New Proposals for Chemicals Policy: Effects on the competitiveness of the Chemical industry

(Project EP/IV/A/2003/07/03-2)

Study for the Directorate General for Research

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Content

1. Introduction

In February 2001, the European Commission has published the White Paper "Strategy for a Future Chemicals Policy "describing the REACH process for the **R**egistration, **E**valuation and **A**uthorization of **Ch**emicals.

Till May 2003, the Directorates General for Environment and for Enterprise of the European Commission developed a legislation proposal as a consultation document based on the ideas of the White Paper. With the publication of their proposal they started an internet consultation phase of eight weeks to allow the stakeholders to share and communicate their opinions, ideas and proposals for improvement. The resonance has been very intensive with over 6,400 answers.

In October 2003, both Directorates transferred a modified legislation proposal to the EU parliament taking into account main concerns and objections of the responses by the stakeholders before and during the internet consultation phase.

Nearby all stakeholders agree that a new chemicals legislation for Europe is necessary. All stakeholders also agree with the two main objectives: 1. the protection of human health and the environment and 2. the improvement of the competitiveness of the European chemical industry. The achievement of both objectives demands different and often contradictional actions. In consequence, the main challenge of the new legislation is and will be to allow the right balance between both targets.

As a result of this conflict of interests, the latest proposal is blamed by both stakeholders: the NGOs and environmental organisations state that the proposal does not guarantee the achievement to protect human beings and the environment. Nearby the whole manufacturing industry fears significant draw-backs in the competitiveness of the European industry and its products in the global business environment.

Many studies have been done to estimate the potential effects of the new legislation with respect to the two objectives of the new legislation.

The evaluation of the benefits from protection of human beings and the environment proved to be very difficult, in specific regarding quantitative measures.

More studies have been done with respect to the effects on the economy in Europe. Most of the studies have been conducted by a qualitative evaluation quoting and analysing specific examples. Two specific studies tried to estimate the specific effects on the German and French economy by estimating changes in Gross Value Added and Working Places.

The objective of the intended study

"New Proposals for Chemicals Policy : Effects on the competitiveness of the Chemical industry"

is to specifically examine the competitiveness of the European chemicals sector in future taken into account the amended REACH proposal.

In particular the study will address:

- comparison between the actual situation and the introduction of the framework legislation
- financial strain on business
- loss of competitiveness for industry
- possible price increase in products containing for the final consumer

- possible job losses as a consequence of the implementation of the framework chemical legislation
- impact on GDP in individual EU Member States / Accession States
- comparison of bureaucratic effort between REACH and existing legislation

On basis of the study's findings guidelines and proposals should be developed for an action plan.

2. Chemical Industry in Europe

- **Economic Power** /1,2,3/

The worldwide chemicals production in 2002 has been estimated at €1,841 billion. Europe accounts for €633 billion (34.4%); herein the EU takes the major share with €527 billion (28.6%).

The worldwide chemicals production excluding pharmaceuticals has been about €1,300 billion in 2002. This "pure" world chemicals market is being led by Asia with a market share of about 33.3% ahead of Europe (market share 32.1%) and the United States (market share 25%). Within the European market share, the EU15 covers the major part with 28% (about €360 billion).

The chemical cndustry forms a very strong factor in the European economic system. The EU chemicals industry accounts for 12% of the EU15 manufacturing industry's value added and holds position three after "production of office equipment, data processing equipment; electrical engineering" and "vehicle construction".

Economic classification (thousand mill. €)	**Gross value added** (000mill.€)	**Share of gross value added of manufac turing industry** %
Manufacturing industry within the EU 15	1,329	100.0
Food and tobacco industries	150	11.3
Textile and apparel industry	49	3.7
Leather industry	11	0.8
Wood industry (excluding furniture manufacture)	21	1,6
Paper, publishing and printing industry	117	8.8
Coking, oil refining, production of fertile materials	28	2.1
Chemical industry incl. Pharmaceuticals	157	11.8
Production of rubber and plastic goods	64	4.8
Glass industry, ceramics, processing of rock, stone and mineral products	58	4.4
Metal production and processing, manufacture of metal products	155	11.7
Mechanical engineering	141	10.6
Production of office equipment, data processing equipment; electrical engineering	175	13.2
Vehicle construction	166	12.5
Production of furniture, jewellery, musical instruments, recycling	36	2.7

Table 1: Economic characterisation of the manufacturing industry and its sectors

The chemical industry without pharmaceuticals generates a gross value added of about €104 billion and therefore of about 8%.

