European chemicals Industry in a
globalized context:

Challenges and Strategies

Dr. Bernd J. Tesche
CEO SOLVAY GmbH
Germany

Dresden, May 3rd 2007
1. Chemicals Industry - overview
1.1 Chemicals Industry, a key industry

- one of the largest world industries
- “Chemistry is not everything… but everything is nothing without chemistry!”
- Chemicals industry is an innovation engine and a source of innovation for a broad downstream sectors

"Chemical innovations are the driver of 50% of innovations in pharmaceuticals, textile and clothing, metal and petroleum processing industries"

**Key facts Chemicals Industry in Europe:**

<table>
<thead>
<tr>
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<th>Value</th>
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<tr>
<td>% EU GDP</td>
<td>2 %</td>
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<tr>
<td>Direct Employment</td>
<td>1,3 M</td>
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<td>Indirect employment</td>
<td>4 M</td>
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<td>Sales</td>
<td>436 b€</td>
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<tr>
<td>% EU Manufacturing</td>
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<td>Trade balance surplus</td>
<td>26 %</td>
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**Chemistry share of the materials value of:**

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<tr>
<th>Material</th>
<th>Share</th>
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<tbody>
<tr>
<td>Bottle of shampoo</td>
<td>100%</td>
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<tr>
<td>Carpets</td>
<td>68%</td>
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<td>Tires</td>
<td>62%</td>
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<tr>
<td>Car</td>
<td>31%</td>
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<tr>
<td>Semiconductors</td>
<td>30%</td>
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<tr>
<td>Paper</td>
<td>22%</td>
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</table>

Source: ACC, Moore Economics, CEFIC
1.2 Chemicals Industry remains broad and diverse

- Increasingly interfaces with biology, medicine and physics
- Estimated 70,000 different product lines
- There are more chemical companies in the world today than 10 years ago
- The number of players still in the game intensifies competitive pressure:

\[ \rightarrow \text{NUMBER OF SMALL ONES INCREASES} \]
1.3 Chemical players: consolidation and newcomers in Europe

- Strong “southern” players emerging. Today, regional, tomorrow, global. Tata
  Brunner Mond (2005), Sabic Huntsman Petrochemicals (2006), Nicholas Piramal
  Avecia Pharma (2005), …

- New chemicals players from Spin off: BP Innovene, Total Arkema, Bayer Lanxess

- Consolidation continues: Lyondell+Millennium, Ineos+Innovene, Crompton+Great Lakes Chemicals

- Growing importance of private equity players: Bain Capital, Blackstone Group, Apollo Management. Investment funds represents a quarter of the total 131 billion invested between 2003 and 2005.

Evolution of ranking of top chemical players (Chemical sales only)

<table>
<thead>
<tr>
<th>N°</th>
<th>1980</th>
<th>1998</th>
<th>2005</th>
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<tbody>
<tr>
<td>1</td>
<td>Hoechst</td>
<td>BASF</td>
<td>Dow</td>
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<td>2</td>
<td>Bayer</td>
<td>DuPont</td>
<td>BASF</td>
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<tr>
<td>3</td>
<td>BASF</td>
<td>Bayer</td>
<td>Shell</td>
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<td>DuPont</td>
<td>Dow</td>
<td>ExxonMobil</td>
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<td>ICI</td>
<td>Total</td>
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<td>Hoechst</td>
<td>DuPont</td>
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<td>7</td>
<td>Union Carbide</td>
<td>Shell</td>
<td>SINOPEC</td>
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<td>8</td>
<td>Shell</td>
<td>Akzo Nobel</td>
<td>Bayer</td>
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<td>9</td>
<td>Exxon</td>
<td>Exxon</td>
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<td>Montedison</td>
<td>Alf Aquitaine</td>
<td>SABIC</td>
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<td>11</td>
<td>Formosa Group</td>
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<td>12</td>
<td>Lyondell</td>
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<tr>
<td>13</td>
<td>Mitsubishi Chemicals</td>
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<td>32</td>
<td>Solvay</td>
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<td>...</td>
</tr>
</tbody>
</table>

Source: Chemical Engineering News
„Growing Capacities: mostly outside of Europe“

Production will follow market, especially commodities same for R+D
Emerging chemicals producing regions (excluding pharm.)
ASIA clearly taking the lead

Source: Cefic, ACC, VCI and Global Insight

(*)Asia excluding Japan and China
Asians going global...

