High Level Group on the competitiveness of the European Chemicals Industry

Energy, Feedstock, Infrastructure and Logistics

Conclusions of the Discussions

The third meeting of the High Level Group focused on developments in energy and feedstock availability and prices which are decisive factors for the competitiveness of large parts of the European chemicals industry, in particular for the production of base chemicals. Furthermore, The Group also dealt with the impact of logistics and infrastructure. As the discussions took place in a period of important policy developments on climate change, the relevant elements of the Commission's Energy and Climate Package, which had been adopted on 23 January 2008 were addressed in the discussions as well. The High Level Group did so with the understanding that negotiations on the climate change policy of the Community in general and on the specific Commission proposals are a matter for Council and Parliament. The High Level Group considered as well how the chemical sector can best contribute to sustainable development and climate change objectives and avail of new business opportunities.

The discussions in the High Level Group were prepared by the Ad-hoc Group on Energy, Feedstock and Logistics (EF&L). This Ad-hoc Group met on 15 January, and again on 7 and 8 February 2008, to consider the impact of energy and feedstock availability and prices in combination with policy measures to mitigate Climate Change. The meeting on 29 February discussed possible improvements of infrastructure and mitigation of bottlenecks in logistics. A major part of the analysis in this paper has been prepared on the basis of about thirty presentations, made by the International Energy Agency (IEA), chemicals industry, academia and European Commission representatives[1].

The results of the discussions of the Ad-hoc Group were discussed and reviewed by the Sherpa Group at their meeting of 2 April. The Sherpas considered that, subject to some modifications, the report submitted to them correctly reflects the outcome of the discussions in the Ad-hoc Group and contains many valuable insights and orientations, thereby providing a solid basis for the deliberations of the High Level Group.

In their discussion of 18 April, the High Level Group generally concurred with the analysis of the Ad-hoc Group. In the course of the discussion a minority of Members of the Group considered, however, that the general picture emerging from the preparatory work lacks the long term vision needed to respond to the challenges of diversifying the raw materials base of the chemicals industry and of contributing to the fight against climate change. In this context they recalled that scientists consider a much higher emissions reduction target of 80% by 2050 as necessary. In view of this perspective, significantly higher commitments of all actors would be needed. Referring to the mandate of the High Level Group, it has been underlined by several members that looking at these issues in terms of the impact on the competitiveness of the European chemicals industry is the main objective for this Group. These Members saw

[1] These presentations are available at: http://ec.europa.eu/enterprise/chemicals/hlg/meetings_en.htm

it as logical that the analysis should focus more on foreseeable developments and the related challenges for the industry.

As regards the revision of the Emissions Trading Scheme and in particular the question of ensuring the appropriate treatment of Energy Intensive Industries, the High Level Group

- recognises that the issues raised are of critical importance for the competitiveness of the chemicals industry, and underlines that legal certainty is essential for the companies and that predictability is needed as soon as possible for upcoming investment decisions

- stresses the importance of having a solid factual base for the decisions to be taken, and the importance for industry to actively engage with the Commission in ongoing work for that purpose;

- notes that the relevant proposals were under examination and would be decided in the appropriate fora;

- considers that the discussions of the High Level Group contributed to a better understanding of the importance of these issues for the competitiveness of the chemicals industry and of the public policy context in which these issues are likely to develop, and of the main specific issues in question.

With this understanding, this report summarises the conclusions from the discussions on the various topics and recommendations of the High Level Group (in bold). Where divergences of views have been identified, the different positions are reflected and no recommendation is given.

The High Level Group approved this report at its meeting of 27 October 2008 with the proviso that the economic situation has substantially deteriorated since the discussions. Part of the analysis in this report will therefore be re-examined when drafting the final report of the High Level Group.

Energy and Feedstock

Energy and Feedstock as decisive elements of competitiveness

1. The chemicals industry uses energy products, namely oil, gas and to a minor degree coal and biomass not only as a source of energy but as principal raw materials for its final products. The policies to combat climate change aim at a reduction of Greenhouse Gas (GHG) emissions, the major part of which stems from energy generation and use. Energy and climate change policies are therefore directly linked; they have a strong direct and indirect impact on the prices of energy products and energy use but also on other aspects of sustainable development, including environmental protection. The chemicals industry accounts for 12% of EU total energy demand and for 1/3 of total EU industrial energy use (energy and feedstock). At the same time energy and feedstock availability and prices are key factors for the competitiveness of large parts of the chemicals industry. In particular for the commodity type of chemical products, energy and feedstock costs together frequently exceed 50% of total production cost.

