

Sustainability and environmental protection – new criteria for the fiber industry

Ladies and Gentlemen:

Once again, Dornbirn is the center of the European man-made fiber industry:

- 710 participants
- from 31 countries
- Broad spectrum of branches represented

Ladies and Gentlemen, distinguished guests, there has been a considerable global upswing in our branch over the last few years. Let us be honest with each other. We have witnessed growth rates in the man-made fiber industry which took all of us a bit by surprise.

Nevertheless, there has also been a rude awakening, a dampening of growth during the past months. This can be partly attributed to slackening market demand coming on the heels of booming times, but even more, it is the consequence of exploding energy and raw material prices.

Trying to understand all these developments as an integrated whole, one comes to the conclusion that there are significant interrelationships, which I would like to talk about in greater detail:

1. First, there is the phenomenon of bullish raw material prices

From my point of view, the period in time in which relatively inexpensive natural resources are available is over, at least for the time being. Getting down to the bottom line, the hunger for raw materials on the part of the high-growth economies of China and India is in contrast to a raw material supply industry which has been stagnating for decades.

We will have to deal with this situation for many years, due to the fact that the production of raw materials is a very capital-intensive and time-consuming process.

For example, in the mining sector, it takes about 10 to 15 years until new mines can be put into operation. In the cellulose industry, we think in similar terms, or even a longer time frame if we consider the entire value chain from wood to the final product. The same applies to agricultural raw materials.

And even the expansion in capacity of oil-based raw materials is not something one can solve in a few months, but a process requiring many years. Imagine going to a plant construction and engineering company today. Suppose now that you order an ethylene cracker for a refinery. Perhaps your equipment will be installed at the beginning or at the middle of the next decade.

(Slide: Commodity Channel Index from 1956 to 2008)

This chart shows the long-term, all-encompassing raw materials index. You can see how the last few years stand out in a long-term comparison. Naturally, speculative trading in raw materials intensified this effect. However, without this relatively certain trend towards increasing demand, there would not be any speculators trying to make big bucks.

Of course, this is closely related to the second topic, namely

2. The development of energy prices

(Slide: Development of oil prices over the last ten years)

Regardless of the day-to-day fluctuations – although there is naturally a huge difference if the price of oil is 105 dollars or 135 dollars per barrel – it is more important to note that the oil price climbed from 10 to 20 dollars a barrel in the regions to around the 100 dollar mark or even higher.

The third fundamental development we have to take into consideration is

3. The ongoing discussion about climate change

It seems that this discussion has definitely moved beyond the confines of elite circles. With Al Gore's film "An Inconvenient Truth", climate change has emerged as a topic which is highly emotional, even among the most stubborn sceptics, and arouses intense interest on the part of the general public. This is because climate change directly and personally affects each and every one of us. For this reason, it comes as no surprise that the German term for "climatic disaster" was named the "Word of the Year 2007".

In reality, the three developments I have mentioned – exploding raw material prices, the energy price spiral and the focus on climate change – are closely related and interact with one another. They are the visible manifestations of a paradigm change, which will influence and transform the way we operate and do business in the upcoming years.

Our economic system has managed to respond, though it has come quite late. We have come to realize that our natural resources are limited. Prices reflect the availability of particular products and the value inherent in them.

In a world of finite resources, in which

- more and more people want to eat well and dress well,
- and more and more people desire greater mobility – in other words,
- an increasing number of people are striving to attain the consumption level of their counterparts in the industrialized countries of the Western World,

it should not be a surprise to any of us that the prices for these products are rising!

In reality, following decades of having access to overly cheap raw materials, we have reached a more normal state of affairs reflecting actual market conditions. Of course, this may represent a setback for that part of mankind

which has not been able to enjoy this level of comfort and prosperity up until now. On the other hand, economies with extensive raw material reserves, such as Brazil and Russia, will stand to benefit, and several raw material-rich countries in Africa will also profit on a medium-term basis. It is vital that we do not underestimate the various geopolitical implications of this new system of global raw material prices.