The geographical location of the EU chemicals industry is mainly concentrated in four countries. Germany is the largest producing country, accounting for over a quarter (26.2%) of the EU production in 2000, followed by France (17.0%), the United Kingdom (13.5%) an Italy (11.6%)

Although often regarded as a mature industry, the Chemical Industry in Europe has grown slightly above the average of the European GDP growth (1997 – 2002). Whilst the average GDP growth has been 2.4% p.a., the overall chemical industry has grown by 3.1% p.a. through this time range. Fastest growing area has been pharmaceuticals (6.2% p.a.), followed by petrochemicals (3.1% p.a.) and specialty/fine chemicals (2.6% p.a.).

The product flows consist of domestic sales (25% of all sales) as well as intra-EU exports (46%). In consequence, 29% of all sales are exported into areas outside the EU. Therefore, GDP growth is not only an internal growth, but is significantly driven by the exports to other countries outside Europe.

The economic strengths of the chemical industry in Europe are also represented in the high number of employees being engaged in this industry. The strong pressure on the industry by the competitive developments (see below) forced the industry to adapt. In the last ten years, employment in the European chemical sector has decreased by 16% to 1.7 million and by 40% in Central and Eastern Europe to 0.6 million.

In the EU, the chemicals industry was made up of 22,890 enterprises in 2000. It has a relatively high degree of concentration in comparison to the total manufacturing industry. However, it is also a very heterogeneous sector and the size of companies in the EU chemicals industry varies considerably. SMEs are often suppliers or customers of the larger companies and they play an important role in the chemicals industry network, providing a certain degree of flexibility. SMEs with less than 250 employees represent more than 95% of firms in the EU chemicals industry in 2000, accounting for 30% of the production value and 36% of employment.

The Chemical Industry cannot be described as one homogenous industry area with a common structure, but has to be defined according the different segments. This segmentation shows different types from petrochemicals to perfumes and pharmaceuticals. As shown in Figure 1, these products are summarized in four categories:

Base Chemicals	37.7% (as share of value of production in 2002)
Specialty & fine chemicals	25.5%
Consumer chemicals	10.2%
Pharmaceuticals	23.3%

The two major categories Base Chemicals and Specialty & Fine Chemicals are mainly produced for industrial use, i.e. they are intermediates within the production chain for the final products as demanded and consumed by the customer. Furthermore most of the base chemicals form the basis for producing specialty & fine chemicals. To produce the final chemical for the end user (consumer or industry), several steps with different chemical intermediates are often necessary. Therefore, most of the chemical products involved in producing the product are not seen directly by the final consumer or the further manufacturing industry. In most cases, the final consumer applies mixtures of chemicals, in the chemical terminology called preparations. In mixing the preparations and generating the specific properties, most of the SMEs in the chemicals possess and keep their key success factor to survive and win in the competitive business environment.