examples

• Governments still considerably influencing foreign trade and investment (e.g. India)

• In China: need for foreign investors to explain all details to competitors surely helps them
2. Chemicals Industry trends and drivers of change in a globalized environment
2.1 Societal drivers

- Overall image of chemicals industry in EU still at low level
- The attractiveness of the chemicals industry as a career choice has been declining in EU since the 1990s
- Stronger role of consumers over producers
- Demographic development
- Sustainable Development & Corporate Social Responsibility

Overall image of the Chemical Industry in EU (2004)

“Wal-Mart targets 20 chemicals for substitution.”
Chemical & Engineering News November 6, 2006

“One major retailer has demanded that a producer reformulate a well-known premium detergent to the retailer’s specifications.”
Ernie Rosenberg, President of the US Soap and Detergent Association, ICIS Chemical Business, 4 September 2006.
2.2 Technological drivers

- Structural changes (relocation to Asia) in downstream industries (textiles, IT,...) and emerging of Asia as a source of strong and cheap R&D globalized world, logistic systems, IT

- Ramp up Biotech industry: In EU equivalent to 3% chemicals workforce. In 2005, US biotech sales ($50bn) were equivalent to 10% all chemicals sales.

- Tomorrow’s chemistry: Less energy, less raw materials, less emissions, more renewables and more customer value added

- The innovation race: In US nearly 14% of basic and specialty chemical company revenues are from products and services developed last five years

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**Wet chemicals world market 2005**

- **EUROPE**
  - Semiconductors
  - LCD

- **NAFTA**
  - Semiconductors
  - LCD

- **ASIA**
  - Semiconductors
  - LCD

**New sales from last 5 years (2005)**

- **Average**
  - Base chemicals: 21.00%
  - Specialty chemicals: 26.00%
  - Total: 20%

- **Best 25% innovators**
  - Base chemicals: 37.00%
  - Specialty chemicals: 55.00%
  - Total: 55.00%

Source: Arthur D. Little (Global innovation Excelence)
2.3 Economical drivers

- Significant growth in emerging markets as opposed to the EU and US: in 2005, for the first time, Asia, became the world chemicals producer leader. Cost advantages, environmental standards not directly comparable

- Higher and more volatile energy and feedstock costs: petrochemicals chain moves to the Middle East

- Commoditization: increasing pressures on value and life cycle reduce available profit pool and squeeze margins.

11. EU chemical industry energy intensity*

Sources: Cefic and Eurostat
* Energy intensity is measured by energy input per unit of chemicals production

Chemicals in Germany

Price index

- Cost of production (factor price index)
- Price of products (producer price index)

Sources: Cefic, ACC, VCI and Global Insight
2.4 Regulatory drivers

- **Legislation increase**: The cumulative effect of regulatory burdens undermines European industry's competitiveness and capacity to invest.

- **REACH**: Introducing today a new chemical substance in the EU takes 3 times longer and costs 10 times more than in the U.S. No control over imported substances in articles.

  Major impact expected in chemical industry broad network of SME’s.

- **EU CO2 Emissions Trade Scheme**: Germany: Increased cost of EE related to ETS only during 2005 6 €/MWh (+10%).

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**Evolution of electricity costs and CO2 costs**

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SOLVAY
5 Challenges
Migration of Manufacturing Industries

Global Shift

High-cost West European countries

Regional Migration

New member states with cost advantages; exports to Western Europe

Cost advantages; but primarily supplying Asian growth markets

Source: VCI

SOLVAY
3. How SOLVAY reacted so far (as example)
DEVELOPMENT OF A CHEMICALS & PHARMACEUTICALS GROUP since 1863

Limestone → Soda Ash (1866)
Salt → Electrolysis (1898)

Fluor
+ Ausimont in 2002 (chemicals/polymers)
+ BP Specialty polymers (2001)

Kali Chemie (1952)

Hydrogen Peroxide (1958) → Chemicals

Molecular Solutions (Girindus) (2005) → Vinlys (1949)

Specialty Polymers (1960)

Plastics → Processing

Pharmaceuticals

Sales in MEUR = 2,998 (32%)
3,800 (40%)
2,600 (28%)

Group Sales 2006 9,4 Bn. EUR

major pharmaceutical acquisitions

DUPHAR 1980
REID ROWELL (USA) 1986
UNIMED (USA) 1999
Fournier Pharma 2005
# LEADERSHIP

