

## RENEWABLE RESOURCES - PERSPECTIVES FOR THE CHEMICAL INDUSTRY

Dr Peter Botschek  
Director Energy & HSE  
European Chemical Industry Council (Cefic)

Ladies and Gentleman,

Pretty soon, some 9 billion people will populate our planet: around 2050. The livelihood of these 9 billion people will depend upon the access to shelter against cold, heat, extreme weather events. We need to answer the question how we will organize transport for these people, communication and the production of goods for the daily needs. And how can we cope with the increasing consumption of resources?

At the same time, climate change, which appears to be causally linked with greenhouse gas emissions i.e. from the combustion of fossil fuels, is predicted to increase the average temperature of the atmosphere accompanied by an increased number of extreme weather events and natural disasters.

Therefore, the access to and sustainable use of energy and raw materials and the reduction of greenhouse gas emissions into the atmosphere are key issues determining the future of mankind. The continuation of our standard of living in industrialized countries depends on the solution as well as how we can raise the standard of living in developing countries which currently only consume a fraction of our energy use. We must also strive preventing the exposure of the poorest world regions to climate change impacts. In other words: In our responsible use of resources lies the key to whether we can use the opportunities for growth and development for mankind.

### **Use of fossil resources**

Today, we predominantly consume fossil resources for energy and raw material use. These resources are not renewable but finite. Moreover, fossil fuels combustion contributes to increasing greenhouse gas concentrations in the atmosphere with threatening consequences for the global climate. That is why our industries and economies need to reduce their consumption of fossil resources. This we need to do in a sustainable manner:

- We need to reduce our fossil resources consumption in order to preserve these as long as possible while searching for new solutions.
- We need to find long-term substitution for the fossil uses.
- We need to manage this transition in a way protecting our economies' competitiveness and employment.



### Use of fossil resources in EU

Combustion of fossil fuels accounts for almost 80% of total energy consumption and 55% of power production (EEA 2006).

Saving fossil resources must be a priority. It is obvious that savings in energy and fuel use have the highest potential. However, EU25 energy consumption has increased by 11.6% between 1990 and 2003. Transport is the biggest end consumer of energy.

Another priority must be the use of new energy sources that can reduce our dependence on fossil fuels and that do not cause a net increase of CO<sub>2</sub> emissions.

The chemical industry contributes to both the saving of energy as well as the increased use of these new energy sources.

Some 40% of the total energy is consumed in the household and services sector with a huge share of fossil resources being consumed for heating. By using modern insulation materials from the chemical industry you can reduce the energy consumption of houses by more than 50%. This could reduce EU's CO<sub>2</sub> emissions significantly.

The fuel consumption of cars has been reduced significantly through the innovation from the chemical industry: Modern material reduce the car weight translating into reduced fuel consumption. 100kg less weight means about half a litre less fuel per 100km. The use of plastics in cars reduces the fuel use in Western Europe by some 2.3 mio tonnes of fuel.

The chemical industry is involved in many ways in the deployment of renewable energy sources:

- In the manufacturing of solar panels
- In the catalysis and chemistry of fuel cells
- In fermentation processes of biomass
- In wind power generation

### **EU chemical industry Energy efficiency**

The EU chemical industry is energy-intensive. Our total consumption (160Mtoe) accounts for roughly 3% of global and about 12% of EU energy demand. Energy costs account for about 10 – 60% of production costs of most products – used as raw material and fuel. That is why energy prices impact heavily on the well-being and future perspectives of this industry.

Since the chemical industry in Europe competes worldwide and has been exposed to high energy prices traditionally, efforts and investments towards highest energy efficiency have been a priority: Specific energy consumption per unit of output has decreased by 35% in the last 20 years.

By improving our energy efficiency performance we were able to decouple production from the use of resources – and we will continue following this path.

### **Greenhouse gas emission reduction**

Although chemical production has risen by 50% since 1990, emissions of greenhouse



gases have decreased by more than 20%. The Kyoto aim for the EU in 2012 is a reduction of 336 million tonnes of carbon dioxide equivalents. Since 1990, the European chemical industry has achieved a reduction of 96 million tonnes, almost one third of the EU's target .

In all these positive developments, cost-effectiveness and resource preservation were the drivers. We continue working in this direction, however, with some processes we have come close to theoretical limits.

### **Renewable Resources use is wide-spread in our industry**

We have been using raw materials from plants for a very long time for the production of pharmaceuticals, washing agents and lubricants and in the textile sector. Recently, new technologies and processes enable the use of new resources. 'White biotech' makes it possible to produce vitamin B2 from plant oil and soybean flower – thereby replacing a complex chemical synthesis. We produce citric acid and essential amino acids from sugar. With 'green biotech' we use potato starch as valuable raw material.