In his new, highly-praised book called “Common Wealth - Economics for a crowded planet“, the U.S. economist and United Nations advisor Geoffrey Sachs demonstrated the interaction of factors such as population growth, climate and environmental protection and poverty in various regions of the world, and pointed out the necessity of developing global solutions to fulfill the goal of sustainable economic development.

In this regard, Sachs shows the enormous opportunity we now have on the basis of prudently using natural resources to achieve a long-term solution to pressing political and social problems in this world. Simply speaking, he claims that economic success, social acceptance and political stability are intimately linked to the sustainable economic management of a company. However, governments also have a high level of responsibility to create an overall framework enabling companies to pursue this approach.

What does all this mean for companies?

The debate about climate change has led all big companies to reconsider their policies. One year ago, perhaps only a handful of companies really confronted the implications of their “CO2 footprint“. In the meantime, this environmental focus has moved into the economic mainstream. Companies which refuse to deal with the issue of sustainable development are clearly at a competitive disadvantage.

In contrast, companies which already have experience with the issue of sustainability have a competitive edge:

- First, because they have already worked with renewable raw materials,

- And in addition, the development of raw material prices already forced them – because it makes business sense – to use these resources as economically as possible, and in an increasingly efficient manner.

Examples include the paper and glass industries, and last but not least, the cellulose fiber industry.

Let us consider the cellulose fiber industry, using Lenzing AG as an example:

At our production facility in Lenzing, the world's largest manufacturing plant for viscose fibers, we have largely managed to become energy self-sufficient with a minimum of waste gas emissions, based on intelligent energy management and the integration of cellulose production. We have closed cycle chemical processes, and by reducing the use of chemicals to an absolute minimum, have been able to maximize our contribution to environmental protection.

Without these measures, which we have been implementing continuously since the year 1990, Lenzing would hardly be competitive today in Central Europe. Moreover, the company would not be broadly accepted by society.

Whereas environmental investments and the operating costs of environmental protection facilities used to be primarily considered as an economic burden for many years, today these investments have been transformed into a competitive advantage.

From a natural science point of view, the fiber production plant in Lenzing is nothing less than one of the biggest networked production systems anywhere powered by solar energy. Nature stores solar energy in the plants which we use as raw materials, assumes synthesis tasks and in the process, produces complex polymers such as cellulose and lignin. In the pulp production process, we subsequently divide the wood into lignin and primary cellulose fibers.

The lignin is subject to combustion in the form of thick liquor. It not only supplies enough energy to drive the pulping process, but also almost enough for the integrated viscose fiber production. Due to the "CO₂ credit" for further products, which nature has produced in wood, for example acetic acid or furfural, Lenzing has even managed to be CO₂-neutral in its viscose manufacturing at this site.

This example of the comprehensive utilization of renewable raw materials could be trend-setting for the entire industry in the future.

From today's perspective, one thing is clear: the fiber industry will remain a dynamic growth branch, with the exception of short-term cyclical fluctuations in demand.

One of the most important growth drivers of our industry has been population growth. Even if mankind more effectively manages to control population growth, which would be an urgent and essential measure, there is a consensus that the global population will continue to increase from the current level of 7 billion people to about 9 billion in the year 2050. This will take place in connection with a further rise in prosperity in the emerging markets.

For the most part, population growth will impact emerging markets. In the light of climate change, and our awareness of the finite nature of many natural resources, we will have to ask ourselves a crucial question: Is it actually possible and worthwhile, and does it make sense for all people on Earth, at some point in time, to have the same standard of living and the same level of consumption as we have today in the Western industrialized countries, in particular in Europe and the USA?

And above all: what would be the alternative?

It is a well-known fact that Europe and the USA are the biggest CO₂ emitters in the world.