Oil

2. Oil (naphtha) is the most important feedstock and an important energy source for the chemicals industry in Europe. Europe has presently no structural disadvantage in oil based production compared to other regions of the world as the global oil market reduces differences in price. Nevertheless the general supply and demand balance does have an important impact on the chemicals industry and Europe's interest must be to strengthen the functioning of the global market. If investments for additional capacities and new petrochemical plants are largely placed in regions offering strong increase in local demand and market growth, investments in Europe are focussed on modernising highly integrated and efficient plants of a size adapted to the needs of the European market. Investments in the Middle East in petrochemical chains based on oil offer a comparatively low profitability, with higher investment and operational costs than in the rest of the world. Their impact on the competitiveness of Europe is therefore considered as limited.

3. Production based on naphtha, the most important petrochemical building block, is however substantially more costly than ethane based production practiced currently in the Middle East. This is the main reason for the current investment boom in ethylene capacity in that region. But availability of ethane is very limited and therefore the consequences of this gas based production on the world market price of ethylene and its derivatives are likely to be limited. Nevertheless, the petrochemicals industry remains cyclical. While the length and severity of a possible cyclical downturn caused by temporary overcapacity in parts of Asia is difficult to predict, the predominant view is that its impact on the production capacity in Europe will remain limited. As in the case of other traditional chemical production regions in the world (NE-Asia and US), which will be equally exposed, Europe has a number of "marginal" crackers with an unfavourable location, capacity and cost structure. This part of the capacity, which could be in the range of 10%, is expected to be closed, a development which would be comparable to adjustments in the previous cycle. Experience from previous restructuring periods demonstrates, however, that the extent of capacity reductions and its regional impact partly depends on policy decisions. If the wrong decisions are made, exporters from the Middle East will be in the position to arbitrate the prices between the main importing regions (Europe, Asia and America). They will orientate their exports to the regions offering the best net-return, taking into account the absence of trade barriers and the existence

of local taxes affecting domestic production (including CO_2). These factors can therefore have a substantially negative impact on the future of the European chemicals industry.

Gas

4. In contrast to the situation of oil/naphtha, Europe has a competitive disadvantage as regards supply of gas (methane). Transport of gas is dependent on pipelines or on sea transport in liquid form. Both options are costly and in consequence infrastructure has not been adequately developed. This, together with trade restrictive measures from a number of suppliers and distributors explains very large differences in the price of natural gas in different regions of the world. Europe is considered as a very interesting import market by third countries and more investments in gas pipelines are necessary to ensure a competitive, safe and diversified gas supply. **An improved performance of an effectively liberalised gas market at least in the Community and the securing of reliable imports of gas at competitive non-distorted prices from neighbouring regions (Russia, North Africa and North Sea) are of very high importance for substantial parts of the industry (e.g. production of ammonia, hydrogen, precursors of polyamides and methanol)**.

Electricity

5. Electrochemical processes (notably the chlor-alkali industry) use large amounts of electricity and its share of cost can reach 60% of total production costs. The sharp increase in electricity prices in recent years, due to the price increase of basic fuels and to the weak competition between electricity generators as well as certain features of the current Emission Trading Scheme (ETS) and national levies on power, has already had an effect on investment in the European chlor-alkali industry, which, in addition, is experiencing a costly conversion from mercury cells to membrane technology. As many of the existing long term contracts will expire shortly, further significant increases of electricity prices for the industry are expected. Together with the general developments in prices of power expected in the next decade, this would seriously jeopardise competitiveness compared to other regions where substantial new capacity is under construction. The situation is exacerbated by the fact that chlorine as the main output of the chlor-alkali industry can hardly be transported over longer distances because of its hazards. However, chlorine is at the top of long and very wide value chains within the chemicals industry. These value chains or at least important parts of them would be put at risk in case of capacity reductions. Securing electricity supply at prices which maintain longer term profitability of this industry is decisive. Due to the long term nature of the high investments needed and the necessity to achieve high capacity utilisation, stable long-term supply is a key element of competitiveness. Long term contracts with power generators or increased own generation in e.g. CHP facilities to cover inherent heat demand are the main options. Further development of electricity markets, also as a consequence of climate change policy, will have a decisive influence on the future of this important part of the chemicals industry in Europe.

