 1999, Monsanto agreed to halt marketing of terminator seeds, and chairman Robert Shapiro appeared via interactive video at a Greenpeace Business Conference in London to seek "dialogue" and a "common ground." Shapiro told the conference: "we forgot to listen," adding that "we have irritated and antagonized more people than we have persuaded. Our confidence in biotechnology has been widely seen as arrogance and condescension." [9]

True, but surely the critics' arrogance and condescension were far greater. Our conclusion: Monsanto and SustainAbility were not so much arrogant as naïve. They believed in GMO, and they believed that with a sustainability approach, others would believe, too. They handed their critics (who do not believe in GMO) the publicity with which they could assassinate GMO. Monsanto's mistake was not a failure to listen, but to ask in the first place. A go-quietly approach may well have worked – in Euro, GMOs could be sometimes controversial, yet widely used (as they are in the rest of the world).

9.6.2 GMO 2: BASF, Monsanto, Syngenta and IAASTD

In 1988, the United Nations created the Intergovernmental Panel on Climate Change (IPCC) to deal with global warming. In a similar process in 2004, the UN created the International Assessment of Agricultural Science and Technology for Development (IAASTD) to deal with hunger.

IAASTD's first major job was to "set a new agenda for global food production," based on a 4-year study, led by the UK Environmental Ministry's Chief Scientist,[4] that involved thousands of scientists around the world. In the spring of 2008, IAASTD issued a full report with 22 findings. Among them, IAASTD did not find GMOs to be particularly useful in alleviating hunger and poverty in the developing world, even suggesting that GMOs may be unhelpful to rural development. It also expressed concern about GMOs' safety.

As these anti-GMO positions were becoming clear in draft versions of the report, Representatives of GMO-producers BASF, Monsanto and Syngenta resigned from IAASTD. Reports differ on precise timing, but this occurred either in late 2007 or early 2008. Syngenta's CEO John Atkin said that being part of IAASTD was "spending

[4] Robert Watson, who also was involved in the IPCC reports on climate change.

time and energy on something that was not making progress, on meaningless conversations. There was a complete failure to meet basic standards of objectivity; a total lack of balance and a large voice with an agenda – no intensive farming, no technology – it was very extreme." [10]

This case is less of a failure than the previous one of Monsanto in Europe. IAASTD probably was going forward anyway, so the GMO-producers jumped on to see if they could make their case. Although this did not work (as Syngenta's CEO Atkin put it, "We, as an industry, have failed in getting over the importance of technology in agriculture" [10]), the opportunity may have been worth the risk. Nonetheless, it highlights the potential risk of a sustainability approach and the need to assess it in advance (which BASF, Monsanto and Syngenta may have done).

9.6.3 REACH

REACH is the EU's regulation for chemicals licensing, which will require risk assessment of some 30,000 compounds that are produced and sold commercially [11].

The chemical industry soundly opposed REACH. In 2003, then BASF vice-chairman and President of Cefic,[5] Eggert Voscherau, warned that REACH was "completely unworkable," adding that it would "de-industrialize Europe." Now that REACH is real (it was adopted in December 2006), BASF is offering to help other companies comply, as part of its "Success – Added Value through Sustainability" services. A number of the other leading 29 chemical companies announce in their sustainability reports how they are prepared for or complying with REACH (see Product (or process) Safety, p. 95), usually not mentioning they have no choice if they want to remain in business.

In its final form, REACH is not as onerous or costly as it might have been, and this can be considered a success for industry lobbyists. As Judith Hackitt, former Director General of the UK Chemical Industries Association (CIA), noted in 2005, "Our greatest achievement in terms of cost and business impact reduction occurred in 2003, when we succeeded in getting the Commission to adopt a proposal with a more realistic scope."

However, that lobbying did not follow the sustainability approach. Indeed, it seemed to follow the classic "battle of litanies" (see The Battle of Litanies: Regulators Versus Industry, p. 36) that predated sustainability. Would sustainability have yielded a better outcome? The point is moot; clearly, however, the industry decided against sustainability, choosing instead the "battle of litanies" approach.

[5] The European Chemical Industry Council, i.e. the trade association of manufacturers.

9.6.4 EU Ecolabels

When it was set up in the early 1990s, the EU Ecolabel was meant to be epitome of sustainability. It was meant to reward sustainable products through a stakeholder-ish selection process that involves industry, consumers, retailers, activists and labor unions.

However, the system turned out to be politics and business as usual. Industry and activists have clashed repeatedly, while the other stakeholders have either watched or ignored the process. Even companies that have leading sustainability programs, such as Procter & Gamble, disparage ecolabels – especially the EU's. EU Ecolabels are available and used,[6] but not at a significant market share.

9.6.5 Zero Waste

Two large, well-known chemical companies – DuPont and Monsanto – have had "zero waste" policies for over a decade now. This promise may have sounded good at the time, but it rings hollow after so many years of non-fulfillment.

9.7 Is Sustainability Profitable, and Should It Be?

'Green business is good business' – if you Google this phrase, you find millions of entries. Probably most of these are celebration: a company becomes more efficient, less wasteful or develops a green product, and then feels good about the side-effects.

Taken strictly, the phrase is nonsense. If it means that there always is profit in protecting the environment, then it is not true. If it means there is no profit in not protecting the environment, that too is not true. Still, in its fuzzy way, the statement is an attempt to address a series of related issues, which we discuss in the following five subsections.

9.7.1 What Is a Fair and What Is a Greedy Profit? There Is No Consensus

This question has a deep populist history in the capitalist as well as the socialist and communist worlds. The answer generally derives from self-interest: if I receive a large profit, that is fair; if someone else does, that is greedy.

[6] See http://www.eco-label.com/default.htm.

Ridiculous as that sounds, this is a staple issue of sustainability debates. Activists often point to a company's profits, arguing that a fraction of it would pay for some environmental or social program. For instance, Greenpeace contends that BASF should fight unemployment by employing more people, because it posted revenues and profits in the €billions [12]. Activists pressing ExxonMobil to pay several $billion for the damage caused to Alaska's Prince William Sound in 1989 by its Valdez tanker spill point out that this amounts to "only" a fraction of the company's annual profit.

Companies reply that they must make a profit to stay in business. Although this is stating the obvious, companies raise this regularly in their sustainability reporting. One of the most comprehensive reporters of the 29 leading chemical companies in this area is LG Chem, which devotes five pages of its most recent sustainability report to it.

However, LG Chem and others are sidestepping the real question, which usually is not *whether* companies should make a profit, but *how much profit should they make*? Economist Milton Friedman famously argued in 1970 that companies should make as much as possible [13], others disagree, and we doubt the matter will ever be settled.

9.7.2 Compliance Is More Profitable than Non-Compliance

Complying with regulations, environmental or otherwise, is generally more profitable than not complying. With some notable exceptions,[7] this would seem to be common sense. Crime does not pay, and it is difficult to run a chemical plant from jail.

This is borne out by research. Analysis of 65 US companies (including 11 pharmaceutical and chemical firms) showed that companies with average or good environmental records financially outperform those with poor environmental records [14].

9.7.3 But Going 'Beyond Compliance' Does Not Generate Extra Profit

The same research [14], however, does not encourage going beyond compliance. It shows that there is no significant financial-performance difference between those with average and good environmental records.

[7] For instance, bribing to win government contracts, paying taxes in countries with lax enforcement or, in a merchant bank, strictly separating investment analysis and deal-making.

This may surprise the numerous proponents of "beyond compliance", i.e. do more than regulations required, that is often suggested in the sustainability literature.[8] We are not so surprised. Our view is that going beyond compliance makes sense only when there is an explicit benefit in doing so. Otherwise, why not, say, overpay taxes or suppliers?

9.7.4 Should Public Relations Be Done with a Sustainability Approach?

Most companies have some sort of public relations function, just as they also have functions in, say, accounting and personnel. These are cost-centers, yes, but they are basics of modern business.

A sustainability approach to public relations, as previous sections have shown, is not strictly necessary, and it can bring failure and risk. At the same time, it may enhance a company's long-term profit both by bringing successes and by remediating problems. As yet, there is no short, simple way to determine if a company should adopt sustainability, or if so, to what extent. (See Get on Sustainability's Bandwagon, But Not Blindly or Blithely, p. 137.)

9.7.5 Beyond Profit: Sustainability as Religion

Some proponents present sustainability as a sort of religion that should be pursued for its own sake. This is antithetical to the "green business is good business" argument. Chris Laszlo, author of The Sustainable Company [15], says sustainability is about "heart and spirit (where a manager) shares his commitment to have the company succeed economically while bettering the lot of all its stakeholders." Andrew Newton, Associate Fellow of the Sustainable Development Programme at Chatham House, goes a step further, arguing that there is a moral imperative for managers to pursue sustainability, whether or not that leads to economic success.