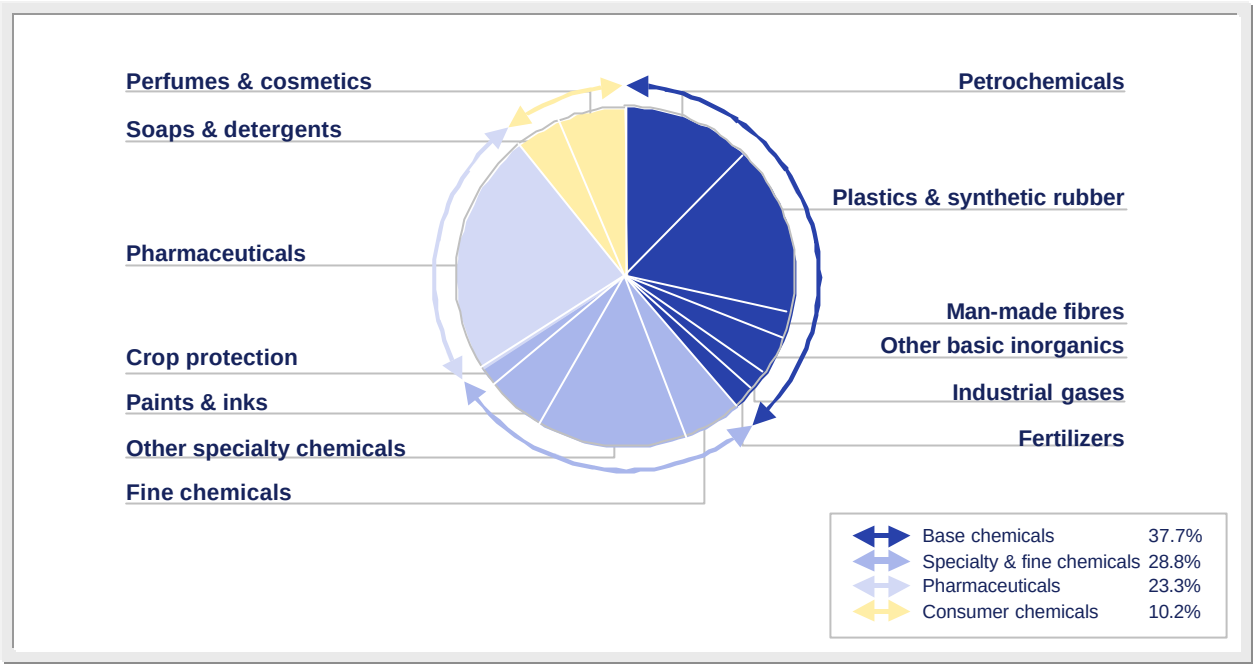


Figure 1: Segmentation of the Chemicals Industry according to the products

Besides this categorisation according to the chemical products the chemicals can be differentiated by their applications. The detailed split shows that only 30% of the chemicals are dedicated for final consumption, but the majority of chemicals is delivered to and applied by other industries.

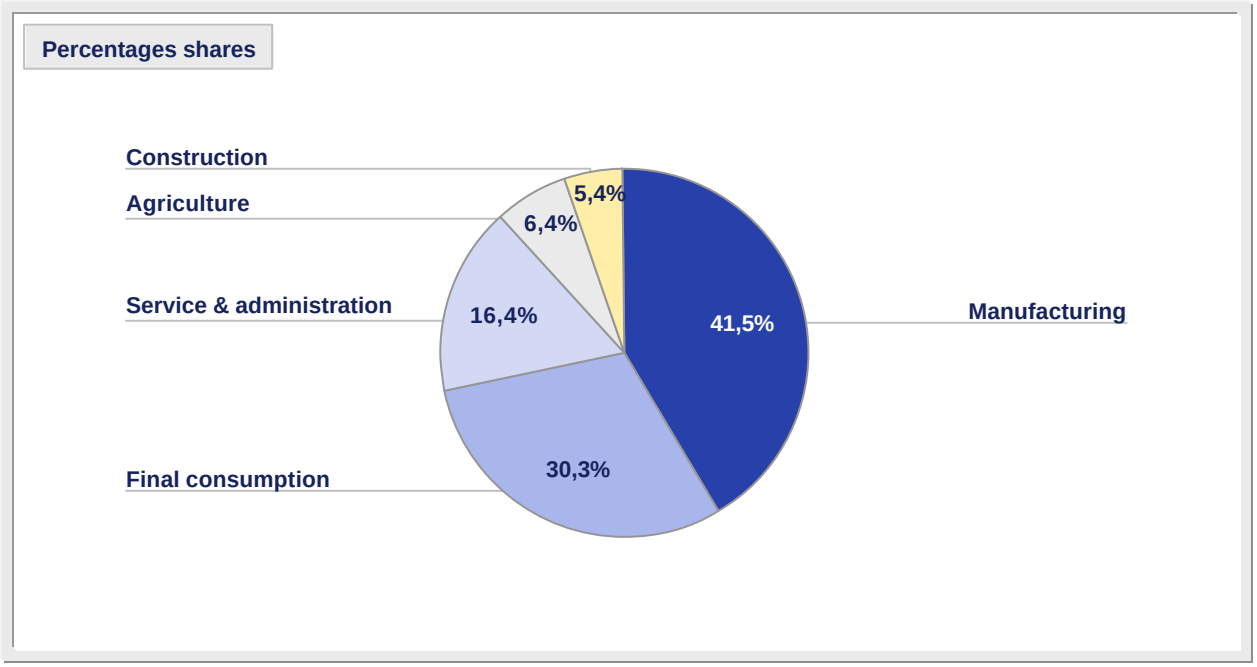


Figure 2: Segmentation of the Chemicals industry according to the application areas