Climate change policy

Energy efficiency and emission reduction potential

6. The strong dependence in the production of base chemicals on fossil feedstock and energy and the high emissions of GHG call for constant efforts to improve energy and resource use efficiency and to provide innovative solutions to contribute to Europe's energy saving targets. In fact, efforts to improve energy efficiency started long ago. The European chemicals industry can be regarded as a first mover and much has been achieved. Although overall chemicals production in Europe increased by more than 50% from 1990 to 2005, the industry's emissions of GHG decreased by 25% over the same period. This is in particular due to the many highly integrated production sites. Other important elements were the large scale move from coal to gas as energy source and changes in the product mix. Resource and energy demand are minimized and their flows are optimised at site level, e.g. by using excess heat from one installation for another one. There are indications that the residual potential for emission reduction in most processes is comparatively low. Ranges of 1-2% p.a. are mentioned in some studies. However, the data available both from these studies and from the ongoing work of the IEA seem to be too crude to come to robust conclusions on the nature, size and location of the remaining scope for improved energy efficiency in various subsectors. The necessary conditions for an exploitation of this potential including the need for targeted research and development in Europe need to be further explored. **The High Level Group underlined the importance of robust and verifiable information in this respect which is indispensable for the imminent decisions on measures to mitigate climate change not only in Europe but also in other regions. Such information is indispensable as well for the setting of benchmarks. A closure of the information gaps is therefore of high priority.**

Engagement of emerging economies

7. The chemicals industry is a globalised industry with a very strong production base in the emerging economies of Asia. As climate change is a global problem, the need to look at the global effects of policy measures is of high importance. A relocation of parts of the chemicals industry due to carbon leakage would not only cause unemployment and loss of economic welfare in Europe, it would also increase global GHG emissions and pollution if major parts of the industry move to areas with a problematic energy mix and low efficiency in energy generation and use namely China and India, but also the Middle East. **Due to this situation, adequate and measurable action by emerging economies is needed as this would contribute best to mitigating climate change and create a more level playing field allowing the European chemicals industry to compete. Europe should do its utmost to create the conditions for such action.**

8. Global sectoral agreements on a reduction of GHG emissions and energy savings can be an important instrument to arrive at an engagement of industry based in emerging economies, in particular to allow these countries to make a meaningful contribution to reducing emissions globally. Strong efforts to arrive at international sectoral agreements based on benchmarks are being undertaken in various subsectors of the chemical industry. In view of the very substantial problems of many emerging economies to secure an adequate energy supply and the pressing need to reduce massive air pollution there should be a common interest in such agreements, although it is too early to judge the perspectives for global participation. In order to be effective against climate change and in particular carbon

leakage, sectoral agreements should lead to an emissions reduction of comparable magnitude as required for European installations, and need to be controllable, verifiable and subject to mandatory enforcement arrangements. In view of the complexity of arriving at such agreements in the chemical industry, **support by all actors (industry, governments, *including those of emerging countries,* as well as Commission) to bring these initiatives to a successful conclusion in as many sub-sectors of the chemicals industry as possible is to be welcomed**.