These technologies are important enablers for the use of renewable resources. This potential deserves recognition from society and industry. Moreover, where economically and technically feasible, the chemical industry uses renewable resources in many areas: We produce a multitude of insulation materials from cellulose, wood fibres, straw, etc.

The broad-scale use of plant based raw materials would even not be possible without the help of the chemical industry, e.g. the chemical additives for paper making: A wide range of chemical products is essential in the manufacturing and finishing of paper from wooden fibres and fillers, including the recycling of paper. For wood, resins from the chemical industry enable manufacturers to produce fibreboard, pressboard and glued laminated timber turning natural raw materials into industrial premium performers.

The chemical industry's input is crucial in the production of biodiesel from oilseed rape - a reaction with sodium methylate. Finally, antioxidants are added in order to prevent the product from premature ageing during storage.

We manufacture biodegradable plastics from sugar, starch and plant oil for packaging purposes. We produce lubricants for machines and equipment from vegetable oils (oilseed rape, sunflower, soy) or from animal fats.

Plant oils replace fossil oils in washing products and cosmetics. Bio ethanol is another example for the use of plant sugar as renewable resource in the chemical industry.

These examples prove: Markets beat subsidies. Markets should be driving the use of renewables long-term.

We have to be realistic: From a technical feasibility perspective, renewable resources will not be able to replace petrochemistry in the foreseeable future. New products and processes need to be equal or better in terms of quality and economic performance. You need the space and the climate for growing renewables; we must admit that other regions have natural advantages here. At the same time, chemical processes and products need to prove their eco-efficiency. While bio ethanol scores high in life-cycle



analyses, not every renewable raw material is as such 'ecologically correct' or performs better. The indigo blue pigment is not anymore being manufactured from plants. The synthetic process is better economically and from the environmental perspective. Similarly, insulation material from plant fibres is not the best option for renovating old buildings: Mineral fibres and chemical material can be more efficient in these applications.

### **Use scarce renewable resources efficiently**

#### EU targets for renewables

In 2003, the share of renewables in total energy consumption was 6%, the renewables share in gross electricity consumption was 12.8%. The EU still aims to meet the indicative targets of 12% and 21% respectively by 2010 (EEA 2006). This would require significant further expansion of renewables.

There is competition between use of land for food and for industrial purposes and competition between uses of renewables for energy, fuels and chemical industry demand. The right signals should come from the market. Problems occur when state intervention impacts on the market thereby increasing the price of the renewable raw material and eliminating the use as raw material in the chemical industry.

Oleochemistry has lost one of its most important raw materials: Oil seed rape. Since bio fuel is being massively subsidised, oil seed rape is used for biodiesel production almost entirely.

Another problem oleochemical companies are facing is the subsidised burning of animal fats in the production of biodiesel, green electricity, co-heating etc... Animal fats in Europe are getting expensive and scarce. The European oleochemical manufacturing industry is threatened to disappear from Europe meaning a loss of 20.000 jobs and business worth over 500 mio euro annually.

Another example comes from the forest industry: Tall oil is being used in many consumer products as essential additive, e.g. in cleaning agents, paints and coating materials, adhesives, printing inks, cosmetic agents, chewing gum, tyres.

In Finland alone, this tall oil processing industry has a turnover of some €260 mio representing 1300 jobs of direct and indirect employment. Now, emission trading and the preferential treatment of bio fuels in the system have affected the raw material availability and pricing in a way not intended when carbon dioxide trading was planned. Perversely and contrary to the good initial intentions, valuable uses of renewable resources as those mentioned above may disappear and be replaced by more fossil resources use accompanied by economic damages and loss of employment.

The European Emissions Trading Scheme favours energy production from biomass. Certain raw materials are getting scarce and expensive for the chemical industry.



### Getting the balance right

Looking at the huge global challenges of a growing world population, finite fossil resources and climate change, renewable resources have a very big role in the future of mankind. However, a fast and successful deployment of renewable resources needs cooperation of industry, politicians and society.

- We need to do more in the field of research & development
- We need active networks such as SusChem
- We need to remove legal roadblocks: 'Green biotech' will help finding plant varieties delivering the right raw material for technical purposes i.e. in the chemical industry. Too burdensome legislation in Europe may hinder the potential. Legislation on waste and agricultural management may hinder the natural recycling of biodegradable material.
- We need to avoid state intervention such as the setting of blanket targets for using renewables that will potentially encourage inefficient and uneconomic developments overriding more sustainable market solutions.

### Conclusions

Global challenges require the saving and more efficient use of fossil resources as well as the reduction of greenhouse gas emissions in the coming decades. In this respect, renewable resources are very promising sources for energy and raw material. We need to further explore the potential. The chemical industry has excellent experiences. We need a constructive cooperation between science, industry and society in order to move towards sustainable solutions for the future. The chemical industry is part of the solution.

Thank you very much for your attention.