The different ranges of products and of applications strongly indicate that the characteristics of success will be different within the Chemicals Industry.

- **Competitiveness and its drivers** /1,4/

An actual CEFIC study published in March 2004 sees that in general the European competitiveness in the global environment is at risk. This conclusion bases on six overlapping developments, which have been regarded as significantly influencing the development:

- Slow demand growth in Europe, high demand growth in Asia, esp. in China
- Increasing imports into Europe from Asia and Middle East (not only chemicals, but also finished goods) with high pressure on prices and margins
- Delocalisation of customer industries (not only textile and footwear)
- High production costs (feedstock, labour, regulation, etc.)
- Highly regulated environment (chemical industry and customer industry)
- Limited product innovation and developments of customer specific solutions due to a potentially burdensome and competitiveness-eroding regulatory policy of the EU authorities (e.g. REACH) and a lack of a real industry policy

The conclusions of the CEFIC study mirror the actual problems and challenges the European Chemical industry is confronted with. To understand this situation, the drivers for competitiveness have to be described (Figure 3). These drivers can be differentiated by company-internal and business relevant drivers.

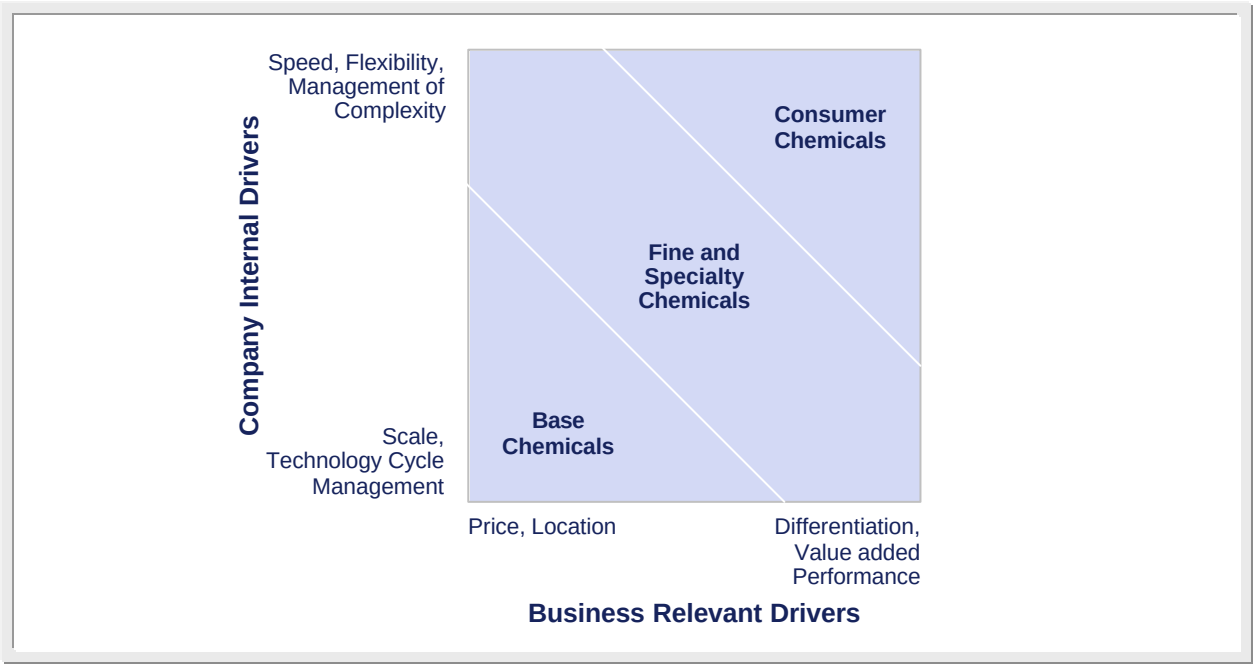


Figure 3: Drivers of competitiveness in the Chemicals Industry

The success of **Base Chemicals** business as the starting point in the value chain strongly depends internally on scale of the plants, efficiency of the technology and the management of the characteristic and strong business cycles. The customer itself wants the commodity at the cheapest price nearby its plant.