**SOLVAY is among the leaders for about 85% of its sales (75% in 2000)**

<table>
<thead>
<tr>
<th>Pharmaceuticals</th>
<th>Europe</th>
<th>North America</th>
<th>World</th>
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<tbody>
<tr>
<td>Cholesterol &amp; triglyceremia</td>
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<td>Fibrates</td>
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Solvay 1st WORLDWIDE SODA ASH PLAYER (capacities on 01/01/2007)
1st WORLDWIDE PRODUCER OF HYDROGEN PEROXIDE
(capacities on 01/01/2007)

SOLVAY
Second European PVC producer

Capacities in kt/year

- EVC: 1440
- TOTALFINA: 1290
- VINNOLIT: 960
- NORSK HYDRO: 655
- SHINETSU: 600
- LVM: 465
- VESTOLIT: 400
- ANWIL: 330
- BORSODCHEM: 300
- SOLVIN: 290

SOLVAY
Solvay: A MAJOR PLAYER ON A GLOBAL PVC MARKET (capacities on 01/01/2007)

Asian producers

Mio tons/year

Shin-Seo: 3.0
Farmand: 2.9
Oxyvinyle: 2.0
Georgia Gulf: 1.9
Inoac: 1.4
LG Group: 1.3
Arkema: 1.2
TPC: 0.9
Tayve Vinyl: 0.7

North America
Western Europe
Asia-Pacific
Latin America
Caustic Soda, Soda ash, Hydrogen peroxide

from Specialties to Commodities
The results remained volatile
3 sectors helped

1 Total 2004 Sales = EUR 7,877 M, including also “discontinuing operations” for EUR 67 M
2 Total 2004 REBIT = EUR 789 M, including also “discontinuing operations” and “non allocated items”, respectively EUR 25 M and EUR -49 M
OUR ANSWER

Acceleration and intensification of our efforts during the past 10 years in order to:

- **Strengthen of our leadership** in our key strategic activities by focusing on innovation and continuously improve our competitiveness

- Accelerate the development of our **pharmaceutical and specialty activities**

- **Exit areas** in which we had no clear leadership position or unsatisfactory return

- **to stay Hybrid** (Chemical and Pharmaceutical company)

- With a clear willingness to **change more and more to a policy of growth** (including eastern Europe and Asia) also **via innovation**
Annual average headcount (FTE) 2006 = 100%

Solvay chemical plants in Europe

Old factories reduct. 4,5%/a

Total factories
Reduced number of sites, concentrate to increase size (AVERAGE PVC PLANT SIZE IN WESTERN EUROPE) PVC as example

Average Plant size (kton/yr)

Dec 2005:
closure of VCM/ PVC plant in Ludwigshafen and debottlenecking of other SolVin production sites

Remark: Biggest plant in the world: 1.3 M t

Source: Solvin
◆ Sustainable Development: Improved energy efficiency through multiple investments in highly efficient "cogenerations" and other measures + be CO2 conscious

◆ Change the group’s organization from a country approach to a European/worldwide business organisation
Focus more on innovation

Increase Innovation Performance

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<tr>
<td><strong>Growth</strong></td>
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<tr>
<td>1. New sales ratio</td>
<td>16.5%</td>
<td>18.5%</td>
<td>22%</td>
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<tr>
<td>2. Number of European or US patents filed</td>
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<tr>
<td>3. Number of NB projects</td>
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<td><strong>Partnerships</strong></td>
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<tr>
<td>4. Customer perception of Solvay’s innovativeness according to surveys</td>
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<tr>
<td>5. % of innovative projects realized with external partners</td>
<td>49%</td>
<td>46%</td>
<td></td>
<td>Faster growth of innovation vs new partnerships</td>
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<tr>
<td>6. Percentage of publicly funded R&amp;D</td>
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<td>7. Number of patents coming from universities and public consortiums that are assigned to Solvay</td>
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<tr>
<td><strong>People</strong></td>
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<td></td>
</tr>
<tr>
<td>8. People perception of innovation through surveys (Solvay Survey)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9. Number of ideas in suggestion schemes per employee</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10. % of units involved in at least 1 innovative project</td>
<td>65%</td>
<td>97%</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Continue CAPEX & R&D INVESTMENTS TO SUPPORT GROWTH

- Major strategic initiatives
  - 2001: Ausimont/BP high performance polymers
  - 2005: Fournier Pharma (EUR 1.2 Bn)
- Sustained R&D investments in Pharma