- The USA, the biggest CO₂ emitter, is responsible for close to a quarter of all global CO₂ emissions.
- However, China has catapulted to second place, ahead of the Europeans, accounting for 18% of the world's CO₂ emissions. If this

development continues at the same speed and with the same intensity, China will already be the world's largest CO₂ emitter in the year 2020.

What does this development mean for industry in general, and more specifically, for our industry?

One consequence is that the countries which are most seriously impacted, namely the USA and the European nations, will have to be in the forefront of vehemently counteracting this trend.

- We will have to develop the right technologies, and take even greater responsibility in our role as technology pioneers and trend-setters than we did in the past.
- Let me give you one specific example: if we have the technology in Europe to enable the construction of coal-fired power plants with CO₂ separation, and then have the carbon dioxide banned to underground storage areas, then we should make use of this technology as quickly as possible ...
- ...even if a kilowatt hour of electricity from such a power plant is more than double (*Note: 2.5 ct/kwH vs. 6.5-7 kwH*) the cost of a kilowatt hour from a Chinese coal-fired power station. (In contrast, there are also savings for CO₂ reduction amounting to EUR 35-50 per ton of CO₂.)

There is still an enormous potential in the energy industry. In reality, the use of regenerative energies is in a state of infancy. On a global basis, the share of renewable energies as a proportion of the world's primary energy consumption is only 13%, in which case it is important to mention that this figure is distorted due to the broad-based use of biomass in the developing countries.

Thank God, Europe is moving in the right direction technologically, and is assuming its responsibility as a technology leader. Political decision makers have taken the right steps by launching appropriate research initiatives:

- The LIFE program of the EU with a total budget of EUR 2.1 billion is designed to fund and promote environmental protection and nature conservation projects in the member states of the EU during the period 2007 – 2013.
- The EU Framework Program for Research, Technological Development and Demonstration encompasses the promotion of projects which are oriented to the development of cost-effective technologies for a sustainable energy industry.
- The Biomass Action Plan involves measures to counteract the EU's import dependency in respect to fossil energy sources.

When it comes to these important issues concerning climate protection, I think it is necessary for us to have confidence in human incentive talent. Throughout the history of mankind, the timely recognition of problems has always been the initial step required to solve them.

For this reason, there can only be one response to the question as to whether China, India and Africa will one day be able to achieve the same standard of living as the Western industrialized countries, and that is an unequivocal

Yes!

This is due to the fact that people in China, India and all other emerging markets have the same right to gain access to natural resources and to make use of them in the same way we do in the Western industrialized countries. However, it is our responsibility to lead the way by developing and adhering to best practices.

Nevertheless, it must be said that having equal rights to the use of natural resources also entails assuming the same responsibilities and making the same commitment to sustainable economic development, in the spirit of ensuring a global approach to tackling the problem. The current situation, in which China puts a new coal-fired power plant into operation every two days using conventional technologies and plans the construction of hundreds of additional coal-fired plants is absolutely unsatisfactory. Moreover, these coal-fired plants in China have achieved a catastrophic level of efficiency, with an efficiency rating of only 23%-28% (whereas German plants even manage 38%-45%).

The fact is that solutions can only be implemented today on a global basis.

We can not accept passing responsibility for sustainable economic development to others.

Whoever violates the rules which the international community has imposed as a basis for ensuring the preservation of a world worth living in should be potentially subject to sanctions. For this reason, the Western industrialized countries should deal with the issue of import duties on products which are not optimally produced when it comes to their CO₂ levels.

In particular, this affects the fiber industry, which is particularly vulnerable. In Europe, we are faced with massive expenditures for environmental protection. But I know companies outside of Europe in which these costs comprise a fraction of what we spend in Europe. This is a perverse distortion of the situation: factories which produce fibers but fail to sustainably and efficiently use natural resources are rewarded with high margins, whereas plants which act in a more responsible manner are being punished.

In this case, it is essential for the regulatory authorities to take action!