We are skeptical of this. Especially at public companies, shareholders may disagree, and it is difficult to force this sort of "heart and spirit" commitment on employees. It should be enough for companies to tell employees what to do (e.g. make these products, obey the law), not additionally to dictate what they must believe.

[8] For instance, a "Sustainability Beyond Compliance in Chemicals" conference held in 2007 featured speakers from Akzo Nobel, BASF, Dow, DSM, Novamont, Rhodia, Solvay and Syngenta. http://www.jacobfleming.com/conferences/chemical/sustainability-beyond-compliance-in-chemicals#eve_inf.

Private companies are much more able to push "heart and spirit" commitment from the top: for example, the founders/owners of Body Shop, Ecover (see What About Sustainability Crusaders?, p. 109), Holcim, Interface, SC Johnson and Patagonia are well-known for their environmental or social commitments and how they push them into their companies.[9]

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[9] In some of these cases, the commitment accounts for a significant amount of the company's brand – so it is not completely altruistic.

Chapter 10
Is There a Non-Sustainable Option?

Abstract Even cigarette producers, armaments makers and manufacturers specializing in dangerous chemicals pursue sustainability. So it is hard to see that any part of the chemical sector would be off limits.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image

When the chemical industry moved toward sustainability, there was an air of desperation (see Losing the License to Operate?, p. 37), as if 'sustainability or die' were the only choices. For the long-term, this appears to be true: to keep and attract employees, Western, public companies in unpopular sectors either must adopt some elements of sustainability or pay outsized salaries.

We conclude this based particularly on inspection of two pariah sectors – cigarette producers and armaments makers – and Albemarle, a specialist in particularly dangerous chemicals. All of these have moved to sustainability reporting.

Does this mean the leading chemical companies that are indifferent to sustainability (Table 7.1) will change their minds? Not necessarily, because they are either privately-held or non-Western. Still, Basell and Ineos will be particularly useful to watch. As major, largely Western, yet private companies, they may be the bellwethers for sustainability in the chemical industry.

10.1 Cigarette Producers

This sector has in recent years come around to sustainability, with the major players reporting to and engaging with stakeholders. This is a change of tactics; well into the 1990s cigarette makers appeared to accept their outsider status. Our inference is

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that they have changed to court employees. Tellingly, the sustainability section of British American Tobacco's (BAT) website includes a Careers FAQs[1] and other FAQs aimed at this.

BAT makes the case for its existence in a low-key, well-argued brief that tackles head on a number of the key objections to smoking, plus a number of other sustainability issues. As Adrian Payne, head of corporate social responsibility at BAT explains: "People find it difficult to acknowledge, but as long as tobacco is legal we have a role to run our business responsibly." Payne goes on to point out of 167 BAT stakeholders invited to dialog, only 34 accepted. Clive Bates, director of Action on Smoking and Health (ASH), the antismoking lobby group, was one stakeholder not prepared to sit around the table with BAT. "We take a cynical view of dialogue – it's about getting critics in a room to stop them criticizing you." [1]

This, we believe, is yet another reason to ditch the word 'sustainability'. Although we accept the cigarette makers' intentions as reasonable, the idea of 'sustainable cigarettes' strikes us as too open to ridicule to be useful. Perhaps it is logically feasible, but along with 'sustainable gambling' and 'sustainable prostitution', we think it will never be credible. For cigarette makers to publish an 'environmental report', by contrast, seems appropriate.

BAT has even achieved a listing in the Dow Jones Sustainability Index (DJSI). Sustainable Asset Management (SAM), the company that selects DJSI members, defended this in a letter to an anti-smoking activist as follows: "No company anywhere is sustainable in an absolute sense. We identify companies that lead in the transition to a sustainable future, and therefore identify the relative sustainability performance of a company to its peer group. Developing a financial index of publicly-listed equities with sustainability leaders is designed to mobilise the capital markets to reward companies that lead in this transition. We recognize that the Tobacco industry is not absolutely sustainable in its current business model and that the Tobacco industry will have to change significantly to move close to a more sustainable business model – if even possible. Our objective and yours – to achieve change – is the same, but the means are different." [2]

We find SAM's comment to be astonishingly cynical and duplicitous, showing sustainability at its greenwashing worst. Surely it is SAM's job to decide whether it is "even possible" for cigarette makers to be sustainable, and if it is impossible, then BAT should not be in the DJSI.

10.2 Armament Makers

Armaments producers, another unpopular sector, have also moved towards sustainability. British Aerospace and General Dynamics, for example, publish sustainability reports. The DJSI is open to armaments makers, although no companies have made the list to date.

[1] http://www.bat.com/group/sites/uk__3mnfen.nsf/vwPagesWebLive/DO728EAN?opendocument&SKN=1.

10.3 Albemarle

Albemarle is a chemical company that has focused on handling dangerous, difficult chemicals. It has unapologetically made major business out of bromine chemistry that is known to be environmentally controversial. In 2007 Albemarle published its first sustainability report, which makes no mention of the ongoing policy debate about bromine in the environment.

In Albemarle's defense, we point out that many companies handle dangerous, difficult chemicals, and that some choose to avoid any public recognition of this. Our point is that Albemarle epitomizes this type of company, and that it has chosen to adopt sustainability.

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Chapter 11
Get on Sustainability's Bandwagon, But Not Blindly or Blithely

Abstract Six suggestions for practitioners, drawn from the core research behind this book.

Keywords Sustainability • Chemical industry • Strategy • Communications • Public image

For large, public chemical companies in the West, we conclude that some amount of sustainability is required. There is a lot of flexibility in scale and scope of its application.

Sustainability is an artifact of the chemical industry's history (see Why the Chemical Industry Turned to Sustainability, p. 25). It may have been fine for the past, but as currently practiced it may not be best for the future. As we discuss in the following subsections, we recommend that companies: study their stakeholders; consider their culture; be responsive, but not necessarily responsible; get rid of the word sustainability; remember the risks; and consider a return to a safety culture.

11.1 Study Your Stakeholders

From the generalist sustainability literature (for example [1]), the impression arises that stakeholders are ready and willing to be engaged – all a chemical company need do is to get started. Reality is not like that, so there should be an up-front study of stakeholders, as some leading companies are doing (see Defining Stakeholders (or, who reads these sustainability reports?), p. 61).

A broad view of a likely outcome is as follows (although the point of a stakeholder study is to understand a specific situation, which will differ in its details).

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11.1.1 Employees Are Your Most Important Stakeholders

They are most interested in a company's performance, and they are well-placed to make the company's case to the outside world, especially local communities. Most people do not work for financial compensation alone; they want to feel some satisfaction from the work they or their company does. As obvious as these statements are, they have not shown through in earlier versions of sustainability, although leading companies are starting to recognize them.

Probably the second-most interested group is the sustainability analysts who work for investment companies.

11.1.2 Most Other Stakeholders Are Scandal-Driven

"Stakeholders…are highly fragmented, contradictory and primarily issue specific," says a study by IMD [2]. In other words, it may be hard to get their attention when nothing is wrong, and then when something goes wrong, you have more of their attention than you wanted. This applies to most regulators as well. Regulation (or even government warnings) is often driven by scandals or accidents.

11.1.3 Some Activists Are Paid to Be Activists

Some of the loudest, least-compromising stakeholders are activists who make their living or their reputation by confronting their opponents. Theirs is an "all-or-nothing" approach that is always dramatic, and in the rare cases it succeeds, also spectacular.

Using force against activists is problematic: doing it may give them just the images they want; not doing it may upset and even endanger your employees or the public. Engaging a confrontational activist may be to walk into a trap.

11.2 Consider the Corporate Position and Culture

The scope and scale of sustainability will depend on a company's position: public or private ownership, regions where it operates, its product portfolio. It also will depend on a company's culture.

11.2.1 Take Stakeholders Seriously

Senior management must be committed enough to sustainability to accept its premise – that stakeholders should be taken seriously and are worth talking to. In practice this is far less obvious than it sounds.

A classic case of not taking stakeholders seriously was delivered by the vice-chairman of General Motors (GM), Bob Lutz, who in early 2008 notoriously told a group of news reporters that global warming "is a total crock of sh*t". Even if Lutz is right, and even if (as he later claimed) this makes no difference in GM's program to develop "climate-friendly" cars, it is an insult to many stakeholders. Surely they will find it hard to believe that GM senior management takes seriously their concerns about global warming. Of course Lutz cheered those stakeholders who share his view of global warming, but they were onside anyway.