In M EUR

<table>
<thead>
<tr>
<th>Year</th>
<th>R&amp;D expenses</th>
<th>Capital expenditures &amp; Acquisitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2001</td>
<td>2,968</td>
<td>721</td>
</tr>
<tr>
<td>2002</td>
<td>1,421</td>
<td>645</td>
</tr>
<tr>
<td>2003</td>
<td>1,044</td>
<td>555</td>
</tr>
<tr>
<td>2004</td>
<td>408</td>
<td>404</td>
</tr>
<tr>
<td>2005</td>
<td>2,402</td>
<td>1,461</td>
</tr>
<tr>
<td>2006</td>
<td>1,421</td>
<td>858</td>
</tr>
<tr>
<td>2007</td>
<td>1,461</td>
<td>905</td>
</tr>
</tbody>
</table>
Key-Players adapt or

(Source: BASF)
Dynamic management of portfolio over the last 10 years (2)

TOP TEN BUSINESSES
In % of Total Group’s sales
* 2004, incl. Fournier Pharma and excluding Industrial Foils (divestment announced in July 2005)

1995
1. Polyolefins (17%)
2. Pharmaceuticals (13%)
3. Soda ash (11%)
4. Vinlys (10%)
5. Electrochemistry (9%)
6. Industrial foils (8%)
7. Automotive (5%)
8. Performance compounds (5%)
9. Hydrogen peroxide (3%)
10. Pipelife (pipes & fittings) (3%)

Acquisition
- Fournier Pharma
- Ausimont
- Specialty Polymers of BP
- Unimed
- Neopharma

Exit
- PP
- PEHD
- Decoration
- Air intake
- Animal Health
- Salt
- Enzymes
- Industrial foils*

Proforma 2004*
1. Pharmaceuticals (29%)
2. Vinlys (14%)
3. Soda ash (11%)
4. Specialty polymers (9%)
5. Inergy Automotive Systems (fuel systems) (8%)
6. Electrochemistry (7%)
7. Performance compounds (5%)
8. Fluor (5%)
9. Pipelife (pipes & fittings) (4%)
10. Hydrogen peroxide (4%)
THE SOLVAY GROUP – Key Data 2006

✓ Employing some 29,000 people
✓ International presence in more than 50 countries
✓ Three profitable & cash generating sectors, with specific strategy for growth: Pharmaceuticals, Chemicals and Plastics
✓ Strategy for Sustainable and Profitable Growth through Innovation and Competitiveness
✓ Record results in 2006:
  - Sales: EUR 9.4 Bn (+10%)
  - REBITDA: EUR 1.6 Bn (+17%)
  - REBIT: EUR 1.1 Bn (+21%)
  - Balance Sheet: EUR 11 Bn
✓ Listed on Euronext Brussels
THE STRATEGY DELIVERED GREAT RESULTS

- Improved business model yields higher operational leverage and stronger cash flow
- Advantages of 3 sectors with specific strategy
4. Short summary of adaptation of Chemicals industry in Europe
Summary

- During the past 20 years the chemicals industry primarily focused (successfully) on:
  - adapting to **reunification and enlargement**, new players and new competitors
  - using the **chances of the single market or worldwide** instead of local and national orientation
  - adapting to **new burdens & threats from regulation**, pressure groups based on environmental and health fears
  - New burdens from **energy supply and raw materials**
  - Changing **financial circumstances**

- In a very **competitively organised market** environment at home generating only meagre results
Summary

• Consequence: multiple industrial investors lost

  – interest to stay in the business or changed the field of activity or region, successfully in general

  – a lot of power in restructuring instead of using it for new markets and innovation, partly the consequence of a zero risk mentality and political interference
Summary

• The **remaining global players** recognize that the global restructuration process is speeding up

• However: In our globalized **world competition still takes place between companies/organization on an incomparable basis (competitive dis/advantages)** and different levels of development of the society
  
  – Regarding **business law including antitrust and takeover rules**
  – **Social and environmental** conditions
  – Financial conditions and cost prices which are not necessary based on market prices, take over rules etc. and partially managed by state owned vehicles

• **Need for support of the industry by political means** and not to weaken it by adding additional burdens and uncertainty in the home-market and to support their innovations (home market is key)
Chances and risks for the European chemical industry

European Chemical Industry 2015
- Restructuring
- Innovation
- Market & Customer Orientation
- Sustainability

Asian Competitors
Middle East Competitors
Global Economy
Customer Industries

European Authorities

Balanced Chemical Policy
Incentives for Innovation
Non-bureaucratic regulations

New Technologies (Opportunities & Threats)
What can we expect from future?

