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Sustainable Products: The Innovation Strategy for the European Chemical Industry

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Abstract: Sustainability will be the key factor which will dictate the progress of the European Chemical Industry in the next decade. Looking at process sustainability—i.e., sustainable manufacturing technologies—we can observe a high level of consciousness as well as behavior aimed at environmental sustainability. As far as product sustainability is concerned, the pace of change is still too slow, and the understanding of what is required for companies to become genuinely sustainable enterprises is often lacking. The European chemical industry has the challenge to become the most sustainable industry in the world by choosing the road which leads to product innovation considering sustainability as the guiding star for this path. Sustainability may represent a factor for competitiveness, as long as the characteristics of sustainability are explicitly illustrated in the performances of the products, and are acknowledged by the market as a value.

1. Introduction

The environment in which today's chemistry-using industries operate has changed enormously in recent years and will continue to change in the future [1]. The challenges of sustainability take many forms: the globalization of markets and of manufacturing infrastructures; the growth in demand for chemical products in developing countries; climate change and the energy debate; a shift in society's concerns, and those of individual consumers, from the production of chemicals to chemical product concerns relating to human health and environmental impact; a growing awareness throughout society of the resource limitations of our planet; the increasing shift in developed countries from bulk chemicals to specialty chemicals to custom-formulated products.

2. Sustainability: The Contribution of the Chemical Industry

Chemical industry stakeholders recognize and demand all the benefits that this industry provides—in health, nutrition, clothing, housing, transportation, communication—but they want all these benefits with none of the negatives.

Major retailers all report heightened consumer interest in the potential impacts on their health and on the environment of chemical residues in food, packaging materials, hygiene and personal care products, and so on.

In this scenario, the chemical industry claims to be science and technology, enabling a number of innovations to provide solutions for the overall objective of conserving natural resources and the environment and protecting people's health: to sum up, aiming to improve the quality of life.

In other words, the chemical industry claims to be part of the solution, which is true, and does not fully recognize that it is part of the problem, which is also true. As a consequence, the chemical industry is not perceived by the general public and by policymakers, as "sustainable" and people are wondering why the claimed capabilities of this industry are not focused first on improving its own sustainability.

Sustainability must be the key factor which will dictate the progress of the European chemical industry in the next decade. Sustainability depends upon maintaining and where possible, increasing stocks of certain capital assets, so that we can learn to live off the income from that capital asset without depleting the capital asset itself [2]. There are five types of capital needed by our economy (and each and every organization operating within that economy) in order to function properly [3].

Natural capital is any stock or flow of energy and matter that yields valuable goods and services. It includes resources, some of which are renewable (timber, grain, fish and water), whilst others are not (fossil fuels); sinks that absorb, neutralize or recycle wastes (for example, forests sequestering carbon dioxide; and services, such as fertility building or climate regulation. Natural capital is the basis not only of all production in the human economy, but of life itself.

Human capital consists of people's health, knowledge, skills and motivation, all of which are required for productive work. Enhancing human capital (for instance, through investment in education and training) is central to a flourishing economy.

Social capital comprises all the different cooperative systems and organizational frameworks people use to live and work together, such as families, communities, governments, businesses, schools, trade unions, voluntary groups, and so on. Although they involve very different types of relationships and organizations, they are all structures or institutions that add value to human capital, and tend to be successful in doing so if based on mutual trust and shared purpose.

Manufactured capital comprises material goods or fixed assets—tools, machines, buildings and other forms of infrastructure—which contribute to the production process, but do not become embodied in its output.

Financial capital plays an important role in our economy, by reflecting the productive power of the other types of capital, and enabling them to be owned and traded. However, unlike the other types, it has no intrinsic value; whether it is in the form of shares, bonds or banknotes, its value is purely representative of natural, human, social or manufactured capital.

These five forms of capital, judiciously combined by entrepreneurs, are the essential ingredients of all economic activity. Natural capital, despite the

sophistication of our modern economy, is still absolutely necessary to maintain a functioning biosphere, to supply resources to the economy, and to help dispose of its wastes.