Can you imagine a senior chemical manager saying a similar thing about REACH? In private, perhaps, but in public, their statements have been measured and mostly respectful. This approach – long ago mastered by most successful politicians – is essential for sustainability to be real.

11.2.2 With Promises, Less Is More

Because sustainability is about communication and trust, it is especially important to deliver on promises made. Making a claim of, say, "zero waste" (see Zero Waste, p. 139), is harmful if it does not happen within some reasonable period.

11.3 Be Responsive, Not Necessarily Responsible

At the heart of sustainability is a Catch-22 that we call The Love Canal Dilemma (see Reputation Versus Liability: the Love Canal Dilemma, p. 31). On one hand, companies inherently try to avoid liability. Most companies are expressed chartered as "limited liability" organizations, for instance GmbH in Germany, Ltd in the UK or LLC in the US. On the other hand, sustainability, or corporate responsibility – if taken at its word – is about accepting liability. By taking responsibility, companies may be perceived to admit liability much greater than they believe they deserve. By stonewalling and denying liability, they may be perceived as greedy and secretive.

Perhaps the answer is for companies to be responsive, but not necessarily responsible. Being responsive is akin to being customer-centric, except that it is stakeholder-centric. This means:

- Acknowledging that problems are real, without necessarily accepting liability for them.
- Taking stakeholders seriously, i.e. accepting the legitimacy of their fear or outrage, even when you do not share their fear or outrage. Many airline employees, for instance, are trained to do this with upset travelers.

11.3.1 Acknowledging Problems as Real

As yet, there is no standard method for how to do this and not accept liability. In practice, it will consist of lawyers, public relations experts and sustainability managers

trying to find common ground (see Fear of Liability, p. 110). Risk communication expert Peter Sandman explains that common ground will be negotiated in five areas [3]:

- Ignorance – which complaints or issues should be ignored
- Silence – when, if ever, should you stonewall
- Candor – how straight should you be, and this includes "technically correct" statements that are misleading
- Apology – should you say you are sorry, and if so, how
- Tone – should you sound like a human, a lawyer or a technocrat

A good place to start is to accept that some stakeholders may see risk quite differently than a company does.

11.3.2 Accepting Stakeholder Outrage

In environmental and social disputes, companies and their critics often impugn the other side's motives. The company cares more about profit than people, say its critics. The critics care more about their egos and their incomes than the real risks, replies the company. Both sides are outraged by the action of the other.

Ironically, both sides usually believe they are doing the right thing. As Peter Sandman puts it: "People who say the risk is tiny and try to get the public to tolerate it are almost always telling the truth as they see it. People who say the risk is huge and try to get the public to find it intolerable are also telling the truth as they see it….Both sides genuinely think they're right – so genuinely that they can't quite believe the other side doesn't secretly agree" [4].

This positioning can amount to irresistible force meets immovable object, a fight to the finish. But Sandman also presents an alternative that he calls "outrage management" [5].

So how do you effectively communicate to an outraged group? Sandman outlines several important points: "First, be prepared for a long meeting. Trying to shorten the meeting suggests there is something to hide. Allowing the audience to determine when the meeting is over gives them a measure of control and indicates that you seriously want to address all their concerns to the fullest extent.

Second, make your long-term goal that of making the issue boring without being boring yourself., A group outraged by something is seized with indefatigable interest, so your goal is to persuade them that the subject itself is boring enough that they would rather stay home than go to another meeting on this issue. This doesn't mean the meeting can be boring; it should be interesting and engaging, but should also aim at the long-term conclusion that the issue is being well-managed by others and doesn't require any further attention from the audience."

Third, never talk first. "Allow the outraged speakers as much time as they need to vent their concerns," says Sandman. "They want to yell, and to be seen to be yelling, so listen carefully, and say little. The less you say, the more they will want to

hear from you, and when they have finished venting, wait until they invite you – or possibly order you – to reply to their concerns. Always start by reiterating their key points, such as that they are angry about X, worried about Y, and want you to take action about Z. This demonstrates that you have not only heard them, but clearly understand them. Do this tentatively, asking questions rather than making statements, to check and see whether you've got it right. If they call you a jerk, control your own outrage at the insult, listen carefully, and focus on the criticisms you can agree with, rather than on rebuttals of the criticisms you think are wrong. It is not intuitive or natural to do so, but your goal is not for you to feel better at the end of the meeting, but for the outraged parties to feel better."

When the crisis is past, Sandman highly recommends giving credit to the critics for the newly improved situation. "In 1990, for example, there were complaints about the environmental impact of the polystyrene boxes McDonald's used for packaging their hamburgers," he explains. "If they had abandoned the boxes on their own and painted the golden arches green, they would have been attacked. Instead, McDonald's representatives met with the Environmental Defence Fund and invited them to police the switch to a more environmentally friendly packaging format, so they could certify that the change had been done right, and to blow the whistle if there were a problem. The EDF was able to claim a victory over a major multinational, and McDonald's agreed they had been forced to take this step. When a critic is busy taking credit, there's little time left over for further attack. And third parties don't doubt the accuracy of an achievement that your critics are taking credit for. If critics say they made you take a certain action, nobody questions whether you did it."

We are not sure that Sandman's prescriptions applies across-the-board. And taken to its extreme, "outrage management" could be very time-consuming as well as divisive.[1] Still, it provides a valuable start to what otherwise seems an almost intractable issue.

11.4 Sustainability and Responsibility: Right Ideas, Wrong Words

As we have noted throughout this book (see How Others Define Sustainability, p. 43 and Credibility Gap, p. 111), sustainability is a poor word for the main topic of this book. As the preceding subsection points out, even responsibility may not be the right word.

How about environmental and social reporting? How about stakeholder relations or even public relations? Whichever, an accurate name would help to build trust.

[1] Employees could argue that it should be applied to internally "outrageous" issues such as promotions and layoffs.

11.5 Remember the Risks

If the main aim of sustainability is to build trust and communication with stakeholders, then the first rule should be to avoid trust-busting.

11.5.1 Be Careful of Chasing Fads

As some leading companies have become more "issue-focused" in their sustainability reporting (see Defining Stakeholders (or, who reads these sustainability reports?), p. 61), the potential problem is that they may seen to be chasing fads, or even worse, fads that have backlashed.

For instance, many of the leading companies surveyed in this book proudly reported their activities in alternative energy, especially biofuels. However, "once-trendy biofuels like ethanol produced from corn are now being derided by the authorities, who say the fuels have little value in the fight against global warming" [6]. In the UK, BP and Tesco (the country's largest oil company and retailer, respectively), have been criticized sharply by activists for promoting biofuels – an activity they surely aimed to win plaudits for.

11.5.2 Talk Is Cheap, Money Is Real

Companies should tread lightly when telling others what to do, because sometimes the people doing the least are talking the most.

Based on two in-depth field surveys of Dutch households, usually ranked among the world's more eco-conscious, a team of researchers found that "respondents who indicate they behave more pro-environmentally do not necessarily use less energy." In other words, they don't put their (electric) meter where their mouth is. While eco-friendly attitudes and actions showed little correlation, the survey revealed a strong relationship between wealth and energy use: as household income and size increase, so does the utility bill. Indeed, the surveys showed the most energy-conscious people tend to be so – no real surprise here – because they are the most cost-conscious [7].

The moral of the story: telling other people to save the planet rarely works, showing them how to save money often does.

11.5.3 Beware Hubris

As noted above, just as there is a clash between sustainability and the legal department, there is an inevitable clash between conventional corporate communications

and sustainability (see Credibility Gap, p. 111). Suffice it to say here that arrogance is in this case counter-productive. Admitting weaknesses is generally unacceptable as well, so we would suggest that a neutral, 'just-the-fact's approach is probably the best compromise.

11.5.4 Who Owns Morality?

Running through the previous three themes is the question of who owns morality. Companies will find that within their own stakeholder base, views of what is right and wrong may vary tremendously.

Take the issue of global warming. In the political arena this is relatively settled, i.e. it is accepted as true and man-made, the main debate concerns what to do about it. Many stakeholders share this view. But global warming is not settled among one key stakeholder group, chemical industry employees,[2] many of whom dispute it.

The point is that this sort of disagreement is possible about many topics. It might be best for companies to steer clear of taking sides.

11.6 Return to a Safety Culture?

The chemical industry is inherently dangerous; chemicals and production of them can kill people. Numerous conversations with chemical industry veterans from the 1950s to 1970s suggest that the industry used to be more openly cognizant of its dangers. The implication was the benefits outweighed the risks, and that the industry was vigilant in keeping that balance.

The industry's safety-consciousness was so widespread that it became a source of complaint. Veterans note that at companies such as DuPont or ICI, top-drawers of filing cabinets could only extend partially, to avoid them tipping over the entire cabinet. Others moan that safety training was "relentless", that safety-first was stifling.