SOLVAY
5. Key trends and risks identified by the EESC and our comments and suggestions
Key trends and risks

The Committee has identified key trends and risks in the EU chemical sector as follows:

1. **Slow production growth**: Production volume in the sector grew, but at a slow rate of 0.4 % per year (2000-2005). This is slightly faster than in the United States, but much slower than experienced by Asia Pacific and Latin America.

   - **Longterm development** +2% p.a. (1995-2005, excl. Pharma), shifting of markets and worldwide economical relations
   - European chemical companies need **full access to booming emerging markets**. Legal and social framework has to be ensured in those markets
   - **Production follows market**, but chemicals industry needs adequate policy framework on its European home markets to be competitive abroad
   - **Chemicals industry has to be recognized as strategic key industry for Europe**
2. **Commoditisation**: *Every product that is today considered a specialty is becoming more commodity-like every year. Nothing remains unique for long. Retailers and consumers demand constantly lower prices.*

True, during last 10 years **producer price increases (near to zero) and remained below increase of costs**, (e.g. price of naphtha tripped)

- **Squeeze of results**: We have to make restructurings easier in Europe (competition law to be revised?, Labour law, national differences have to disappear, no state interventions)
- **However**: We also **need commodities in Europe** for strategic reasons as well as for timing and financing of innovation for specialities and employment.
Key trends and risks

3. Constantly developing new and improved products and processes: in addition to providing for customers present needs, the chemical industry is generating and serving completely new markets. This enables other industries to be more efficient and productive by using more effective substitute materials and products.

- Important enablers for environmental technologies (solar cells) and goods.
- Without the chemicals industry’s products and solutions human life expectancy would not have increased so much.
Key trends and risks

4. a) Stable levels of R&D expenditure: R&D expenditure in the EU has remained constant at around 2% of sales and the sector maintains this way its innovative drive and enhances competitiveness.

- It is not innovation as such, but the time needed to bring products on the market “time to market” that makes the difference.
- Nanotechnology, genetic engineering e.g. are very promising strategic novelty technologies having the potential to revolutionize the industry, but difficult or impossible to make use of in Europe/different regulations.
- Innovation is really the key for growth and competitiveness for European industry (biomass, industrial (white) biotechnology, bio fuels etc.).
- Tendency should be to shift to higher value & innovative products, without endangering existing sources of cash and employment.
Key trends and risks

4. b) Stable levels of R&D expenditure: *R&D expenditures in the EU have remained constant at around 2% of sales and the sector maintains this way its innovative drive and enhances competitiveness.*

- Demanding **highly skilled people, starting in the kindergarten**. Schools and universities have to attract talents for techniques and chemistry
- To organize a **network between industry and universities**.
- **European legislation for patents** has to be improved and harmonized furthermore (translation costs, uncertainty of law) in Europe
- **Intellectual property rights** in emerging markets to be ensured
Key trends and risks

5. Declining employment: *Employment in the sector declined, but not as rapidly as it is experienced in Japan and the USA*

- Sign for **restructuring and strengthening** of the chemicals industry in Europe - productivity increased rapidly
- Sector with the **highest added value per employee**
- Policy of **outsourcing of activities** to be taken into account
- Need to make restructuring more easy by harmonizing national law in Europe, **reviewing of competition law (critical size) and labor law**
- New jobs in higher skilled activities
Key trends and risks

6. Changing **employee** characteristics: The *decline in* employment levels in the sector has coincided with a shift towards a greater proportion of employees in *high-skilled occupations and a larger proportion of employees with a tertiary education*.

- Chemicals industry already now among those sectors *requiring the highest number of young graduates*
- Growing demand for **highly skilled people**
- Availability of good number of well-prepared graduates in chemistry is critical to the sector’s future development
Key trends and risks

7. Risks of disproportional rise of energy costs: Since being an energy intensive industry, the sector is highly sensitive to the energy costs incurred either due to the international market development or, due to the EU Climate change policy in general and the EU ETS implementation in particular. Instability in the energy issues projected into the cost volatility reduces the innovative and development potential of this sector.