The chemicals industry as energy intensive industry and the European ETS

9. The information provided at the meetings of the Ad-hoc Group indicated that at least the production of some base chemicals could qualify as energy intensive industry due to the high share of energy cost in the final product. The Commission has started work in consultation with stakeholders to determine which (sub-)sectors of energy intensive industries may be especially vulnerable to carbon leakage, which measures would be most effective in this regard, and up to what level (sub-)sectors should be broken down to ensure both fairness of treatment and enforceability. It remains to be determined how strong the exposure to international competition is in each case, and to which extent the affected industry subsectors will be able to pass on cost increases caused by climate change measures taken on a European level.
Industry and some Member State representatives considered that the chemicals industry as a whole were clearly exposed to carbon leakage. Industry is opposed to the principle of auctioning which would affect technology leaders and less performing companies alike. Industry considers that free allocation of carbon allocations based on benchmarks was necessary to secure the competitiveness of the European chemical industry in absence of a global agreement on climate change with an equivalent engagement of competitor regions. It was pointed out that the base chemicals segment is fully integrated into the rest of the chemical industry and the subsequent value chain. One Member State representative considered that it will be very difficult to adequately define Energy Intensive Industries which are exposed to significant risk of carbon leakage. In the absence of a reasonable multilateral agreement, all manufacturing sectors, encompassing chemicals, should therefore benefit from free allocations of allowances.
Environmental NGOs did not share this view and stated that auctioning of carbon allocations should become the general rule. The validity of the carbon leakage hypothesis needed empirical verification. Exemptions would need a detailed justification on the level of installations as there was a considerable risk of windfall profits and abuse.
The High Level Group agreed that the shape of a future international agreement on climate change and of the European Emission Trading Scheme are of key importance for the competitiveness of the European chemicals industry. Carbon leakage must be prevented and the new ETS must not lead to a situation where companies are encouraged to leave the European Union. While the discussion on how best to achieve this are ongoing there was a general agreement on the urgency of the issue and the need to ensure predictability in the EU so as to avoid displacing investment in energy intensive sub-sectors.

10. In addition, industry representatives called for addressing a number of specific issues concerning the proposal for a revision of the EU ETS. The most important of these are a higher threshold (50 kt CO_2 / a) for the exclusion of small facilities in order to reduce the administrative burden on SMEs. It was argued that such a threshold would still cover 95% of the emissions, but it would exclude 75% of the sites. The Commission pointed out that the

threshold will be subject to the active debate in Council and Parliament. Other important points for industry were the treatment of indirect emissions from the use of electricity in electro-chemical processes, in particular the chlor-alkali industry and the treatment of combined heat and power (CHP) generation for use in the industry. However, it was recalled by the Commission that the ETS is not the only instrument for promotion of CHP and that the CHP Directive already contains rules on incentives provided by Member States for electricity produced by high efficiency CHP.

Carbon capture and storage

11. Carbon capture and storage (CCS) could provide an important contribution to GHG emissions reduction in the longer term, in particular after 2020. While underground injection of CO_2 has been applied for more than a decade in various applications within the oil and gas industry, including commercial projects aiming at enhanced hydrocarbon recovery, up-scaling these technologies for commercial application in large industrial installations poses a substantial challenge. While CCS can be implemented in principle in petrochemical plants, the adding of CCS to existing plants adds to technical complexity and costs. For this reason equipping new power plants with CCS seems to be a more promising option. Most current cost estimates are in the range of 50-70 €/t CO_2. However, with further R&D the deployment costs are expected to drop substantially, making the technology attractive at carbon prices of 40 €/t CO_2 and above. For the successful further development of this technology it will be also essential to ensure public acceptance of CO_2 transport and storage projects. **While accepting that a large scale deployment of CCS is hardly feasible before 2020, the High Level Group underlined the importance of further promotion of CCS by means of pilot projects as one of the possible options because of its high potential to reduce industrial emissions and because CCS is considered a precondition for a wider use of coal as energy and feedstock** (see paragraph below).

Efforts on climate change as a business opportunity for the European chemicals industry

12. Increased efforts to save energy and mitigate climate change are not only a challenge for the chemicals industry but offer as well substantial and rapidly growing market opportunities. The chemicals industry offers a wide range of products (inorganic and organic chemicals) which allow either environmentally more sustainable energy generation (e.g. solar panels), energy storage (batteries depend on chemical products) or energy savings (e.g. insulation material and light weight materials or tyres which save energy for transport). Currently the Commission is preparing a comprehensive Action Programme on Sustainable Consumption and Production and on Sustainable Industrial Policy. This comprehensive approach entails the promotion of energy and resource efficient technologies, creating a dynamic internal market for better performing products and for the move to leaner and cleaner production. It aims furthermore at encouraging consumers to move to more sustainable consumption patterns. In particular an improved energy management in buildings offers even in the short-term a vast energy savings potential for the economy as a whole which is critically dependant on products of the chemicals industry. The energy savings resulting from such products largely exceed the energy required for their manufacturing. Hence, products of the chemicals industry frequently create the energy savings and emissions reduction potential in other sectors of the economy. The contribution of the chemicals industry is often overlooked as these savings are attributed to the user sectors and not to the chemicals industry. In addition, the feedstock contained in the final products can be, and is being increasingly used through recycling or recovery. Nevertheless, waste prevention provides for

highest energy and thus CO_2 savings and this needs to be considered in product and process development as well.
In the longer run the consequent use of chemical innovations related to energy efficiency, energy generation and energy storage is of highest importance as the High Level Group concluded at its session on Research and Innovation. **In conclusion, climate change mitigation will be a very important research and development focus in chemistry and the related major business opportunities for the European chemicals industry should be fully exploited.**