Now I will focus on the role of public authorities in our transformation process towards more sustainable economic structures.

Free competition on the marketplace is capable of arranging many, many things, but it is not in a position of being able to optimally regulate everything, as has been demonstrated by trading with CO₂ certificates. The fact of the matter is that the use of CO₂ certificates has not really led to a reduction in greenhouse gas emissions. This is because certificate trading makes it possible for companies to buy their way out of adhering to the guidelines stipulated in the Kyoto Protocol designed to cut down on waste gas emissions. To put things more bluntly, we could talk about trading in "hot

air". In this case, the level of greenhouse gas emissions could be said to decrease even though this may not correspond to reality.

In this regard, I would like to point out something which is very important for the fiber industry. The truth is that man-made fiber production is at a disadvantage compared to cotton.

The environmental impact of cotton is enormous, particularly as the result of water pollution and ground contamination, but also due to the emission of greenhouse gases through agrochemicals. If one charged cotton producers the same household or industrial tariffs for water consumption which prevail in the industrialized countries, the water costs alone would amount to 2-10 US dollars per kilogram of cotton. Accordingly, it is false to say that industrially produced fiber products are more environmentally incompatible than cotton. In fact, when making an objective overall comparison, the conclusion is that man-made fibers are, for the most part, superior to natural fibers, because they

- demonstrate a more favorable water balance,
- require less agricultural land (or none at all) which could be used for growing food, and
- feature a better track record in terms of greenhouse gas emissions.

Nevertheless, despite these clear-cut competitive advantages, the cotton industry is subsidized by the government, for example in the USA. I mean by the same authorities which also provide support to promotional programs designed to reduce greenhouse gas emissions.

This is only one of the many examples which I could give to show the uncoordinated and indiscriminate approach of government authorities trying to tackle the problem of climate change.

Let us once again summarize the key points:

- On the one hand, we are in the midst of a long-term, substantial growth in demand for products manufactured by the fiber industry.
- On the other hand, we are being asked to prudently and sustainably use our natural resources.

The bottom line of this equation is:

Produce more – but use fewer natural resources.

A large number of measures are required in order to find the right solution to this equation. I only want to briefly touch upon a few of the more important measures:

First, we should make use of more renewable raw materials.

This leads us to the cellulose fibers – and there is certainly considerable potential to expand production.

Wood is the basic raw material required for 90% of cellulose production, has a very low impact on the environment and on the fertility of the soil, and moreover, we are far from tapping the full global potential for wood production. Only about 10% of the annual worldwide wood harvest currently totaling about 1.7 billion tons is processed into pulp. Of this amount, only about 3% is chemical pulp, which is used in our fiber industry and for other applications. In addition, 90% of the renewable land biomass is lignocelluloses, which underlines the growth potential. We still have considerable flexibility and leeway to ensure a sufficient supply of raw materials for a continually expanding cellulose fiber industry.

What about the second measure to be taken?

We have to significantly increase the share of recycled raw materials in the manufacturing process, in particular oil-based polymers. In this case, we should follow the example of several other industries which I mentioned before, for example the paper and glass industries. Due to increasing raw material prices, recycling has become quite attractive to the fiber industry. And even some emerging markets have demonstrated that it is not so difficult after all to create a well-functioning recycling infrastructure, if there is an appropriate economic incentive to do so (for example Brazil).

For economic reasons based on the rise in energy costs, many industries have been driven to achieve impressive recycling quotas.

Europe is at the cutting edge of this development.

The recycling quotas in Europe for selected industries:

- Paper industry: 55%
- Non ferrous metal industry: 50% - 70%
- Glass industry: 62%

In contrast, the recycling quotas of companies in the USA are considerably below the levels in Europe. For example, the American glass industry recycles about half the quantities recycled in Europe.

I believe that the fiber industry can certainly learn from these recycling trailblazers. In our industry, we already see the promising beginnings of the material recycling of PES, for example "recycled polyester", in which case we have to make an important distinction between two different approaches.