- **Safeguard security of energy supply** in view of decreasing own resources and ensure good product mix
- **Harmonise energy policy** in Europe. Set a framework for new investments in power plants
- Ensure **predictable and competitive energy prices** for electro-sensitive industries
- Don’t use the industry’s raw material “energy” as vehicle for environmental purposes in Europe
Key trends and risks

8. Image and perception of the chemical industry:

recent efforts to improve the reputation of the industry seem to be working. The image of the chemical industry in the last two years has developed far better than the average of all eight benchmark industries - all other industries, except Nuclear Energy, faced declines, Electricity and Petrol/Oil significant ones, whereas the image of the chemical industry improved.

- The chemicals industry has identified this problem and works on it; large national differences remain
- Responsibility of media
- Maximizing the individuals’ freedom and liberty does not necessarily lead to the community’s optimum
Key trends and risks

9. Implementation of the REACH regulation:

*EH&S pressures in the sector continue as strong as ever, because of REACH regulation risk of increase of non productive costs, risk of cartel agreements, disproportionate exposure of SMEs should be minimized.*

- How to control “imported” substances in articles?
- How will the rest of the world react to REACH?
- It is the legislation’s cumulative effect that finally counts
General remarks on Globalization

- **Trade**: Chemicals Industry needs free access to emerging markets. Europe has nearly no industrial tariffs (3-4%) whereas India e.g. is at 29%.
  - Full elimination of all tariffs should be target

- **Main issues**:
  - **WTO negotiations**, tariffs in the **Doha round**
  - **Bilateral Free Trade Agreements** (BTA to solve questions like environment, investments, intellectual property, government procurement etc.)
  - Support for actual **EU negotiations with Mercosur, Gulf Corporation Council, Korea, ASEAN and India**
  - **EU/US relationship** to be improved (tariffs no problem, but problem lie behind the border – diverging regulations increase cost for business and decrease competitiveness.
    - Long term goal: transatlantic market as internat market
    - Mutual recognition, further harmonization

- Trade: Help industry to seek **adequate measures against dumped or subsidized products**, ensure protection of **intellectual property rights** and avoid state interventions
General remarks on Globalization

• **Company takeovers** are an **EU issue**: certain defense possibilities remain for member states. Policy has to be based on the principle of „equality of arms“. Protectionism alone is not the right answer.

• Ensure a right **balance between the 3 pillars** of sustainable development (to reinforce competitiveness), taking into account, that all 3 pillars cannot be reached simultaneously, especially if we want to deliver the objectives of the Lisbon strategy.

• **Europe cannot go alone** (e.g. CO2 emission trading, REACH, Scale..) Don’t forget the *cumulative* effect of legislation and regulation.

• **Better regulation initiative** (EU Commission) to be supported → less is more.
Climate change Policy

Kyoto-targets vs. real evolution until 2005

Treibhausgasemissionen der größten Emittenten
Veränderung in Mio. t gegenüber 1990

Kyoto-Minderungsziel 1990-2008/2012
Tatsächliche Veränderung 1990-2005

EU15

Deutschland
Japan
Russland
USA***
Kanada
Mittlerer Osten**
Indien**
China**

Veränderung in Prozent, 2005 ggü. 1990

-343,2 (-1,2 %)
-236,7 (-7,7 %)
-76 (-29,8 %)
97,1 (+15,7 %)
427,7 (+30,8 %)
186,2 (+103,0 %)
525,1 (+108,4 %)

1990
2005

Quelle: DIW 2006

Kyoto-Gase: Kohlendioxid (CO2), Methan (CH4), Dinitrogenoxid (NO2), teilharnierte Fluorkohlenwasserstoffe (HFKW), perfluorierte Kohlenwasserstoffe (PFC) und Schwefelhexafluorid (SF6).


*** USA hat bisher das Kyoto-Protokoll nicht ratifiziert.

SOLVAY
Only a competitive European Chemicals Industry will help to deliver the results to reach the Lisbon Strategy Objectives of „making Europe, by 2010, the most competitive and the most dynamic knowledge based economy in the world“
Back-up slides
Chemicals and pharmaceuticals with highest value added per employee