Fine and Specialty Chemicals as intermediates in the value chain are often dedicated for specific application and specific customers. Therefore the influence of speed, flexibility, management of complexity as internal criteria as well as product differentiation and the perceived value added of the product as business relevant drivers become more relevant. Whether the internal or the business relevant drivers overwhelm, depends on the specific situation or the specific supplier/customer relationship as well as the product and it position in the overall value chain.

The sector **Consumer Chemicals** is the direct frontier to the consumer. Therefore all drivers satisfying the customer's demand like product differentiation and value added performance supported by high internal flexibility and speed of development/innovation are important.

Discussing the effects of REACH, the potential influence on these drivers of competitiveness has to be discussed.

3. Current legislation /5,6/

- **EU - legislation**

The legal framework of the European chemicals sector has a rather long record towards the harmonisation of different Member States regulations. These were dealing mainly with questions of labelling, classification and packaging. The first European wide legislation came into force in 1967 with directive 67/548/EEC. From the perspective of the protection of human health and environment, objectives which are core elements in the REACH proposal, the sixth amendment of the directive of 1981 is of interest, as it introduced a notification procedure for new substances, including test requirements. The seventh amendment of 1992 increased those requirements and introduced principles for risk assessment.

Of specific importance in the context of the discussion of REACH is the directive of 1993 covering existing chemicals, which are listed in the EINECS (European Inventory of Existing Chemical Substances). These substances fall under the control of the EC and are not the subject to the notification process. These substances can be applied by the chemical industry without further registration process.

Substances which are listed in ELINCS register (European List of New Substances) have to be notified, which makes them more costly for industry than the use of old substances.

It is this dual character of the European legislation for chemicals which leads to different costs for chemicals producers and importers for the reformulation of substances to new products. This in turn has a decisive influence on the innovation performance and behaviour in this sector. One of the key elements of REACH is to unify this split system of old and new substances.

In the EU a new substance has to be notified if it is placed on the EU market either on its own or as a preparation and it is neither in EINECS nor in ELINCS and if it is not covered by one of following exemptions:

- Substances placed on the EU market in quantities of less than 10 kg per year per manufacturer
- Polymers
- Substances for scientific R&D
- Substances for process-oriented R&D
- Manufactured for export use only
- Intermediates manufactured and consume on the same site

If the new substance has to be notified, the path for the notification requirements to be followed is differentiated to the quantities produced per years.

The basic criterion which establishes testing requirements is the volume/tonnage per year. The notification approach is not risk-oriented, as it is the case in the US or in Japan.

- **Comparison to current legislations in Japan and US** /5/

A comparative look at the regulatory systems in Europe, Japan and the US reveals some common elements. At the same time there exist differences, which have to be considered while discussing the competitiveness in the sector.

All three regulatory regimes are based on the indication of volume, particular exemptions, and an inventory that serves as the baseline to measure whether a chemical substance is a new chemical substance according to the regulation. However, the major difference is that

the structure of the EU system is one with fixed testing requirements, whereas the Japanese and the US system are risk contingent testing requirement systems. The differences in the regulatory regimes lead to differences in the costs and time needed to bring the new substances to the market, two important factors in competition. The relevant differences are the following (Figure 4):