Somehow in the meantime, the industry's image as a safe pair of hands in a dangerous sector has faded. Whether that has come from a fear of environmental liability, a desire to appear more kind and gentle, or something else is not clear. Whichever, it hardly registers in the industry's sustainability reporting.

Maybe it should. Part of the message here is that if society wants chemicals, it must accept responsibility for them. Not to absolve the industry of all responsibility, but to share it among its beneficiaries.

[2] As ongoing correspondence and reporting in one of the industry's prominent journals, Chemistry & Industry, will attest.

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Chapter 12
Appendix 1: Company Classification

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Table 12.1 Complete classification of all companies studied

	Profile						
Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
United States							
Chevron	US	Public	Ecuador – environmental impact and cancer claims	VP for policy, government and public affairs, Rhonda Zygocki	The Chevron Way – a charter about communities, environment, human rights and ethical practice	Website says DJSI, but not on current DJSI list. Human Rights Equality Index 100% rating.	WBCSD, National Petroleum Council report on energy supply and demand
Dow Chemical	US	Public	Asbestos & Bhopal[a]. Tittibawassee River contamination. Agent Orange litigation.	VP, Sustainability, Neil Hawkins. Chief sustainability officer, David Kepler.	Sustainable Development Principles	DJSI. Various other awards.	WBCSD
DuPont	US	Public	CFCs PFOAs	VP and chief sustainability officer, Linda Fisher. Sustainable growth council, chaired by CEO.	Core Values: Safety and Health; Environmental Stewardship; Respect for People; Ethical Behavior	Business Week 'Top Green Company' 2005. Various other awards	WBCSD
ExxonMobil	US	Public	Alaskan oil spill	Five Board committees tasked with responsibilities.	Statement of corporate citizenship.	10 of 10 score from Governance Metrics Int'l	
Huntsman Corp.	US	Private, Huntsman family			Commitment to Sustainability	Various local awards to plants and sites.	
Lyondell Chemical[e]	US	Public			'Basic elements' statement of aims. No mention of sustainability issues except 'be ethical'. Vague statement about sust on website.		

PPG Industries	US	Public	Contamination in Lake Charles area, probably not of national attention.		Several broad statements on website.	Previously in DJSI	Member of Climate Northeast Partnership.
Europe							
Air Liquide	France	Public		Xavier Drago, Sustainable Dev Director. Anne Lechevranton, VP, Corp Communication	'Principles of Action', 2006 statement about protecting environment, integrity, transparency and anti-corruption.	Ethibel Sustainability Index since 2005	Observatoire sur la Responsabilité Sociale des Entreprises (ORSE)
Akzo Nobel	Netherlands	Public		Sustainability Council in Board of Mngmnt. Gen Mngrs have sust targets. Sust 'focal points' in all biz units. Director of sustainability, Andre Veneman. Media contact, sustainability, Marc Michelsen.	Statements of Values, Business Principles and Commitments	DJSI, previous listing in FTSE4Good. Best in class in Storebrand SRI ranking.	WBCSD
Basell	Netherlands[g]	Private					
BASF	Germany	Public	Poison gas, slave labor in the 1940s	Sustainability Council, led by Board Member Harald Schwager. Regional steering comms and Sustainability Center to coordinate. Project teams handle specific programs. Climate protection officer, Ulrich von Deessen. Chief compliance officer,	Issue framing, to identify & rank 'issues of interest' to society and BASF.	DJSI Global 100[h].	WBCSD

(continued)

Table 12.1 (continued)

	Profile						
Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
Bayer	Germany	Public	Poison gas, slave labor in the 1940s	Corporate Sust Board since 2004, Sustainable Dev Planning Group, Environment Sustainability Dept. Head of Enviro & Sustainability, Chair of Climate Program, Wolfgang Entrup.	Policy on climate change.	DJSI FTSE4Good Advanced Sustainable Performance Index Storebrand best in class rating Low-Carbon Leaders.	WBCSD
Evonik/ Degussa	Germany	Foundation	Poison gas, slave labor in the 1940s.		Global Code of Conduct	FTSE4Good Various local awards to plants and sites.	WBCSD Ecosense Euro Corp Social Responsibility Alliance
DSM	Netherlands	Public		Vice Chair of Board, Jan Zuidam, chairs Corp SHE Committee. SHE Council reports to it. Dept of Corp Sustainabillity.	'What we believe in' principles. Vision 2010: retain top rankings in SHE & sustainability, leadership in biotech, improvement of eco-footprint, more diverse/int'l staff.	DJSI Formerly in FTSE4Good	WBCSD China Bus Council for Sust Dev World Economic Forum Leaders for Nature
Ineos	UK	Private	CFCs, PVC and chlorine		Excellence in safety, health and environmental performance is our top priority and we are open and honest about such performance, which we publish locally and nationally, as required.		

Shell	Netherlands	Public	Brent Spar Niger Delta	Sust Dev and HSSE Executive Group, chaired by CEO. Social Reponsibility Committee. Sust dev targets account for 20% of bonus scorecard.	Business Principles.	Global 100.	
Solvay	Belgium	Public	PVC and chlorine, F-gases		Commitment of responsibility, innovation, durability, proximity.		
Japan							
Mitsubishi Chemicals	Japan				Review to strengthen CSR is underway.	DJSI (part of Mitsubishi Corp)	WBCSD
Mitsui Chemicals	Japan	Public		CSR and Corporate Communications Division est in April 2007. 334 staff 'CSR Supporters' named.	Broad aims built into 'Grand Design' and 2007 'Action Guidelines'. Staff training on guidelines.	Various specific awards, but none for sust as such.	WBCSD
Shin-Etsu Chemical	Japan		Naoetsu plant explosion.	CSR Promotion Committee, chaired by Managing Director, Kiichi Habata.	CSR Vision and Basic Policies. Environmental Charter.	FTSE4Good	
Sumitomo Chemical	Japan	Public				DJSI (part of Sumitomo Corp)	WBCSD
Toray Industries	Japan	Public		CSR committee, chaired by VP. CSR operations group est in 2006, within strategic planning. Training and promotion throughout corp.	Corp Mission and Principles. CSR guidelines set up in 2004. 10 Basic Environmental Rules'.	DJSI KLD Global Climate 100	

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Table 12.1 (continued)

	Profile						
Company	HQ country	Ownership	Legacy issues	Corp org	Guidelines or charter	Awards	Associations
Other							
China Petroleum and Chemical (Sinopec)	China	State controlled					WBCSD China Bus Council for Sust Dev
Formosa Plastics	Taiwan						
KPC	Kuwait	State controlled			HSE Vision of excellence. No explicit mention of sustainability or stakeholderism.		WBCSD
LG Chemical	S Korea	Public			Core values – a vague statement of growth and value creation.	Various specific awards, but none for sust as such.	Korea Bus Council for Sustainable Dev Korea Assn of Enviro Friendly Companies
Petrochina	China	State controlled			Not a single document as such. Perhaps UN Global Compact serves as guildelines.		
Reliance	India	Public			Our Vision – statement of economic, financial and socio-enviro aims. Company-wide sustainability strategy in development		WBCSD, joined in mid-2007.
SABIC	Saudi Arabia	State-controlled					

Company	Stakeholder approach				
	Sustainability report, GRI compliance, audit	Responsible Care	Consultation or dialogue	Partnership	Philanthropy
United States					
Chevron	Corporate Responsibility report since 2001. Benchmarked and largely compliant with GRI guidelines. Audited by Lloyd's Register	Chevron Phillips Chemical rejoined in 2007	$119 mln in community engagement. Stakeholder engagement training. Corp-wide program for Environmental, Social and Health Impact Assessment started in 2007	Angola Partnership $25 mln. NGO leadership workshops. Indonesian biodiversity project. Operation Clean Sweep to reduce plastic waste.	Discovery Channel Education Partnership. Vocational training in Bangladesh & Indonesia. HIV/AIDS project. Disaster aid in Phillippines. Indicator for community investment.
Dow Chemical	Corporate Report in 2007, combines stakeholder with economic performance reporting. Separate GRI reports were issued from 2002-2006. Pending in 2007. Dow is considering audit, but has not yet implemented.	Member. Applied Responsible Care Guiding Principles to global operations in 1999.	Corporate Environmental Advisory Council, since 1991 [55]. Community relations assessment for all major sites by 2015.	With the Natural Resources Defense Council to reduce toxic pollutants in Michigan [55]	Ambassador of Environment. Loan guarantees to WaterHealth Int'l. Habitat for Humanity. Total philanthropy in 2007: $54 mln.
DuPont	GRI report is extracted from other corporate reports. GRI principles applied 'where feasible'. Appears to be broadly compliant, but not audited.	Member, Community Advisory Panels at 'almost every DuPont site around the world'.	Biotech and Health Advisory Panels. Former developed Bioethics Guiding Principles.	Environmental Defense Fund, to develop standards of care for nanotech.	$22.7 mln in donations.
ExxonMobil	Corporate Citizenship Report, following IPIECA and API guidance, consistent with GRI G3 guidelines. Audited by Lloyd's Register.	Member.	Extractive Industries Transparency Initiative, Voluntary Principles on Security and Human Rights. Best Practices in External Affairs – community consultations. Citizen Engagement Forums. Opinion Leader Dialogues. Employee forums. ESHIA for new sites.	Supported local NGOs and associations in Angola, Indonesia.	Support to education, Africa Health Initiative, local health care, local economic development. Employee volunteering. $206 mln in community investment (unclear split between capital spending and giving). At least 10 biodiversity preservation and restoration projects.