Raw material change

Renewable Raw Materials

13. The heavy dependency on fossil hydrocarbons, high oil and gas prices and the ambition to achieve a lighter carbon footprint have led to considerable efforts in the chemicals industry to explore the possibilities to widen its feedstock base, in particular by broader use of bio-based renewable raw materials. Influential studies[*] published around the beginning of this decade indicated the significant potential for a rather rapid move to renewable raw materials. However, relatively soon these forecasts were shown to be over optimistic and had to be reduced, namely, to an estimated potential of around 10% by 2010. Many experts consider this still to be too high; the predominant estimates of the experts are now in the upper area of the range of 5-10% by 2015. Many participants noted that the available figures, even for current production, seemed rather unreliable, partly due to the lack of uniform definitions. Uncertainties and variances in expectations increase further when the longer term perspective is considered.

14. While in principle a large amount of chemical substances can be produced from renewable raw material, the technical and logistic difficulties must not be underestimated. Industrial production needs a reliable flow of high quantities of feedstock of constant quality. This requirement represents an important difference to the use of renewable raw materials to generate energy and some fuels, where chemical composition and purity are less of a concern. However, technological developments and up-scaling may alleviate some of these problems. Important long term R&D programmes are ongoing or imminent to address this challenge and to boost investor confidence.

15. The decisive bottleneck in the availability of "first generation feedstock" or food crops is on the agricultural and ecological side. Prices of agricultural commodities moved up sharply in the recent past, partly due to the wider use in bio-fuels. This has raised some ethical aspects, notably in relation to concerns about possible food shortages as well as deforestation and a loss of biodiversity. The environmental impact of intensified agricultural production therefore needs to be evaluated together with the CO_2-saving potential and other GHG emissions in order to assess overall eco-efficiency. As a consequence a reassessment of bio-fuels is ongoing which has repercussions on chemical uses, for example, as regards ethanol.

16. The future use of "second generation biofuels" largely based on agricultural and forestry by-products or waste could ease many of these concerns although the above mentioned technical and logistic challenges need to be considered here as well. However, further research and development are necessary to come to viable larger scale production. **At present it seems too early to make a robust assessment of the economic viability of such feedstock in the chemicals industry but the expected large potential available provides sufficient justification to continue ongoing research and industrial development activities as a priority.**

17. One of the main problems and a major cost factor in the use of bio-based raw materials is the need for suitable infrastructure (the best locations seem to be close to deep sea harbours) in order to get the huge quantities of feedstock needed for industrial scale production of chemical building blocks from the agricultural production areas to the industrial

[*] For references please consult the presentations at the Ad-hoc Group

processing plants. Many regions in Europe have a limited area available for domestic production of biomass for industry. Partly the capacity depends on the use of GMO's, and other innovative and efficient technologies. Promising cases have been presented in which it is intended to use existing clusters in the agro-industry (France) or in the pulp and paper industry (Sweden) for the additional production of chemicals (and energy) based on bio-based raw material. This cluster approach, possibly in combination with some financial support in the start-up phase, could be decisive for the achievement of economic feasibility.

18. The efficiency of renewable resources for chemical production varies considerably, with grain such as rye, wheat and corn having a relatively low yield of 5-10 t/ha and producing 2000 to 3500 l/ha of ethanol, while potatoes, sugar beet and sugar cane have higher yields of 40-70 t/ha producing 3500, 5000 and 6500 l/ha of ethanol respectively. Brazilian prices for bio-ethanol are recognized as being competitive with the production of petrochemicals such as ethylene, propylene and benzene. However, this is considered to be a local phenomenon dependent on climate and geography combined with the yield of sugar-cane. Natural conditions in Europe for the production of first generation biofuels are in general less favorable than in some other regions of the globe.
Access to sufficient high-quality fermentable feedstock under world-market conditions is essential for a competitive chemicals industry in Europe. For this reason in particular the tariff for bio-ethanol together with an assessment of the sustainability of such bio-ethanol production should be reconsidered in the European Union, provided that a common agreement with trading partners about the sustainability indicators for the production of bio-ethanol is achieved and its enforcement ensured.

