

# Green concepts take firm root

Sustainability ideas are much more deeply entrenched among chemical producers, both large and small, than they were just a few years ago, reveals a recent reader survey carried out by *ICIS Chemical Business* in association with Genomatica

JOHN BAKER LONDON

**C**hemical producers globally, both large and small, are clearly engaging in sustainability and green chemistry. The concept and practice of sustainability is being extended right across the supply chain, from suppliers to customers, and into the way producers think about their businesses and operating decisions.

In recent years, uptake of sustainability has been significant, with the majority of companies seeing it as cost-effective. This is a big swing from conventional thinking not so long ago, when it was viewed as more of a cost than a benefit. A “green premium” for products was seen then as critical to commercial considerations.

Companies now are looking for cost savings, improved raw materials supply and reduced carbon footprint, and are clearly seeking to use sustainability in their product design and marketing.

And many more producers are finding that customers are asking for information on sustainably produced chemicals – which itself provides a driver for the shift to renewable materials. Over one-third of downstream chemical companies are engaging with suppliers to develop approaches to sustainability.

These headline findings emerge clearly from the latest research among *ICIS Chemical Business* readers, carried out in association with US bio-based technology developer Genomatica. The survey, a follow-up and extension of a previous ICIS/Genomatica research project in mid-2009 on sustainability practices, shows that over the past three years, sustainability has become more deeply entrenched than ever and is regarded as a driver of cost reductions in the sector's operations.

Christophe Schilling, CEO of Genomatica, believes the ICIS “survey points to a striking result: the time for renewables is now. It's a clear mandate for action.”

He adds that: “The survey shows that sustainability – and the use of renewables-based chemicals – is part of the mainstream of thinking and action for both chemical producers and chemical users.

“Companies within the chemical industry want sustainability as part of their message, to be seen as leaders, and to use sustainability to differentiate themselves.”

The 2012 survey shows 54% of the 700+ respondents say their company has a sustainability strategy and/or policy already in place, and a further 17% indicate a policy is currently in development and 17% that initiatives are likely within the next 2-3 years. Only 12% reported that there is little interest.

This in itself shows that the concept has gained considerable traction in the chemical industry and has become an accepted requisite of business. Sustainability is no longer an option in the chemical sector, it seems.

More particularly, when asked if their

company is engaging in sustainable chemistry practices, 60% responded positively, with 23% saying no and 17% unsure. These figures show a slight increase from the same question in 2009, when 57% indicated activity in sustainable chemistry, with 25% saying no and 18% not knowing. But they are still a striking recognition of the importance of sustainability in practice and show that the majority of companies are doing something about the environmental performance of their products and business overall.

In terms of business priorities, the promotion and marketing of sustainable products was cited as the key priority, by 26% of respondents, while 23% confirm they want to take an active lead in sustainability issues. Other priorities cited included engaging sustainability-conscious customers at a business level (16%) and being able to respond to questions on their sustainability position (15%). Only for 9% of respondents was sustainability not a priority. »



Customers are now asking suppliers for information on sustainably produced chemicals

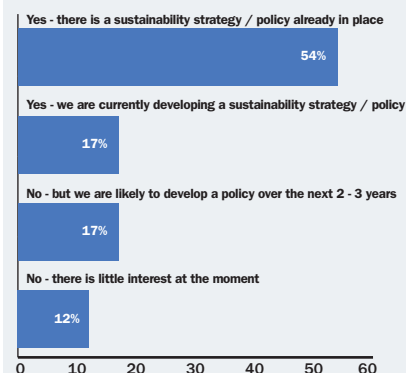
» Looking at practical engagement with sustainable practices, the key initiative over the past five years has been to improve manufacturing processes, especially with respect to reducing energy and waste. This was mentioned by no less than 75% of the respondents. Other leading initiatives include the reduction/elimination of toxic chemicals (mentioned by 47%) and increased use of bio-based and renewable content in products (44%).

Again, initiatives are widely reported across the industry – only 8% of respondents indicated their company had made no sustainable initiatives in the past five years.