(continued)

Table 12.1 (continued)

Company	Stakeholder approach				
	Sustainability report, GRI compliance, audit	Responsible Care	Consultation or dialogue	Partnership	Philanthropy
Huntsman Corp.	No	Member, original signatory in 1988. Open days and events at various sites.			Local support of education, disaster relief and community volunteering. Huntsman Family foundations have donated several $100 mln to cancer research, education and other causes.
Lyondell Chemical[e]	No	Member. Active CAPs and visiting programs, including 'Global Care Day'.			Support of education, local communities, matching-gift program.
PPG Industries	Reporting as part of website. Benchmarked against GRI guidelines.	Member, original signatory in 1988.			Onsite wildlife conservation projects.
Europe					
Air Liquide	Sustainable Development Targets and Indicators. Not benchmarked to GRI, but uses many of its indicators. Audited by Mazars & Guerard and Ernst & Young.	Member in some countries and sites.			Sponsors healthcare, education, environmental actions. €1 mln/yr at group level. Aim to create corporate foundation in 2008.
Akzo Nobel	Sust reports since 2004. GRI G3 A+ in 2007. Audited by Ernst & Young.	Member. CAPs, Open Days and local publications.	Employee survey and forums. In 2007 engaged with Amnesty Int'l, World Resources Institute and WWF.		Community program started in 2005 – volunteering and support.
Basell		Member			
BASF	'Facts and Figures' report, plus supplements on website. GRI G3 A+ compliant. Not audited, but checked by GRI.	Member. Competence Center for group with 4 staff, reports to Schwager. Expert groups and audit team. 66 CAPs at BASF sites.	Leadership feedback. Employee surveys.	Developed eco-evaluation software for textile dying with UNEP and UNIDO.	€75 mln supporting communities, education, sport and culture. Volunteer support.

Bayer	Sustainable Development Report, GRI G3 A+, audited by Ernst & Young. Carbon Disclosure Project.	Member. BayKomm HQ in Leverkusen.	External and employee surveys. Survey of Sustainable Dev Report readers – what topics they want to see.	€1 mln/yr support to UNEP for enviro education.	'Bayer Cares Foundation', 'Science and Education Foundation'. Support for education, health, sport, local communities, water conservation. "International Children's Painting Competition on the Environment." Billion-Tree campaign, anti-malaria projects €1 mln/yr support to UNEP for enviro education.
Evonik/Degussa	Corporate Citizenship Report, not explicit GRI link, but addresses much of the guidance. Audited by PwC.	Global Charter member. Open days at various sites.	Employee survey.		Degussa Foundation supports education, research and conservation. Local cleanup days.
DSM	'People, planet and profit' report. GRI G3 guidelines B+ rating. Audit by KPMG Sustainability.	Member	Employee Engagement Survey. Stakeholder assessment study.	Supports UN World Food Program with tech advice, $1 mln of hi-nutrient products, volunteers. Groundwater cleanup in Toansa, India.	€2.5 mln support of education, culture, sport and social projects. Torch projects for local communities.
Ineos		Member			
Shell	Sustainability Report, based on IPIECA guidance, consistent with GRI G3 guidelines. A+ ranking, according to Shell's self assessment. External review by 6 experts, but not by auditors.	Member, with similar approaches taken to non-chemicals ops.	Global advertising campaign. Round Tables for Sustainable Palm Oil, Sustainable Biofuels. Drilling program in Beaufort Sea. Social Performance Plans for sites.	$1.1 mln/yr each to biodiversity projects with IUCN and Wetlands Int'l. $2 mln to Port Arthur Communities Fund.	$20 mln to community development in Niger Delta. $170 mln in social investment. HIV/AIDs education. Shell Foundation funded w $250 mln in 2000: poverty relief and economic development.
Solvay	Towards Sustainable Develoment reports, 2004-2008. Guided by GRI	Member. Open days, info packs, complaint lines, public emergency plans. Good Neighbor Program.	Policy of 'dialogue and strategic choices with stakeholders'. Employee survey, triennial. Sponsor of 'Greenfacts'.		Support to local communities, education.

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Table 12.1 (continued)

Company	Stakeholder approach: Sustainability report, GRI compliance, audit	Responsible Care	Consultation or dialogue	Partnership	Philanthropy
Japan					
Mitsubishi Chemicals	No report, but a webpage of 'Corp Citizenship Activities'	Member			Education and culture sponsor. Promo of recycling, waste disposal, green businesses.
Mitsui Chemicals	CSR report since 2005. GRI & Japan govt guidance used. No audit, however, '3rd-party comments' from 2 academics included.	Member. Public tours at various sites, 'Public Relations' newsletters. Detailed in CSR report.	Explicit stakeholder focus – relations shown in CSR report. CSR survey of suppliers. Meetings with local communities at 2 plants.		Disaster relief, community volunteering, cleanup projects, 'wonders of chemistry' sponsor for schools. Culture, education sponsor.
Shin-Etsu Chemical	Environmental and Social Report. Broadly to GRI guidelines, but not benchmarked or audited.	Member. 3rd-party audits since 2006.	Reaction to Naoetsu explosion. CEO renounced 50% of pay for 6 months as apology.		Donation campaign for UN High Commission for Refugees. Volunteer programs, and support for sport, culture, health.
Sumitomo Chemical	Corp Social Responsibility Reports, 2004-2007 (EHS Report from 1998-2003). Although labeled CSR, report is entirely about the environment.	Member. Open Days. Audits of individual sites.			Donations to WHO anti-malaria project. Local volunteering. Support to local communities, culture.
Toray Industries	Corp Social Responsibility report. GRI compliant and benchmarked, but not ranked. 3rd-party review by Aarata Sustainability Certification.	Member. Dialogue w local communities as part of CSR program.	Broad stakeholder dialogue plan adopted in 2005.		Contributes 1% of ordinary income to 'social' activities: education, culture, disaster relief.

Other					
China Petroleum and Chemical (Sinopec)	Sustainable Dev Report, first in 2007. GRI G3 guidance applied. ERM reviewed report.		Stakeholder Communications map.		Poverty and disaster relief. Support for cataract patients, education, health care, culture and sport.
Formosa Plastics					
KPC					Donations to handicapped.
LG Chemical	Enviro reports since 2003, switched to Sustainability report in 2006. GRI G3 A+ certified. Audited by KMAR.	Member. Separate annual report since 2003. RC Committee reports to CEO. RC assessment.	Survey of stakeholders in 2006. Their requests are included in 06 Sust Report. 'Voice of the customer' program detailed in Sust report.		'Twin Angel' gift matching, volunteering, cleanup day, support of elderly, disabled. Poverty relief to children, education grants. Chemistry eduation. Cultural event and community group sponsor.
Petrochina	Corp responsibility reports started in 2006 (Englishc and Chinese). Benchmarked to GRI guidelines. Not audited.		Government and media are explicitly recognized as stakeholder. Efforts to boost media relations in 2007. No clear channels to NGOs.		Poverty reduction, agriculture aid, education, disaster relief, Olympics and voluntary works. China's Green Carbon Fund for sequestration.
Reliance	Corporate Social Responsibility Report (started in 2005). A+ conformance to GRI G3 principles. Covers all manufacturing. Audited by Ernst & Young.	Member.	With key stakeholders: survey questionnaires; one-on-one forums; and an open dialogue. Planning 'detailed roadmap' for 2008.	Gujarat Safety Council, promoting safety culture.	Dedicated teams support health-care, education, economic development in local communities. Village Awareness programmes. Mostly through foundation. Greenbelt created outside Jamnagar refinery.
SABIC	Corporate social responsibility and SHE sections of annual report.	Joined in the US in 2007.			$27 mln of donations in Saudi Arabia & Europe.

