Competitiveness of the EU Chemical Industry, a Key sector in the Refining Value Chain
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Profile of the European Chemical Industry “Manufacturing Platform Europe”

- Generates €558 billion of revenues (2012)
- Contributes to 18% of the world’s chemical sales (2012)
- Employs 1.1 million people (2012)
- Creates a trade surplus of €49.5 billion in (2012)

Source: Cefic Chemdata International
EU Chemical Industry Structure (2012)

Percentage of sales

- Consumer chemicals: 11.5%
- Petrochemicals: 27.7%
- Basic inorganics: 15.2%
- Polymers: 20.2%
- Specialties: 25.4%
- Consumer Chemicals
- Petrochemicals
- Auxiliaries for industry
- Paints & inks
- Crop protection
- Dyes & pigments
- Man-made fibres
- Synthetic rubber
- Plastics
- Other inorganics
- Industrial gases
- Fertilizers

Source: Eurostat and Cefic Chemdata International
The EU chemical industry supplies virtually all sectors of the economy

Percentage of output consumed by customer sector

- Other business activities 7.4%
- Furniture 2.1%
- Electrical machinery and apparatus 2.2%
- Publishing and printing 2.3%
- Wood 2.6%
- Food and beverages 2.6%
- Machinery and equipment 2.8%
- Fabricated metal products 3.1%
- Other non-metallic mineral products 3.1%
- Textiles 3.2%
- Basic metals 4.3%
- Automotive 4.3%
- Pulp and paper 4.6%
- Service 4.9%
- Wholesales & retail trade 5.1%
- Other manufacturing 5.4%
- Agriculture 7.0%
- Construction 7.9%
- Health and social work 11.2%
- Rubber and plastics 13.9%

Sources: European Commission, Eurostat data (Input-Output 2000) and Cefic Analysis
Chemical industry: 11% of the total EU energy demand and for one-third of industrial use (fuel and feedstock)
Raw material use by the EU chemical industry

Simplified; proportions not to scale!

Chemical industry (NACE 20)

Fine and specialty and consumer chemicals

Customer industries

Chemical Value Chain

Raw Materials Base

Petrochemical/Plastics Industry

Inorganic base chemicals

Chem. industry Energy use

Chem. industry Energy use

Refineries

Agroindustry

Inorganics mining

Coal Mining
Natural gas production

Coal

Refineries

Bioethanol
tar

Bioethanol

= internal energy use in crackers

Naphtha, condensates, LPG, gasoil

Vegetable oils, Animal fats, Cellulose, Sugar, Starch, Bioethanol, Natural Rubber, Glycerol, and others

Salt, phosphate, fluorspar, lithium, potassium, precious metals, and many others

Simplified; proportions not to scale!
Raw material use by the EU chemical industry (2011, material use – draft)
### EU-28 net

<table>
<thead>
<tr>
<th>Material</th>
<th>Net Use (Tons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refining Products</td>
<td>61.210</td>
</tr>
<tr>
<td>Natural Gas</td>
<td>19.200</td>
</tr>
<tr>
<td>Coal</td>
<td>1.340</td>
</tr>
<tr>
<td>Renewables</td>
<td>8.500</td>
</tr>
</tbody>
</table>
The European Petrochemical Sector

- 59 crackers in the EU
- 40 units integrated with refineries (approx. 70%)
- 26 million tons ethylene → in total 40 million tons of chemicals
- 20% of WW ethylene capacity (130 million tons)
Petrochemical Industry: Crackers’ key dimensions

- Crackers convert raw materials into valuable compounds
- Cracking is energy intensive
- Units are capital intensive (2.5 to 4 billion euros)
- Units are difficult to upgrade (technology dependent)
- Capacity and utilisation rates are essential for viability
- 80% of manufacturing costs are related to feedstock and energy
- 85% of European crackers use naphtha as main feedstock
- Integration is highly important
Refining / Petrochemicals integration

Typical 25-30% of cracker input

Product integration: feeds and petrochemical products

Process integration
- Heat integration
- Utilities (air, water, …)
- Maintenance
- Shared services
Global Chemical Market Profile and Evolution

- Chemicals Market Size: chemicals demand in value

- The global chemicals market has doubled in ten years, and is expected to continue growing at approx. 3-4%/yr for the coming 20 years.

- Despite having grown in absolute terms, EU share of global demand has declined.

- European demand grew more slowly than world average (due to mature markets, aging population).