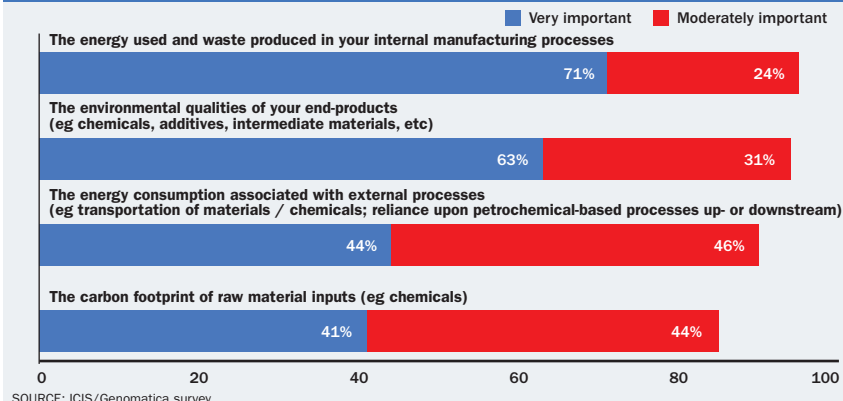
The issue of energy efficiency with relation to sustainability is high on the industry agenda generally, as improvements here continue to be within grasp, and bring immediate benefits in terms of cost and carbon footprint of operations and products. If anything, the prominence of energy has increased over the past three years, as in the 2009 survey more respondents cited the environmental qualities of end products (56%) than energy issues as the prime consideration in the definition of sustainability.

By 2012, energy and waste in internal man-

#### DOES YOUR COMPANY HAVE A SUSTAINABILITY STRATEGY OR POLICY?



#### IMPORTANCE OF FACTORS IN DEFINING SUSTAINABILITY



ufacturing processes were by far the most important factor – cited by 71% as very important – with environmental qualities of end products cited by 63% of people.

Looking at priorities going forward, the situation is similar today as in 2009. The prime short-term priority in both surveys was raw material sourcing and pricing, with 53% putting this top in 2009 and 65% in 2012. Strategic costs reductions and energy usage and pricing were also high level short-term priorities in both surveys, and product development also featured in the top five priorities.

Interestingly, by 2012, improving health and safety performance had become much more important, cited by 63% of respondents in 2012 but only 20% on 2009. Reducing the environmental impacts of products featured relatively lowly in both surveys for short-term priorities.

These findings reflect the immediate business impacts of high raw materials and energy costs, and the fact that progress on product design and environmental impact is a longer-term development. Asked specifically about longer term priorities, product development did in fact move

well up the list, to the top priority in 2009 (with 44%) and to joint top in 20012 (at 36%), tying with increasing shareholder value.

#### UPSTREAM PRODUCERS

In the latest survey, ICIS and Genomatica decided to probe the different responses and priorities of those, generally larger, producers at the head of the chemicals supply chain (36% of respondents) and those further downstream, closer to the customer and more in the specialty chemicals arena (33%) or chemical distribution (15%). Of the producers of commodities or intermediates, 45% said they are currently investing in R&D into renewable feedstocks and 36% have made a strategic commitment to use such feedstocks. Indeed, just over half of respondents said their companies are investing in renewable-based production facilities and a further 26% are actively investing and planning.

A quarter said they were working in partnership with others companies, and a mere 18% said they had little interest in renewable at this time. Renewables were defined in the questionnaire as sugars, starches or biomass.

#### CHRISTOPHE SCHILLING CEO, GENOMATICA

### THE IMPORTANCE OF A PAINLESS TRANSITION

ONE OF THE primary conclusions from this survey is that sustainability has become mainstream. Both producers and users are incorporating sustainability in their processes and products, and renewable materials are increasingly important.

Here I would like to focus on two related points. First, what does it take for producers and users to transition to renewables-based chemicals? Your responses were clear. For users, the most important factor was minimal impact on product performance or characteristics; for produc-

ers, minimal impact on downstream products and customers (after the “table stakes” of availability of technology and feedstocks).

The best way to meet this “minimal impact” requirement is by delivering the “exact same chemical”. Customers shouldn’t have to worry about colour issues, fibre strength, blending chemicals from different sources, etc. The term “drop-in”

replacement has become muddier and provides less of a performance guarantee. We advocate – and stand behind – strict criteria here.

And in fact, the chemicals produced using our first process technology, for BDO, have already met these standards at over a dozen firms.

The other key factor? Economics, of course. We were encouraged to see the sea-change in the industry’s viewpoint that shows

optimism about scalability and the potential for cost savings using renewables technology. We expect that 2013 will showcase important milestones in delivering on that promise, and look forward to great progress.