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Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
United States								
Chevron	Target of zero accidents. Corporate indicator for safety.	Operational Excellence Management System. Corp-wide program for Environmental, Social and Health Impact Assessment started in 2007.	Targets on climate change, energy efficiency & biodiversity. Indicators: emissions, energy, & spills.		Committed, managed, with several updates in 2007. Chevron Hotline (for whistle-blowing on ethical issues)	Indicator for diversity. Business Conduct and Ethics code.	Sequestration project proposed in Australia.	Biofuels R&D.
Dow Chemical	Corporate indicators for safety, accidents & leaks.	Little or no mention in 2007 corporate report.	UN Global Compact, signed in 2007. Target on energy efficiency, 25% cut, 2005-2015.	Dioxin, furan and PCB – exposure studies in Michigan. Security and Prosperity Partnership on chem. Assessment and management. In-house LCA capacity. $10 mln support to Sustainable Products & Solutions Program, UC Berkeley. Public safety assessment for all products by 2015[b].	Committed, managed.	Codes of business conduct, financial ethics.	Water supply and conservation. Lower-energy propylene oxide process. Polyethylene from sugar cane. Landfill methane use. Methane feedstock research.	RENUVA soybeans to polyols. Glycerin-based propylene glycol.

DuPont	Target of zero injuries and accidents. Several corporate indicators.	'Highest standards for the safe operation of facilities and protection of environment, employees, customers and people of the communities in which we do business.' Benchmarked externally as meeting or beating expectations.	UN Global Compact, endorsed in 2001. Target cuts for 2004-2015: GHGs 15%, water use 30%, air carcinogens 50%, plus fleet fuel efficiency. Target of zero waste and emissions. Other indicators: energy use, renewable energy, land conservation, GHGs, hazwastes[c].	2015 target: introduce 1,000 new products or services 'that help make people safer'. $1 mln to Global Crop Diversity Trust. Product stewardship with review on 2-4 year cycle.	Committed, managed.	Business Conduct Guide. Supplier diversity – TEMPO. Employee diversity policy. Human rights policy. Rejection of child labor, forced labor. Anti-bribery policy.		Goals for 2015: $2 bln revenues by 2015 in products that cut GHGs, $8 bln in non-depletable resources. 30-40 specific products mentioned.
ExxonMobil	12 indicators.	Environmental Business Planning system for each site.	Energy efficiency up 10%, 2002-2012. VOC and NO_x emissions down 5%/yr. Cut hydrocarb flaring 50% over several yrs. Indicators: 20 ones for spills, emissions (including GHGs) and energy. Standards for water use.	Sponsors Stanford U's 'Global Climate and Energy Project'. LCA and risk assessment capacity.	Committed, managed. Transparency agreements monitored. 3 indicators tracked.	Standards of Business Conduct, Controls Integrity Mngmnt System, Ops Integrity Mngmnt System. Extractive Industries Transparency Initiative – anti corruption. Global Women in Mngmnt Program. Anti-malaria & AIDS programs.	Involved in carbon capture and storage. Improved combustion tech. Water conservation.	Automotive plastics and tire tech. Lithium-ion battery films. Higher economy motor oils.

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Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
Huntsman Corp.	Target of zero accident and injuries. Several corp indicators. 14 US sites joined OSHA Voluntary Protection Program.	EHS vision, policy and standards. Implementation of standards throughout corp is measured. Target: 100% standards implemented by end 08- Audits at each site every 3 yrs. ISO 14001.	Target of 'no harm to the environment'. Indicators: GHG and other air pollutants, wastewater, waste, haz waste. US ops to cut GHG intensity 18%, 1990-2012[d]. Five-yr corp improvement plan mentions GHG and energy reductions – no firm targets. Rubicon (Geismar) pledges to eliminate aniline and benzene emissions, part of US EPA's NPEP voluntary reductions.	Product stewardship networks.			Green chemistry	Green chemistry: a variety of products listed, some for each division.
Lyondell Chemical[e]	Vision of zero accident and injuries. Several corp indicators.	Policy of compliance and good management (operational excellence).	Ultimate goal of preventing pollution at source. Voluntary use of infrared cameras to detect fugitive emissions.	Compliance with HSDS requirements.	Statement of commitment 'to operating our businesses with the highest principles of integrity, ethics and corporate responsibility.'	Ethics code, conduct policy, compliance hotline.		

PPG Industries	Several indicators and ongoing programs.	EHS Process. ISO 14001.	US ops to cut GHG intensity 18%, 1990-2012[f]. As part of US EPA Climate Leaders, to reduce total global GHG emissions by 10 percent from 2006 to 2011. 25% energy eff increase, 2006-2016. Part of US EPA's NPEP program, to voluntarily cut mercury emissions. Indicators: waste and hazwaste.	Joined Coatings Care, a stewardship program of US National Paint and Coatings Assn. Supply chain and transport risk mngmnt.	Committed, managed.	Global code of ethics, ethics hotline.		Ecological Building Solutions – for architects and designers. Pool care, inks and other items.
Europe								
Air Liquide	Goal of zero accidents. Indicators of accidents and accident frequency.	Industrial Mngmnt System rolled out to 99% of group by end 2007. ISO 9001 and 14001 certifications.	At group level, 9 indicators of energy and water consumed, GHGs emitted. Other emission & consumption indicators for specific processes and transport. Targets to raise energy efficiency.		Committed, managed.	Codes of conduct introduced at about half of operations. 19 indicators of employee 'sustainability. Goals to raise hiring of women, training, and performance reviews.	60% group R&D devoted to energy efficiency, new energy and cleaner production. Target for new patents.	Fuel cells and hydrogen-power for automobiles.

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Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
Akzo Nobel	ISO, Responsible Care, OHSAS standards. Internal & external audits. Several indicators.		'Carbon strategy' to be revised in 2008. Indicators: carbon, water and energy consumption, emissions of GHGs, NO_x and So_x at some sites., VOC, ODSs, wastewater, waste and haz waste.	Eco-efficiency evaluation of product portfolio. Sust policy for suppliers.	Committed, managed. Risk mngmnt framework.	Broad employment policies of diversity, training, development and compensation. Code of conduct. Integrity mngmnt. Complaints system. Indicators for employee health. Sustainability and eco-efficiency training.	Low-carbon power.	Aim to hike 'eco-premium' products from 18% revenues in 2007 to 30% by 2015. Long list of existing eco-premium products.
Basell	Several corp indicators.	ISO 14001.						
BASF	Target for 2002-2020: cut transport accidents 70%; lost time and occupational disease cut 80%.	Little or no mention in 2007 corporate report.	Corporate life-cycle carbon balance published 2008. Targets for 2002-2020: cut 25% energy use and GHG/t of product; cut 60% heavy metals, 80% organics, 80% N discharge to water; cut 70% air pollutants. Halt gas flaring by 2012.	Socio-eco-efficiency evaluation of product portfolio. Internal and external LCA capacity. Eco-efficiency label. Risk profiling of sites, with periodic audits. Supply chain profiles. Product stewardship.	Committed, managed.	Qualitative goal to hire more women, non Germans. Goals: >70% senior execs with int'l experience. Training and work-life balance.	'BASF Success'– a environmental services supplier[i].	GHG and energy conservation: insulation, catalysts, automotive plastics, biodegradables, etc. Eco-efficiency label.

Bayer	Managing Safety Initiative and ArguS. Several indicators.	Integrated HSE system, compliant to ISO 14001, EMAS and other standards. HSE audits started in 2005.	UN Global Compact signatory. Climate Program: 'Bayer Climate Check' software; business unit cuts of 5-25%, 2005-2020. Targets: cut 10% organic carbon and N discharge to water; 30% cut in VOCs; max ODS emissions; and waste. Indicators: energy & water use.	Sustainable procurement. Stewardship, products reviewed through their life cycles.	Committed, managed.	Internal comms about anti-corruption, compliance, human rights and working conditions. Commitment to employee rights, diversity. Human rights, child labor audit or supply chain.	€3 bln in climate-related R&D or investment, 2008-2010. Hg removal from fluegas.	Jatropha-based biodiesel. Polycarbonate to replace glass. Drinking water pipe coatings.
Evonik/ Degussa	Target of zero accidents. Goal for 2014: max 1.5 accidents/ mln hrs.	ESHQ policy. TechniData EPM and SuRe systems introduced in 2004 to collect & stndrdise data.	Goals 2004-2014, cut: energy-GHG 20%; water use 20%; waste 20%. Indicators: air emissions of CO_2, SO_x, NO_x, VOC, particulate, heavy metals; water and energy consumption; wastewater COD, waste and hazwaste. Corp material flow balance.	Supply chain audits. Copr guidelines on genetic engineering and nanotech.	Committed, managed.	Global Code of Conduct. Global Social Policy. UN Human Rights Declaration, ILO Core Labor Stndrds. Social Accountability Standard 8000.	Direct synthesis of H_2O_2. Energy-saving processes.	Solar silicon. Biodegradable peracetic acid and H_2O_2 formulation. Silane tire additives.