Source: Cefic Chemdata, *proxy for M-E (Iran, Israël and Saudi-Arabia)
Has EU chemical industry lost (production share declined) or won competitiveness (trade surplus increased)?

Source: Cefic Chemdata International 2013
EU chemical industry: trade surplus could be 3 times higher

EU trade surplus [in bn €]

Source: Cefic Chemdata International 2013
What are the key factors affecting competitiveness?

- Energy and Raw Materials
- Regulatory Stability and Consistency
- Access to Markets
- Innovation
- Skills and People
- Logistics and Infrastructure
- Capital Investment
Impact of shale gas on Ethylene Costs: EU vs US

Critical regional differences: Over 85% of U.S. production gas based, about 85% of European petrochemical production naphtha based, Gulf region mainly use gas Crackers
Ethylene costs - Global Picture

2012 Global Ethylene Cash Costs by Region (US$/ton)

- Middle East: 485
- United States: 501
- EU: 1201

Source: ICIS Consulting and Cefic Analysis
Impact of shale gas on the Petrochemical Industry

- New Investments in the US
  - Ethylene as key example:
    - largest basic building block for the chemical industry and largest volume organic chemical produced (~130 million tons/yr).
    - more than 38% increase in ethylene capacity in US in coming 3-5 years (existing capacity approx. 30 million tons).
  - Boosting profitability of US-based petrochemical companies.
  - 126 new chemical projects, totaling around 84 billion USD new capital investment, have been announced

- Key Consequences for Europe:
  - Increased US volumes of ethylene derivatives to Asia, Latin America, and Europe. European export capacity affected.
  - Loss of competitiveness of EU naptha crackers vs US ethane crackers.
  - US manufacturing renaissance may create pull for specialties.
Impact down the Value Chain

Impact of Shale Gas on the Chemical Value Chain

- Petrochemical Industry
  - "Petrochemical Derivatives" (Plastics Resins, Fibres, Solvents, Surfactants, Polymers)
  - Power (or Gas)
- Global Impact: Exports of Goods
  - "Converters" and Formulations (Production of Food Packaging, Plastic Parts, Coatings, Adhesives, Construction Materials, Fine Chemicals)
  - Power
- "Assembly"
  - Automotive equipment, Machinery, Appliances, Textiles, Packaged Consumer Goods, Pharmaceuticals
  - Power
Capital Investment (Euro Billion)

- China, attracting the bulk of chemicals investment
- Increase in investments in the US due to improvement in feedstock and energy costs
Cumulated number of EU regulations on Health, Safety and Environment (net of abrogation)

Source: EU, Directory of EU legislation in force (Chapter 15 – Environment, consumers and health protection)
Enterprise and Industry

• **Fitness Checks, Cumulative Cost Assessments and Evaluations planned:**
  • Fitness Checks on the most relevant chemicals legislation not covered by REACH as well as related aspects of legislation applied to downstream industries;
  • Evaluations of the machinery Directive and firearms legislation;
  • **Cumulative cost assessments in the areas of chemical industry** and forest-based industries (woodworking, furniture, pulp/paper and printing).
• **Fitness Checks and Evaluations ongoing/completed:**
  • Evaluation of regulations regarding internal market for industrial products;
  • **Fitness check** on the type-approval system for motor vehicles and **of the oil refining sector**;
  • Cumulative cost assessment of the aluminum sector;
  • A cumulative cost assessment on the steel sector has been delivered in 2013.
Competitiveness – Pros and Cons for Europe

😊 Large integrated domestic market with strong customer industry clusters

😊 High international orientation and global network to external customer industries

😊 Until now availability of skilled and motivated workers and scientists

😊 Continued strategic restructuring efforts (flexibility to globalised markets)

😊 Strong innovation efforts will generate new growth clusters: Efficient Energy use, health and new materials which could solve upcoming societal mega challenges

😢 Low “new consumers” population growth in the EU => low demand growth for chemicals in general - elderly population, shrinking working age classes, high saturation levels.

😢 High energy and feedstock costs vs Middle East and now the US => EU is facing an upcoming wave of petrochemical capacity additions, especially in Middle East and US

😢 High Regulatory Compliance Costs (eg REACH, Seveso, IED, 7th EAP…)

😢 Non-energy raw material availability and cost issues (eg. biobased feedstock, rare earths, minerals)

😢 Lack of a “Common Industrial Policy” or a “Common Energy Policy”