19. Renewable raw materials such as starch, cellulose, sugar, vegetable oils and other fats are all traditionally used for producing chemicals and fibres. Many experts consider that such renewables are more appropriate for specific uses (e.g. surfactants, food & feed ingredients, enzymes, etc.), rather than serving as general feedstock (through biorefinery or pyrolysis) like oil and gas.
White biotechnology covers both the use of renewable resources and the biotechnological production of specialty chemicals. Ingredients, additives and active components for personal and household care products can be based on renewable feedstock including palm, coconut, soy, rapeseed and sunflower oil and tallow. The advantages are biodegradability, skin compatibility, little or no environmental impact as well as favourable risk characteristics.
Incentives (e.g. subsidies or regulation) in agriculture or energy policy can divert biomaterial into other applications (e.g. tallow disappeared as feedstock for the detergent industry due to higher subsidies for bio-fuel use). Policy makers should seek to avoid such unwanted side effects which can seriously jeopardise attractive uses of bio-based raw materials in the chemicals industry.

20. The EU produced about 60 million tons of plastics in 2006 from fossil feedstock. There are some 200 plastics families in production. The total production capacity of bioplastics in 2007 was variously reported as between 110,000 and 600,000 tons, i.e. a small fraction of production from petrochemical feedstock. This picture is expected to remain for some time and biomass based feedstock will not take over from petrochemicals in the foreseeable future. Bio-based plastics are predicted to rise to 5 mio t/y over the next 20 years. They will be largely used for packaging and will continue to fill specific niche roles due to specific technical advantages.

21. In a partial analysis limited to the chemicals industry it appeared that at least in the next 15 years there is a strong tendency for biomass to be used for the production of biofuels rather than feedstock. In the short and medium term biomass may be better left to energy production rather than petrochemicals, for both economic and ecological reasons. Most Members of the High Level Group consider that in this period the use of biomass will provide only a limited opportunity for the chemicals industry primarily through specialized products, with material substitution through new molecules and products.
The long-term perspective could be more positive and the High Level Group supported the view that the efforts to achieve a wider use of renewables should not be reduced. Diversification of feedstock and energy sources is more important than ever. Envisaged research programmes such as the forthcoming call for proposals on biorefineries in the Community Framework Programme, a wider use of Public Private Partnerships in innovation projects and more commitment from Member States to implement the Community Biomass Action Plan are considered as crucial elements in order to achieve the desired technological breakthroughs in the years to come. In addition R&D investment to explore the feasibility of a conversion of CO2 into feedstock should be considered.

Coal

22. Coal is comparatively cheap, supply is abundant and the technology is available for chemicals manufacture. The price of coal is not coupled to that of oil and gas, and coal reserves worldwide are massive and not limited to politically unstable regions. As with biomass and waste such as sewage sludge, coal can be gasified to produce syngas (and the subsequent C1 chemistry value chain beginning from methanol and ammonia) and steam, so powering combined cycle power plants. If Fischer-Tropsch or other gas-to-liquid technologies are applied, an even more versatile feedstock for many other value chains of the petrochemical sector can be created. Acetylene and aromatics can be produced by traditional coking.
In terms of competitiveness, the chemicals industry has assessed the production costs of syngas from coal to be less than that of local natural gas and similar to Middle East natural gas, including shipping costs of ammonia (in syngas equivalents). However, coal gasification produces three times the amount of CO_2 compared to oil and gas based petrochemistry. The future use of coal as raw material therefore critically depends on the availability of CCS. At least as long as CCS at competitive cost is not yet a reality (see section on carbon capture and storage) CCS costs would lead to a loss of competitiveness of coal-based investment projects. *C*oal does not therefore provide a viable option at present for Europe. However, some competitors with ample coal reserves and a less ambitious climate change policy enter increasingly into the production of chemicals based on coal. This again underlines the urgent need to come to a global agreement on climate change.