<table>
<thead>
<tr>
<th>Industry</th>
<th>Value Added per Employee (thousand €)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Pharmaceuticals</td>
<td>92</td>
</tr>
<tr>
<td>2 Chemicals (excl. pharma)</td>
<td>88</td>
</tr>
<tr>
<td>3 Transport equipment</td>
<td>67</td>
</tr>
<tr>
<td>4 Pulp, paper and paper products, publishing and printing</td>
<td>52</td>
</tr>
<tr>
<td>5 Electrical and optical equipment</td>
<td>50</td>
</tr>
<tr>
<td>6 Machinery and equipment n.e.c.</td>
<td>47</td>
</tr>
<tr>
<td>7 Manufacturing</td>
<td>46</td>
</tr>
<tr>
<td>8 Manufacture of other non-metallic mineral products</td>
<td>45</td>
</tr>
<tr>
<td>9 Rubber and plastic products</td>
<td>43</td>
</tr>
<tr>
<td>10 Food products, beverages and tobacco</td>
<td>43</td>
</tr>
<tr>
<td>11 Basic metals and fabricated metal products</td>
<td>40</td>
</tr>
<tr>
<td>12 Manufacturing n.e.c.</td>
<td>28</td>
</tr>
<tr>
<td>13 Wood and wood products</td>
<td>27</td>
</tr>
<tr>
<td>14 Textiles and textile products</td>
<td>23</td>
</tr>
<tr>
<td>15 Leather and leather products</td>
<td>22</td>
</tr>
</tbody>
</table>

Source: Eurostat and Cefic, 2003
GERMANY: Increasing Life expectancy

Life expectancies of newborns in 1871, 1950, 2004

- 2004: Girls 90.4, Boys 84.9
- 1950: Girls 79.3, Boys 72.0
- 1871: Girls 42.1, Boys 39.1

Quelle: Statistisches Bundesamt, April 2006
Worldwide Economic Relations (exports in US$) 2001
Combating Climate Change: All together please!

China emits in few months the amount Germany is able to save in 17 years…

**Energiebedingter CO2-Ausstoß**
(2002 in Mio. Tonnen)

- **China**: 4.082
- **Russland**: 1.498
- **Japan**: 1.144
- **Indien**: 982
- **Deutschland**: 834
- **Kanada**: 532
- **Großbritannien**: 520
- **Italien**: 437
- **Frankreich**: 384

- **USA**: 5.592

---

**Entwicklung Treibhausgase**
1990 bis 2002

- **China**: 1.500 Mio. t
- **USA**: 800 Mio. t
- **Deutschland**: 230 Mio. t
### Nobel prizes in chemistry

<table>
<thead>
<tr>
<th>Period</th>
<th>Western Europe</th>
<th>Other countries</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901-1950</td>
<td>43</td>
<td>7</td>
</tr>
<tr>
<td>1951-1970</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>1971-2004</td>
<td>20</td>
<td>48</td>
</tr>
<tr>
<td>1901-2006</td>
<td>80</td>
<td>67</td>
</tr>
</tbody>
</table>
Innovation

- Customers are eager to have it…
  U.S. market size for flat screen TVs

- It’s the way to move forward!
  Innovation is a key source of differentiation for growth strategies in developed countries and high-demanding industries.

“Nearly 12% of basic and specialty chemical company revenues are from products and services developed within the past five years.”

2006 Survey to Member-company spending plan
Chemistry ahead: Use of Renewables as raw materials (% of all RM)

<table>
<thead>
<tr>
<th>Material</th>
<th>% of All RM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>2.1</td>
</tr>
<tr>
<td>Heat</td>
<td>5.1</td>
</tr>
<tr>
<td>Fuel</td>
<td>3.4</td>
</tr>
<tr>
<td>Chemicals</td>
<td>12</td>
</tr>
</tbody>
</table>

Quelle: Statusbericht Bundesregierung 2006, FNR/VCI-Erhebung für 2003

Source: VCI
Chemical production (without pharmaceuticals) grew by 2 percent per year.
Chemistry + Energy = Solar cells

Source: VCI
Evolution of Energy Mix in Germany (2005-2020)

Source: Ernst & Young

Downstream users: automotive, energy, electronics, textile, construction, paints, pharmaceuticals and healthcare

Advanced technologies could only come through with nanomaterials, e.g. flexible ceramic membranes → Lithiumionen-batteries
Schematic view of the merit order curve for Germany: the last operation power plant determines the electricity price.

Operation cost of the existing power plant park

€/MWh

Installed capacity in MW

water renewables nuclear lignite coal gas oil gas turbines
As in the past, let us now reflect on how to shape a common bright future for mankind using good science, driver of a healthy and competitive European chemical industry.