The technology required to once again separate PET from beverage bottles or even PES pullovers (Patagonia / Tejin) in order to create monomers and then to produce new PET by means of polycondensation already exists. However, this technology does involve an extensive, well-coordinated logistical effort to collect the raw materials, as well as a considerable consumption of energy.

The second alternative would be the "bottle to fiber" technology, which is a promising approach from the point of view of achieving a positive ecological balance.

In my opinion, the third point is a significantly improved understanding of the life cycle of our products

in respect to greenhouse gas emissions. Whether we want it or not, the CO₂ footprint will become standard practice for all our products in the same way we use tenacity to describe fiber strength. The fundamental understanding of the climatic balance of our products is the pre-requisite for optimizing production. Those companies which implement innovative measures at an early stage will logically have a competitive edge.

Ultimately, the awareness of consumers will play a decisive role. An increasing number of companies are already reacting to growing demand for

eco-labels which provide information on how many grams of CO₂ or equivalent greenhouse gas emissions arose in production, transport and storage of a given product. An increasingly large group of consumers is prepared to pay more money to acquire these sustainably produced products.

In terms of the quantities used, the most important raw material in the man-made fiber industry is and will naturally continue to be oil, which is a finite resource, as we all know. I have to disappoint any of you who maintain hopes that we will return to the earlier level of oil prices. The era of “easy oil” is a relic of the past, and the gap between oil reserves and demand/consumption continues to grow. It will become increasingly expensive to find new sources of oil, because these deposits are deep in the ground, offshore, under complex rock formations or even in the form of oil sands. Moreover, the volume of oil pumped from existing oil fields is decreasing.

Is the polyester fiber era coming to a close?

No, because in terms of quantities and availability, there is no viable alternative to fulfill growing demand for fibers. In the upcoming decades, there will continue to be sufficient raw materials for the polyester industry, but at higher prices. Polyester fibers will remain the “main staple” of our industry.

This situation will continue in the future, especially if our industry succeeds in significantly raising the recycling quota for polyester, similar to the levels achieved by other energy-intensive industrial branches as I described earlier, and in the light of increasingly stricter environmental protection regulations.

Nevertheless, it will also be necessary – **and this is the fourth measure which will transform our industry – to discover completely new raw materials for the man-made fiber industry.** However, these raw materials will only be able to gain a significant market share on a long-term basis, because they are hard to process in technological terms, or they compete with other applications. Think of casein. We consider its use as a raw material for fiber production to be technically feasible, but which will involve us in a competition with the food industry.

The fact is that cellulose is one of the most widely used natural polymers, which are the easiest to process, particularly in an ecologically sensible manner, based on the technologies available today. Perhaps, some years from now, the cellulose required for the fiber industry will not only be derived from wood, but also from quickly growing plants (e.g. sugar cane, grass, straw), thus opening up new perspectives.

Therefore, I believe that

- the market share of fibers produced by using renewable raw materials with a correspondingly attractive energy and greenhouse gas balance will certainly increase in the years to come, and that
- fibers which are manufactured in line with sustainability criteria will be more enthusiastically welcomed by consumers.
- In this regard, new fiber qualities and increasingly specific applications will be developed by mixing different raw materials.

We will also witness the fact that the increases in man-made fiber prices will be more closely linked to the price trend for primary energy and raw materials than in the past. For example, I cannot fully understand why oil product prices are adapted to the price of crude oil on a daily basis, but fiber prices are generally changed on a quarterly basis. In this case, the market will have to function more efficiently. We will also have to more effectively communicate the value of our products.

In conclusion, let me take this opportunity to say that our industry is faced with considerable new challenges which have only become apparent during the last two years. In the final analysis, it must be mentioned that our products and their applications represent an integral part of human culture. In our generation, we will lay the groundwork to ensure that these products will be available on a sustainable basis in the long term.