Christophe Schilling is CEO of Genomatica ([www.genomatica.com](http://www.genomatica.com)), which develops processes for the production of major industrial chemicals – like BDO and butadiene – from renewable feedstocks. He can be reached at [cschilling@genomatica.com](mailto:cschilling@genomatica.com). ■



When it comes to considering the shift to renewables, the important factors cited were, not surprisingly, availability of renewable feedstocks and the availability of technology. This was also the case in the 2009 survey, where alternative feedstock cost was also of high concern.

But a close third on the list – with 93% saying it was very or moderately important – was the need for minimal impact on downstream products and customers (see panel text for Genomatica's comment on this). Producers have learnt that customers require green materials that can be substituted easily for existing fossil-fuel-based materials in products, avoiding reformulation and reinvestment in new equipment.

After this, came a range of important factors all grouped around the ideas of reduced costs – in terms of feedstocks, operating costs, maintenance costs and capital expenditure. That these are considerations that can be positive is shown by the fact that no less than 43% of respondents consider that there will be long-term economic advantages from the switch to renewable feedstocks. This is close

### **“Companies within the chemical industry want sustainability as part of their message... to use sustainability to differentiate themselves”**

**CHRISTOPHE SCHILLING**  
CEO, Genomatica

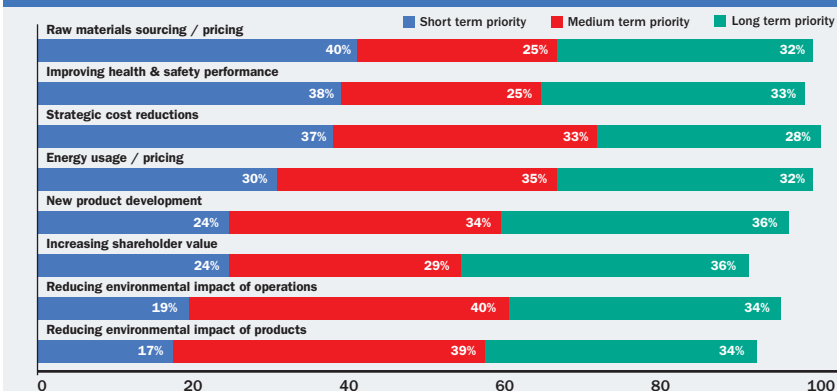
to the overall figure for the 2009 survey, of 46%, but by 2012, the number expressing a negative reply had fallen from 31% to 25%.

Respondents in 2012 and 2009 alike expressed the opinion that their company should be reducing its exposure to petroleum-based commodity markets (57% saying yes to this question in both cases).

Besides cost benefits, most major producers in this arm of the questionnaire said that a major driver for their interest in renewables was the fact that their customers have expressed an interest in sustainably produced chemicals. Some 72% reported this was the case in the 2012 survey, a huge increase on the 57% recorded in the 2009 version. This key finding serves to illustrate that sustainability really is spreading its tentacles along the supply chain and becoming a key element in purchasing considerations.

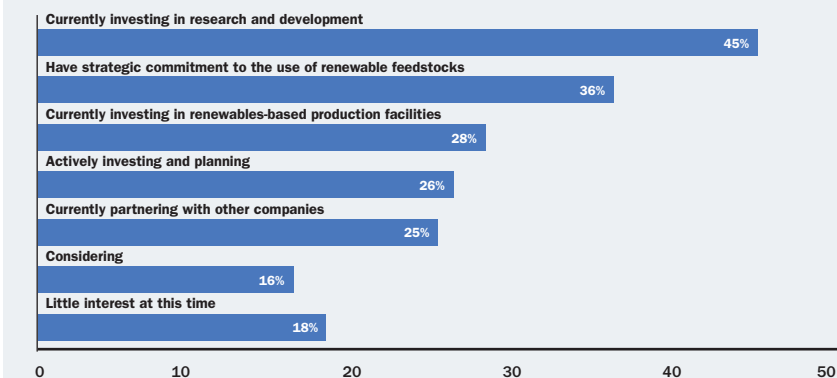
In terms of which products are grabbing the interest of this group of producers, specialty chemicals came out top, with 54%, followed by polymers (44%) and polymer intermediates (33%). Other targets for production via renewable feedstocks are C3s (propylene and