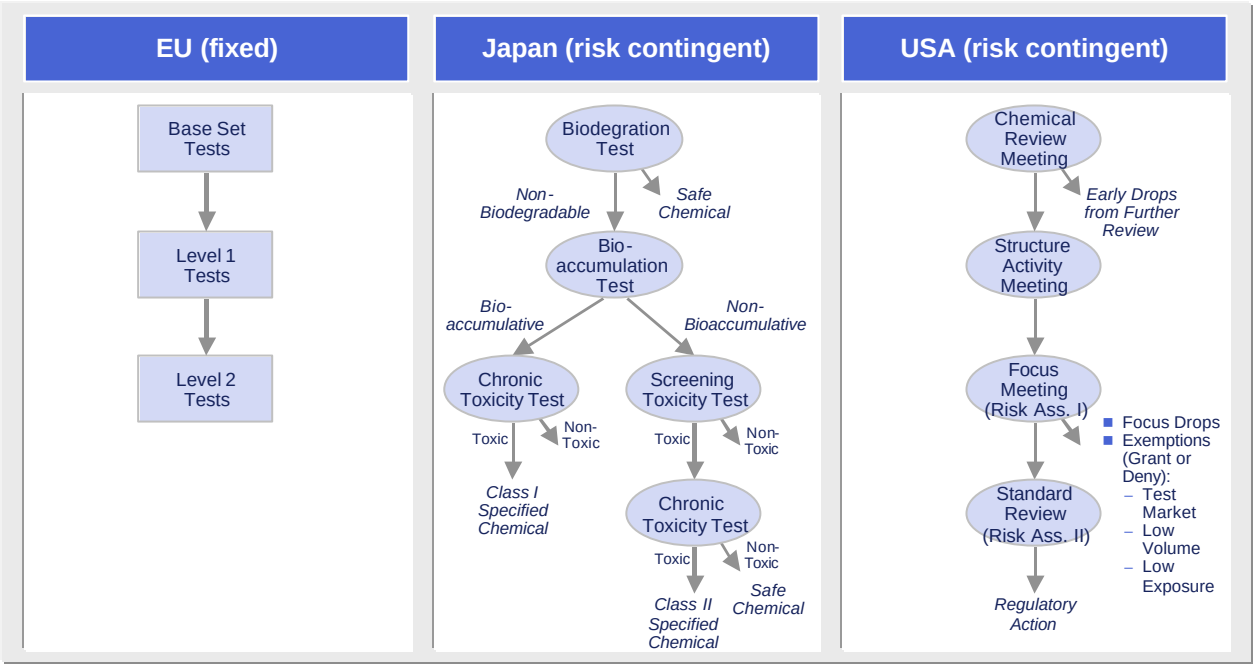


Figure 4: Schematic comparison of the today's legislation approaches for chemicals in Europe, Japan and US

- The EU regulation requires fulfilling a basic set of test and data requirements. The requirements are independent of risk. However, the firms do know the requirements and the time and cost effects in advance. All companies can use modest R&D and Low - Volume Exemptions (modest as compared with the Japanese and US regulations). The system foresees low sanctions for non-compliance, a high non-compliance rate was observed during several inspections among SMEs.

- The Japanese regime is two-tiered, based on the criterion of biodegradability. If a new chemical substance is biodegradable, then standard requirements need to be fulfilled, whereas in case of non-biodegradability the test are more complex, time consuming, and expensive. The system foresees low sanctions for non-compliance and is not relying on inspections. All companies are benefiting from extraordinary R&D and Low-Volume Exemptions.

- The US regulation is a two-tier system as well. The minimal information requirements for the pre-manufacturing notification are low. Depending on the estimated expected health and environmental risk of the new substance further tests are required or not. Thus, there is a significant amount of uncertainty of the outcome of the request. This uncertainty is expressed in the uncertainty of costs and time-delay. In particular, the US exemption of polymers is different from the EU regulations. Polymers with a high molecular weight are exempted. The system foresees high sanctions for non-compliance and relies on inspections.