Logistics

Logistics and infrastructure as important elements of competitiveness

23. Logistics costs represent on average about 10% of the total turnover of the chemicals industry, a figure that can increase up to 40% for certain bulk chemicals. These statistics can be partly explained by the geographical situation of the chemicals industry which is spread-out across Europe. Intra-EU movements represent 50% of total sales; Extra-EU exports are also significant (25% of total sales in 2006). In spite of permanent efforts of the industry to minimise transport distances by further integration and clustering and to limit transport of hazardous goods as far as possible, the freight volume is still expected to increase annually with more than 2.5% over the next 10 years. The ability to move chemical goods and the efficiency of the transport system and its infrastructure are therefore vital to keep the chemicals industry competitive. Environmental sustainability and chemical safety have to be fully respected in pursuing this objective.

Clusters

24. The high integration of most of the European chemicals industry along the product value chain is one of its main competitive advantages. Many companies integrate upstream or downstream activities. Leading players in the petrochemicals sector link steam crackers and other chemicals units with refineries in integrated complexes and clusters which unify several interconnected but independent plants on one production site. The majority of the 300 European production sites are located in such clusters. The success of these clusters depends on having a valid combination of key assets in place, amongst them shared use of infrastructure and services, access to major transport modes and proximity to markets and customers, the latter being the main distinguishing factor to the emerging petrochemical clusters in the Middle East. Companies in well performing clusters benefit from an optimized cost structure, from a better access to resources and leave a lower carbon footprint. Clusters are therefore playing a key role for the European chemicals industry and the improvement of their competitiveness contributes to the sustainable growth of the chemicals industry as a whole. However, in quite a number of Member States the industry is still widely dispersed and located around a historical feedstock or energy resource. In addition, often complete supply chain integration within clusters is not yet achieved and the interconnection with other clusters is insufficient. Consequently, clusters considered economically viable should be supported in their development. The improvement of the logistics infrastructure within and between the European chemical clusters can be considered as an important contribution to the competitiveness of the industry and the development of a "roadmap" has been proposed. The High Level Group considered that in many cases logistics and infrastructure have been neglected and that there is a considerable scope for improvement.
Moreover, a valorised relation between Logistics Service Providers and producers characterised by long-term contracts and an improved IT-integration can make a contribution to the logistics performance of clusters.
The High Level Group concluded that in many cases the development of local cluster platforms with an active cooperation between industry and (local) public authorities would improve the overall management of clusters including their logistic performance. A multi-stakeholder approach to cluster leadership may permit developing long-term perspectives and guarantee consistency. A pan-European cluster platform can help to create a broader European perspective focussing on improvements of logistics infrastructure between clusters. Furthermore, they could provide tools and criteria to

improve performance. Such an initiative should be linked to the horizontal initiatives on cluster development discussed in the European Council.

Transport

25. Long distance transport is the rule in the chemical sector. Even if large parts of the industry are located in clusters, the distances between these production sites can be very long. Moreover, chemical companies are usually quite specialised and one company can supply the whole European market. The parameters determining the performance of transport are therefore of particular importance for the chemicals industry. The High Level Group expressed a general concern that insufficient logistics infrastructure and other transport bottlenecks could prevent the goal of stronger clusters being achieved. In general the Group felt that the share of road transport was too high, the decreasing use of rail should be reversed and more pipelines were needed. The development of efficient transport systems has been neglected and needs more attention with due attention to environmental impacts and safety aspects.

26. The use of intermodal transport is generally supported and of increasing importance. Efficient infrastructure for intermodal transport is not yet in place everywhere and regulatory hurdles can delay projects. Industry cites, for example, the lack of transit storage permission for containers containing hazardous goods at intermodal terminals and the complexity of procedures to obtain permits for new intermodal terminals. Also the complexity of procedures to obtain permits for on-site storage facilities and spur tracks to connect railway lines with chemical sites should be addressed. In the decision making process wider European impacts should be taken into account instead of focusing on local interests alone. **Stakeholders should work together with authorities on a Member State and Community level to further identify and to address key bottlenecks.** At the international level differences in the rules for transport of dangerous goods by mode of transport can be an obstacle to intermodal transport which should be addressed.