#### **SHORT, MEDIUM AND LONG TERM PRIORITIES**



SOURCE: ICIS/Genomatica survey

#### **COMPANY STRATEGY REGARDING USE OF RENEWABLE FEEDSTOCKS – LARGE PRODUCERS**



SOURCE: ICIS/Genomatica survey

#### **BIO-BASED MATERIALS JOHN BAKER LONDON**

### **THE 2012 ICIS/GENOMATICA SURVEY**

THE SURVEY ON attitudes within the chemical industry towards sustainability was carried out online in mid-November last year and attracted over 700 respondents from ICIS Chemical Business readers around the globe. Some 40% of respondents were

based in Europe, 27% in North America, 13% in Asia and 5-7% in each of Latin America and the Middle East.

The respondents were generally senior executives (27% board level and 24% general manager) and worked mainly in the specialty (22%) and

commodity/polymers (30%) sectors, with a further 12% in chemical distribution.

Company size ranged from below \$500m in turnover (50%) to over \$10bn (16%), with 18% between \$1bn and \$5bn, giving an average of \$3.3bn. ■

propanediol, etc, 27%) and C4s (butadiene and butanediol, etc, 27%). Also mentioned were aromatics and C6s, such as adipic acid. In terms of customer requests, packaging plastics came out highest, at 59% of enquiries to producers responding, followed by personal care products (45%), engineering plastics (41%) and fabrics and fibres (22%).

When promoting the sustainability of their renewable products, large producers look to a referenced feedstock source above all, followed by published life-cycle data. Third-party accreditation marks were also seen as useful, along with published standards and

test results. Less useful but still listed as effective were describing the technology and simply listing the ingredients.

#### **DOWNSTREAM PRODUCERS**

Turning now to replies from specialty chemical firms and distributors, these indicated that they too are active in the sustainability initiative. Some 70% require information from their suppliers on the sustainability of their products, and well over a one-third are actually engaging with suppliers jointly to develop approaches to improving sustainability. One-third is also including sustainability as a fac- »

» tor on supplier scorecard ratings and 28% provide measurable sustainability requirements to suppliers. A fifth of respondents said they would drop suppliers that don't meet sustainability criteria.

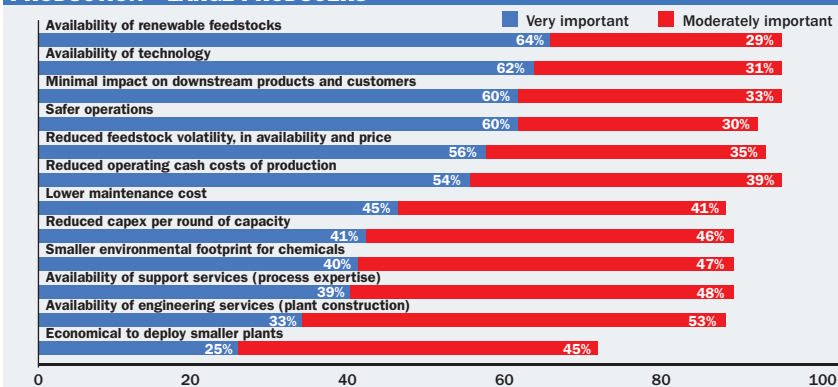
Not surprisingly, slightly fewer of these generally smaller companies have active R&D efforts in place for renewable feedstocks (31% vs 45%) or have a strategic commitment to renewable (29% vs 36%).

And investment is lower too. But the percentage partnering with other companies on renewable is the same at around a quarter. Fewer report no interest in renewable at all (12% vs 18%).

Again, not surprisingly, the prime consideration when considering renewables for this sector of the industry is minimal impact on product performance and characteristics (70% cited this as very important), followed some way behind (56%) by the ability to differentiate their products in the marketplace. Minimal impact on production processes and facilities is also highly regarded. But costs savings are not so important – but respondents here are looking at least for similar costs to conventional materials.