Human capital provides the knowledge and skills that create manufactured capital, and operate it effectively. Social capital creates the institutions that provide the stable context and conditions within and through which economic activity can take place, and which enables individuals to be vastly more productive. Financial capital provides the lubricant to keep the whole system operating.

The chemicals industry is central to the pursuit of a sustainable society; without it, the prospects of sustainably meeting the needs of nine billion people by the second half of this century are zero.

In operational terms, this combination of responsible care, eco-efficiency and corporate social responsibility has provided many of the world's leading chemical companies with a solid starting point for addressing the challenge of sustainable development.

Looking at process sustainability—i.e., sustainable manufacturing technologies—we can observe a high level of consciousness as well as a behavior aimed at environmental sustainability. On the basis of the significant results obtained, we can conclude that the European chemical industry is on the right track.

As far as product sustainability is concerned, the pace of change is still too slow, and the understanding of what is required for companies to become genuinely sustainable enterprises is often lacking.

This is the heart of the matter.

3. Product Sustainability: The Heart of the Matter

Europe can gain a leadership position for the following reasons:

The market is ready to accept new sustainable products; moreover it is asking for such a product.

A huge market is there.

For a few years, REACH—Regulation on Registration, Evaluation, Authorization and Restriction of Chemicals—has been in force.

The main aim of REACH is to ensure a high level of protection of human health and the environment from the risks that can be posed by chemicals. REACH makes the industry responsible for assessing and managing the risks posed by chemicals and providing appropriate safety information to their users [4].

Europe has a lead over other countries. Without a doubt, the new regulations will force the chemical industry to carry out a severe, costly assessment on how to implement them.

It is an opportunity to take advantage of, not a threat.

The European chemical industry is at a crossroads. It may choose the road which leads to resisting the changes, by trying to postpone the obligations required by the new standards and to ignore the demand from the market for as long as possible, but this is only a short-sighted, losing approach.

Short-sighted in that, even if it managed to postpone the changes to a date yet to be defined, it would never be able to elude them; they are required by the general public and they are clear market needs.

A losing choice because, by focusing its efforts in this direction, the industry would lose sight of the crux of the problem: namely, reduced competitiveness and lower prospects compared with newly-industrialized countries, where the production costs are considerably lower, and will remain so for a number of years.

What, then, is the alternative?

To bravely choose the road which leads to product innovation, considering sustainability as the guiding star for this path. The current state of awareness of the environment and safeguarding our health imposes behavior which is aimed at sustainability, and encourages a wide-reaching innovation program that regards the sustainability of products as its main priority.

There are four key actions that the chemical industry has to take in order to implement this strategy:

Define with the stake-holders (including NGO) a charter of sustainability for a chemical product. Commit to avoiding the introduction into the market of new products unless they comply with the defined charter. Commit to substituting, in a reasonable timeframe which has to be clearly defined, all the existing products that do not comply with the defined charter (starting with Persistent, Bioaccumulative and Toxic substances) with new sustainable products. Commit to manufacturing its products using sustainable manufacturing processes and technologies.

If the chemical industry shows concrete, credible signs that it wishes to follow this road, support from the stakeholders will not be lacking, to guarantee a transparent, scientifically-based risk assessment program, along with support from the policymakers for the high investments which the road to innovation brings.

Sustainability may represent a factor for competitiveness, as long as the characteristics of sustainability are explicitly illustrated in the performance of products, and are acknowledged by the market as a value, which means information and education strategies aimed at consumers and industrial users, the definition of a coherent standards program and a legislative program which provides incentives for sustainable solutions.

In so doing, the European chemical industry may construct legitimate barriers against the entry of products from other markets with sustainability characteristics that do not meet the European standards.

The European chemical industry has the challenge to become the most sustainable industry in the world.

Europe has a solid base of tradition, culture, knowledge, business capacity and resources to take up this road successfully. One should not forget that the chemical industry was born in Europe, and that Europe still claims a high position for the value of the production of chemicals in the world.

Conflicts of Interest: The author declares no conflict of interest.

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