27. A decrease of the use of rail transport can be observed in several Member States. Non aligned railway systems between countries, the lack of efficiency and flexibility seem to be reasons for this current development. This situation raises concerns especially amongst Member States' Governments and the Commission who see the promotion of railway transport as an important step towards reduction of road congestion and emissions. **Possibilities for a revitalisation of railway transport should therefore be carefully assessed by national and European authorities.**

28. As regards road transport the increase and harmonization of the allowable vehicle weight at European level could be an option to address the increasing problems caused by congestion and to integrate the fact that most of the chemical products are important in weight. Industry aims at an increase to 44 tons for road transport and to 48–50 tons for intermodal transport. A higher and harmonized vehicle weight would reduce congestion, emissions and the losses resulting from under-utilizations of vehicles. However, the suitability of the existing road infrastructure and aspects of road safety need to be carefully considered and the external costs arising from such a measure need to be carefully evaluated. A study of the Commission to assess the advantages and disadvantages is ongoing. The severe shortage of qualified truck drivers is a particular concern for the chemicals industry. The driver profession has become less attractive due to long working hours and difficult working conditions. In the chemicals industry, transport distances are usually even longer and loading

procedures can be time-consuming. Furthermore, the skills demanded for drivers of dangerous goods are high. **While this issue needs to be addressed first of all by the industry, Member States are encouraged to undertake supportive actions. Mutual recognition of requirements and reduction of administrative hurdles to the participation in driver trainings would be steps in the right direction. At Community level, the possibility to use European funding to re-educate unemployed people with a focus on logistics professions could be assessed.**

Pipelines

29. (Product-) pipelines are crucial for the chemicals industry and they can make a substantial contribution to the reduction of transport emissions and risks. From an environmental perspective, pipelines are considered to be more advantageous than traditional modes of transport provided that aspects of nature protection are adequately addressed during planning and construction of pipelines. Pipeline constructors need to deal with numerous authorities and regulations to realize multinational projects which make preparation and implementation of this type of project extremely time-consuming and costly. Closer transboundary cooperation seems necessary to address the challenges together with stakeholders. The aim of a European vision underpins the idea of a pan-European Olefins Pipelines Network linking and improving existing olefins pipelines in particular to close gaps towards southern and eastern Europe and thereby integrating all major clusters and regions. As pipelines are quite expensive and the return on investment relatively low, public authorities are often asked to support investments in these infrastructures. Public Private Partnerships or creating third party providers are important in this respect. Nevertheless, there are important issues linked to public support given to the construction of pipelines, in particular regarding coherence with competition policy and state-aid rules, as often only a small number of companies will directly benefit from a given stretch of pipeline. It needs to be kept in mind that pipelines are essentially commercial projects operated by the private sector. **The question of closing gaps in the olefin pipeline network and of public support needs to be followed up in order to establish an appropriate basis for decisions on investments and political priorities in this field. The High Level Group welcomed the upcoming 2nd Strategic Energy Review which is expected to provide clarification on the way forward.**

Focus on Central and Eastern Europe

30. Due to changing production patterns with regards to Eastern Europe, the Middle East and Asia there is also a change in transport flows. The emerging regions in Central and Eastern Europe are close to sources of feedstock and represent a growing market. The East – West focus takes on more importance compared to the traditional North – South connections. In contrast to the established chemical logistics and pipeline networks in Western Europe, the chemical sites in Central and Eastern Europe do not have sophisticated connections between their sites and are not equipped with the appropriate logistics network to realize the growth potential regarding new markets in Russia and its neighboring countries. For the development of these sites, a pan-European vision seems necessary. Therefore, the European Chemical Regions Network (ECRN) unified different stakeholders and started to develop a strategy for chemical logistics in Central and Eastern Europe. This concept highlights ways to reduce road traffic and to better exploit inland waterways or railways. It further suggests the creation of intermodal logistics centers and the development of a pipeline network for feedstock supply. Besides, ECRN emphasizes the need of know-how transfer and best practice exchange, and

the need for the streamlining of administrative, organizational and technical requirements. The strategy should reach out to financing institutions and entail the development of public-private-partnerships.

The High Level Group welcomes this initiative of ECRN and noted that initiatives of this kind should be supported and further developed.