The chemicals they are seeking are the same

#### IMPORTANCE OF FACTORS WHEN CONSIDERING RENEWABLE-BASED PRODUCTION – LARGE PRODUCERS



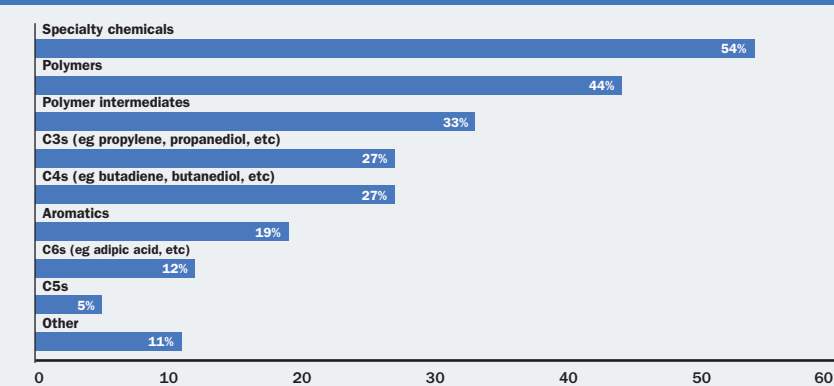
ranking as for the major producers, applications, too, match across both arms of the survey, and effective strategies for promoting the sustainability of products is by and large the same.

Finally, when asked to name leading exponents of sustainability and green chemistry, the 2012 survey respondents perceived global majors BASF, Dow Chemical, DuPont and Bayer as leading the way in technology development. Other firms mentioned included the

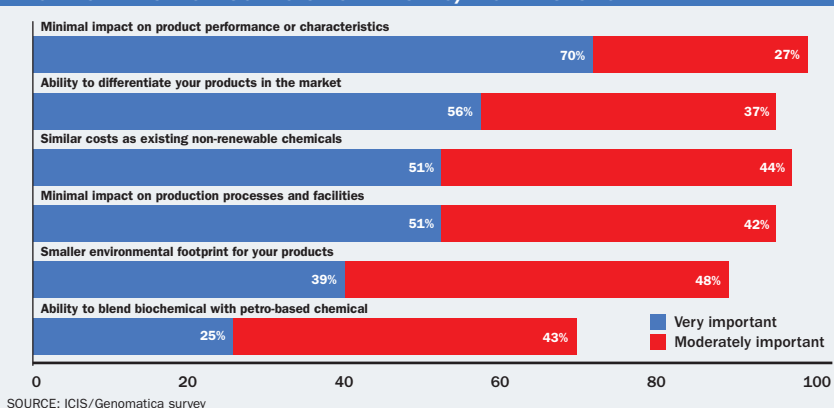
likes of Braskem, DSM and Solvay, as well as Shell Chemicals, ExxonMobil Chemical and Genomatica itself. When it comes to actual producers, the list extends also include the likes of Cargill and NatureWorks, which were early movers in the bio-based polymer sector.

For the 2009 survey, the list is similar, but with the inclusion of BP, ADM and Clariant, indicating that Braskem, with its sugar-based polyolefins technology, has made a rapid impact, and that DSM and Solvay have made recognisable strides in this area.

#### CHEMICAL OR CLASSES OF CHEMICALS OF INTEREST FOR PRODUCTION USING RENEWABLE FEEDSTOCKS – LARGE PRODUCERS



#### IMPORTANCE OF FACTORS WHEN CONSIDERING USING RENEWABLE-BASED CHEMICALS – USERS OF CHEMICALS/DISTRIBUTORS



#### MAJORITY INTEREST

The survey clearly indicates that chemical companies are engaging with sustainability, to the point that it is only a small minority of companies that have yet to embark on developments in this area.

Thinking has moved on from the cost of being sustainable to an appreciation that sustainability can be a driver for cost reductions, especially in energy but also raw materials and capital equipment.

Most companies are taking a pragmatic approach and looking for drop-in or near-drop-in bio-based alternatives to petroleum products, in an attempt to minimise development time and costs associated with reformulation and re-equipping production facilities.

And once in the renewable products space, companies are keen to leverage this with customers and find ways of quantifying their green credentials and leading the way in promoting the sustainability message. This is encouraging communication along the supply chain and spreading the message through the sector.

Few companies can ignore the growing trend and effort to sustainability and if they do, the survey indicates they may lose out on business as committed companies, including retailers, drop them from their supplier base. ■

For the full presentation of the survey results, go to [www.icis.com/greensurvey](http://www.icis.com/greensurvey). For Genomatica, go to [genomatica.com](http://genomatica.com)