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Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
DSM	Target: 50% cut injuries, 2005-2010. Corp indicators.	Implementing policy to use same standards globally.	UN Global Compact signed in 2007. Targets for 2010: energy efficiency up 2%/yr; 15% GHG cut 2005-2008; 'Planet' indicators: energy use; emissions of GHGs, dust, VOC, COD, NO_x, SO_x, N_2O; enviro complaints and penalties.	Sustainability Issue Tracker. Code of Conduct for suppliers, with questionnaires and some audits. Target to cover 90% by 2011. Starting to track carbon footprints of products. LCA capacity.		Employee health-awareness campaign. UN Global Compact, human rights, whistle-blowing hotline. Indicators: diversity, training, turnover, absenteeism. 'Employer of choice' program. Research and reporting on animal testing.	Reduced fly ash and COD in China ops. Energy conservation. Fermentation route to Vitamin B2.	Plastics to lightweight autos, build windmills & sewers. Biomaterials. Energy saving enzymes.
Ineos	Aim of zero injuries. Publishes injury indicator.							
Shell	Goal: no harm to people. Corp indicators and standards. In 2007 started corp wide road safety standard.	Systematic approach to managing HSE. ISO 14001. HSE mngmnt system, w global enviro stndrds. Biodiversity action plans. Protected areas commitment.	Target: GHG 5% cut, 1990-2010[i]; end continuous flaring; 'Ambition' for each operation to be in lowest 25% for GHG emissions.	International Alert for political risk, peace building.	Committed, managed.	Code of Conduct, w employee training. Whistle-blower hotline. Employee rights, human rights. Targets: 20% women in	R&D on carbon capture and storage. Coal gasification, renewable electricity. Packaging: wt reduction, eliminate PVC.	Additives and lubes for fuel economy. Biofuels. Hydrogen fuel. Low-temp detergents.

			Indicators: emissions of GHG, SO_x, NO_x, VOC, flaring, energy intensity, spills, external perception of enviro performance.			senior mngmnt, 50% native senior managers. Indicators on diversity, labor relations, corruption and favorability.		
Solvay	Health & Safety Charter, 2002. OHSAS 18001 being implemented. Several indicators. Auditing of distribution companies. Exposure assessments. Uniform hygiene stndrds.	EMAS and ISO 14001 certified. Energy audits. Enviro improvement plans at each site.	Indicators: air and water emissions; EuroChlor Sust Dev variables. Environmental Release File.	Solvay Sustainability Screening. Product stewards I each biz unit. Vinyl 2010 project. Recycling. Carechem24 program. Local health assessments.	Committed, managed. Corp governance policy published in 2003.	Ethical Values guidelines. Work-life balance.	To treat incinerator emissions and residues, geomem-branes, bleaching.	Mild biocides and cleaners, long-life products, lightweight-ing.
Japan								
Mitsubishi Chemicals		Compliance is a top-management priority.			Some commitment and manage-ment, since 1999.	Employment of disabled. Code of ethics and of conduct.		Medicines. Pollution control equipment.

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Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
Mitsui Chemicals	Several corp indicators. Developing company-wide prevention, education program.		Targets: GHG emissions at 90% of 1991 level; industrial waste at 1% of total waste, VOC reductions. Indicators: eco-efficiency, toxicant emission, air pollutants, incidents.	Product safety dept est in Jan 2006.	Committed, managed. Detailed report.	Targets for employee health. Training and gender diversity. Rehiring of retirees. Employment of disabled.	Unspecified target to develop non-fossil-fueled processes. NO_x removal.	Adult incontinence products – ie diapers.
Shin-Etsu Chemical	Group Environmental and Safety Meeting. Several corp indicators. Major review following explosion.	Group Environmental and Safety Meeting. Emergency response system expanded.	Targets for 2010: cut GHGs 66%, 1990-2010; less than 1% waste to landfill[k]. Corp material flow balance. Indicators: energy use; emissions of CO_2, soot, NO_x, SO_x, HCl, wastewater, waste, recycling. Environmental accounting introduced.		Committed, managed. 'Enhancement of governance is most important task of CSR'.	Compliance Pledge, with whistle-blowing. Performance-based pay and promotion. Child-care leave.	Promotion of zero-emission technology.	'Our products… support a life of affluence'[l]. Green procurement.

Sumitomo Chemical	OSHMS certified in 2007 for entire company. Several indicators. Process safety review committee.	ISO 14001 and 9001.	Targets 2002-2010, cut: toxicants[m] emissions 50%, waste to landfill 47%[n], energy consumption 6.5%, CO2 6%. Indicators: toxicants to air and water; emissions to air of SO_x, NO_x, soot, dust, VOCs, GHGs; to water for COD, N, P; use of water, energy.	Safety information database. Ecopoint calculations for each site.	'Compliance' message in website, Compliance Committee.	'Relationship with Society' rules. Compliance hotline.		
Toray Industries	Unified SHE mngmnt system. Numerous indicators.	Unified SHE mngmnt system. ISO 14001. Risk mngment system.	Goal of zero emissions. Targets, cut: GHGs 15%, 1990-2010, toxicants 55% from 2000, landfill waste to 5%. Energy efficiency up 2%/yr. Increase recycling. Indicators and interim targets: SO_x, NO_x, dust and VOC to air, BOD and COD to water.	Product safety dept est in 2006. Detailed safety review and audit procedures. LCA capacity. Promotion of recycling. Supply chain compliance.	Committed, managed. Focused on upgrading internal controls. Risk mngment system.	Corp Ethics and Compliance Code of Conduct. Whistle-blower hotline. 'Advancement of Women' project. Work-life balance program. Human rights promotion.	Water desalination and treatment..	'Ecodream' started in 2005, to double sales of eco-friendly products by 2010. Lightweighting, biodegradables. Polylactic acid. Benchmarking of products for environmental benefits.

(continued)

Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
			Environmental efficiency indicators being developed. Environmental accounting introduced. Material balance for company.					
Other								
China Petroleum and Chemical (Sinopec)	OHSA 1800 certified.	HSE management system. ISO certified.	UN Global Compact, joined in 2004. Indicators: emissions of GHGs, COD, VOC, to soil and groundwater, other aqueous effluents; resource efficiency; complaints.		Plans to improve and to accept supervision from stakeholders.	Assistance fund for employees. Complaint box. Indicators: training, retention, complaints. Anti-corruption rules. performance reviews, holiday policy, pension. Non-discrimination, diversity.	Low-effluent biodiesel technology.	Biofuels.
Formosa Plastics					Discussion included in annual report.			
KPC						Training programs aimed at developing Kuwaiti tech & management talent.		

LG Chemical	PSM, OHSAS and KOSHA compliance, training of staff and suppliers. Accident & injury indicators.	Eco-accounting and performance measurement.ISO, OHSAS and KOSHA compliance. Global EHS standards. E&S audits. Emergency response to spills, accidents.	Indicators for: raw material and water use, waste generated, wastewater, recycling, and various pollutant emissions. Target of zero waste.	Product safety and liability Council est in 2002. Annual product liability report, and reviews. LCAs of batteries, electronics and a few chemicals.	Detailed reporting. In 2006 appointed more outside directors, greater autonomy to the Board of Directors and the Audit Committee.	'Management by principle' guidelines issued in 2004, Fair Competition guide in 2006. Ethics hotline. Labor cooperation and health.	Small CDM project started.	Eco-product development system. Won 60-70 ecolabels in 2006. REACH and RoHS compliance.
Petrochina	Safety campaign throughout company. Accident and injury indicators. Target is zero injuries & accidents.	Began to establish a uniform, corp-wide HSE system in 2007. Guidelines issued and training conducted.	UN Global Compact, signed in 2007. Compliance with waste disposal regulations. Zero pollution target.		Broad statements of commitment and management. Internal financial risk control system started in 2006, audited by PwC. Also started western-style accounting.	EEO policy, and compliance with Chinese labor laws. Policies on emp health, training. Codes of ethics for employees and senior managers introduced in 2005.	Carbon sequestration projects. Energy conservation and pollution reduction projects.	'Sustainable' supply of energy. Wood-based biodiesel. Bioethanol.
Reliance	Conducts annual benchmarking, which is made public. Created HSE center of excellence. Safety education for contractors.	Integrated management system for environment, quality and health. Compliant to ISO 14001, ISO 9001, OHSAS 18001.	Reports 35 core indicators specified in GRI G3 guidelines. Includes: energy, water use and discharge, GHGs and other air pollutants, waste generation, recycling	Supports Indian Centre for Plastics in the Environment, recycling operation, together with municipalities. Enviro assessment of polymers across lifecycle. Developing LCA capacity.	Committed, managed. 'Best governance' policy and guidelines. Very detailed reporting.	Code of ethics and policy against insider trading.	Two CDM projects underway, 4 more in planning.. Business 'cell' formed to find more. Capture of coal-bed methane.	Cleaner fuels, pre-colored yarns, PET as glass container replacement, PET recycling.

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Table 12.1 (continued)

	Rebranding risk mngment reg compliance						Recognition	
Company	Operating safety	Enviro mgmnt system	Enviro targets, indicators	Product (or process) safety/risk	Governance	EEO, diversity other	Green processes	Green products
SABIC	"One of our most important social responsibilities is to ensure that every single employee has a safe and healthy place to work."	Some ops have been ISO 14001 certified. Some compliance audits.	Energy indices for most sites.			'We are a Saudi Arabian company, and we are keenly aware of our responsibilities to the Saudi people and state. We are proud of our heritage and believe that it is our duty to help our country to develop. In this spirit, we are increasing the number of Saudi nationals…'	Five projects registered with the UN Clean Development Mechanism	

[a] Legacies of the former Union Carbide, which was acquired by Dow in 2001
[b] Available at http://www.dow.com/productsafety/finder/
[c] As submitted to US Toxic Release Inventory
[d] As part of the 'Climate Resolve' program organised by the US Business Roundtable.
[e] Was acquired by Basell at the end of 1997.
[f] As part of the 'Climate Resolve' program organised by the US Business Roundtable.
[g] Headquarters in the Netherlands, but owned by a US company, Access Industries, which is privately held by a Russian.
[h] BASF is classified as a 'materials' company, not a chemical company.
[i] Similar to, for instance, Ciba Services – offering analytical and administrative services, such as REACH registration, to third parties.
[j] Claims to be only major oil & gas company to target an absolute decrease in GHG emissions.
[k] It is unclear what this precisely means.
[l] That is to say a good, dignified life.
[m] As listed on the PRTR, Pollution Release and Transfer Register (similar to the US Toxic Release Inventory).
[n] Toxicant and landfill targets appear to be in reaction to regulation.

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Chapter 13
Appendix 2: Quantity Versus Quality – How Experts and Laypeople Disagree About Technology Risks

Hazards of modern life tend to be assessed differently by specialists and -specialists. It is not so much a conflict of answers, but of questions asked in the first place.[1]

Which is more dangerous for UK residents, atomic energy or stepladders?

On the one hand, "nuclear power has not killed anybody in the UK and very few people elsewhere," says no less an authority than Ian Fells, Professor Emeritus of Energy Conversion at the University of Newcastle, and currently Chairman of the Centre of Excellence for New and Renewable Energy.

One the other hand, the government's Department of Trade and Industry reports that "one person a week is killed in accidents involving ladders." So, in the interest of public safety, this comparison proves we should green light nuclear stations and put a stop to DIY, right?

Not quite, but it highlights the problem of assessing technologies by the numbers alone.

13.1 Quantitative – Approach of the Experts

Although risk assessment surely dates back to prehistory (e.g. a caveman deciding how closely to stalk his prey, such that he kills it rather than vice versa), "doing the numbers" of technology risk is a relatively young science. It started in the 1950s with engineering studies aimed at finding a safe design for nuclear reactors. By 1975 this had evolved to "probabilistic risk assessment", which has since grown into an industry employing tens of thousands of engineers, scientists and regulators.

Probabilistic risk assessment, or PRA, is an expert's game. It depends heavily on analytical, mathematical and computing tools that are inaccessible to laypeople: Monte Carlo analyses, influence diagrams, multiple attributes, minimum cut

[1]The following non-copyrighted article was written in 2005 by the author of this book for a general audience.

E. Johnson, *Sustainability in the Chemical Industry*, Green Energy and Technology,
DOI 10.1007/978-94-007-3834-8_13, © Springer Science+Business Media B.V. 2012

sets, fault trees and the like. The science is fast-moving as well as voluminous. For instance, since 1986 the US Environmental Protection Agency (EPA) has published 5,000 pages of guidance on how PRA should be done.

The core of PRA, when applied to an object as complex as a space shuttle or as mundane as a new detergent, is the so-called "triplet of risk":

1. What can go wrong?
2. How likely is that to happen?
3. What are the consequences if it does happen?

Although PRA itself it complex, its outputs are simple. Consequences, at a human level, typically are expressed as mortality. In other words, X people will die, if, for instance, the bridge collapses, the plane crashes or the chemicals are released.

Economists can translate this into something even more understandable, money. According to researchers at the Free University of Amsterdam, the European Union in its policy studies currently values a single human life at an average of one million euros – generally referred to as the "one-million-euro rule". So, the annual public cost of stepladder usage in the UK is at least €52 million, while that of nuclear power is €0, right?

Not quite, but the comparison highlights the importance of non-quantitative factors in risk assessment.

13.2 Not Just Whether You Die, But How

As PRA blossomed in the late 1970s and early 1980s, complicated, complex technologies became ever clearer and manageable – to the experts, that is. To the general public, ironically, they actually became more obscure and frightening. A primary object of contention was (and still is) nuclear power: according to PRA it is relatively low risk compared to, say, driving a car, and its dangers have diminished over the years as technical know-how has increased. Of course this is at odds with perceptions of laypeople, who over the years have become more fearful about it, not less.

This is simply irrational or ignorant, say some experts. The problem, they say, is a lack of communication plus the common person's inability to understand basic maths. The solution, they add, is more science. Legal scholar Stephen Breyer (now a Supreme Court Justice) went so far as to advocate creation of a US federal agency charged with creating uniformity and rationality in technology risk assessment. The agency was proposed (albeit not adopted) to the Senate as part of the Comprehensive Regulatory Reform Act of 1995.

Some critics also see public fears of technology as a reflex of an over-pampered society. Now that most Europeans and Americans need not worry about food, clothes and shelter, they have invented worries about hazards in them. They are biting the hand that feeds them – a luxury that earlier, harder-working generations could not afford.

Meanwhile, over the past quarter-century another explanation has developed that considers public concerns to be neither foolish nor uninformed. University of Oregon Professor Paul Slovic pioneered the idea that when judging risk, ordinary people add to mortality two additional fear factors: dread and unknown. The most dreaded technologies are potentially catastrophic, dangerous to future generations, involuntary and uncontrollable. Unknown ones are where the dangers are hidden, delayed in time or simply not yet recognisable.

Nuclear power is, once again, the classic example. Whatever its safety record, the public consistently ranks it highly on dread and unknown. As Karen Bickerstaff of the University of East Anglia's Centre for Environmental Risk points out, laypeople see atomic energy as far more dangerous than bicycles or power tools, even though experts judge the latter to be more likely causes of individual harm.

Finally, there is the key issue of trust. Ordinary people are more willing to punt on a new technology, say Slovic, Bickerstaff and other researchers, if they believe they can rely on the authorities to protect their lives and livelihoods. If the authorities are seen to be incompetent or uninterested, if the people feel treated as pawns or guinea pigs, most will dig in their heels and oppose potentially harmful technologies.

13.3 The Leading Cause of Death? Life

So while the PRA crowd sees risk as objective, the Slovic camp sees it as subjective. As Slovic himself argues: "There is no such thing as "real risk" or "objective risk". The nuclear engineer's probabilistic risk estimate for a nuclear accident or the toxicologist's quantitative estimate of a chemical's carcinogenic risk are both based on theoretical models, whose structure is subjective and assumption-laden, and whose inputs are dependent on judgment …. Nonscientists have their own models, assumptions, and subjective assessment techniques (intuitive risk assessments), which are sometimes very different from the scientists' models."

Not at all does Slovic reject PRA, instead he maintains that it should be blended with the acceptance that public concerns are both real and legitimate. The US EPA already has done this to some extent. The bulk of its budget in recent years is aimed at hazardous waste, primarily because the public sees it as America's most serious environmental threat, even though experts say indoor air pollution is a greater health risk.

Clearly, this has implications for other policies, among others chemicals, genetically modified organisms, nanotechnology, nuclear power and yes, even stepladders. (Check out The Stepladder Users' Guide at http://www.hse.gov.uk/pubns/indg402.pdf.)

So, if we address the risk concerns of both experts and laypeople in an atmosphere of trust, nuclear power can become as non-controversial as stepladders, right? Not quite, but at least both groups might be talking to each other rather than past each other.