	EU	Japan	USA
Name of Procedure Corresponding legislation and year of first publication	Notification (DSD, Dangerous Substances Directive) European Council Directive 67/548/EEC (1967) And 7th Amendment 92/32/EEC (1992)	Notification (CSCL) Chemical Substances Control Law No. 117 (1973) and amended in 1986	Premanufacture Notification (TSCA) Toxic Substances Control Act (TSCA) (1976)
Purpose of legislation	Protect man and environment	Protect man from contamination through the environment	Protect man and environment
Inventory (Type)	EINECS (static; old) ELINCS (static; new)	ENCS (dynamic)	TCSA Inventory (dynamic)
Polymers listed?	No	Yes	Yes
Approach for new substances	Premarket	Premanufacture	Premanufacture
GLP requirement	Yes	Yes	No
Classification of Substances	On the basis of intrinsic properties	! Designated ! Specified Class 1 ! Specified Class 2	None
Legal delay before manufacture	60 days (before marketing)	Japan: 90 days Import: 120 days	PMN: 90 days NCMI: 30 days
Responsible bodies	National competent authorities and European Commission DG XI	MITI MHW	US EPA

Table 2: Differences between the legislation in Europe, Japan and US

Due to the differences in legislation between Europe and the US resp. Japan the number of new notifications in Europe is among those in the other countries (EU: 143 notifications per year, Japan: 154, US 425). The main innovation in the European chemical industry takes place on basis of the chemicals being registered in the EINECS due to lower costs.

4. REACH Legislation

- **New principles** /6/

The key principle of the new European legislation is that existing and new substances should be governed by a single system in the future. The fixed testing requirements instead of risk contingent testing are kept. In direct contrast to the present situation, the proposed system has the following characteristics:

- Same registration and authorisation procedure for both existing and new substances
- Data and testing requirements dependent on production volume
- However, testing requirements also according to exposure
- Additional time demands and costs involved in using previous existing substances and substances not listed in EINECS (substances produced and used internally within companies; exported substances), because comprehensive data will also have to be collected for these. If substances have not been registered or have only been incompletely registered by a certain specified date, their production or importation is prohibited until the required data are provided.
- Cost reduction for new substances through lower requirements (exemption for quantities < 1 t per annum and lower requirements for substances produced in quantities of 1-10 t per annum)
- Cost increase for new substances due to registration requirement as of production, preparation of risk assessments and risk management proposals, and duty of registration for downstream uses
- The responsibility for substances and their safe use over the entire lifecycle is shifted to manufacturers, importers, further processors and downstream users. Manufacturers and importers are primarily required to provide data for the intended uses of substances. The function of the authorities is to check the submitted data and in certain individual cases to carry out their own risk assessment. In addition, certain substances have to be specially authorised by the authorities.
- Extended obligation of further processors and downstream users to provide data and exposures for unintended uses and their own risk assessments
- Downstream users can be obliged by the authorities to carry out additional tests if the intended use or exposure differs significantly from the patterns originally evaluated by the manufacturer or supplier. Therefore, in addition to manufacturers and importers of substances, downstream industrial users are also affected.
- Authorisation: for certain substances classified as particularly dangerous, use-specific permission will have to be given, if these substances are not prohibited completely.
- Extension of disclosure duties to ensure higher transparency for consumers and users and all other interested parties.

Some aspects of the legislation proposal are described in more detail below.

Production quantity (tonnes per annum)	Present requirement		Requirement according to the Legislation proposal
	Existing substances	New substances	
< 0.01	none	none	none
0.01-0.1	none	very limited "base set" testing[2)]	none
0.1-1	none	limited "base set" testing[3)]	none
1-10	none	"base set" testing	data on physico-chemical, toxicological and ecotoxicological properties
10-100	data on hazard classes and use to ECB [1), 4)]	"base set" testing	"base set" testing
100-1000	data on hazard classes and use to ECB [1), 4)]	"base set" testing + "level 1" tests	"base set" testing + "level 1" tests
> 1000	data on hazard classes, use, physico-chemical properties, toxicity, ecotoxicity to ECB [1), 4)]	"base set" testing + "level 1" tests + "level 2" tests	"base set" testing + "level 1" tests + "level 2" tests

1) ECB = European Chemicals Bureau
2) e.g. no data are required on irritant, corrosive or sensitising properties, sub-acute toxicity, biodegradability, toxicity to aquatic organisms, bacterial inhibition, adsorption and desorption
3) e.g. no data are required on sub-acute toxicity, bacterial inhibition, adsorption and desorption
4) "Base set" testing for priority substances and additional "level 1" and "level 2" risk-based tests

Table 3: General survey of testing requirements in the present system and under the Legislation proposal (normal case, somewhat simplified)

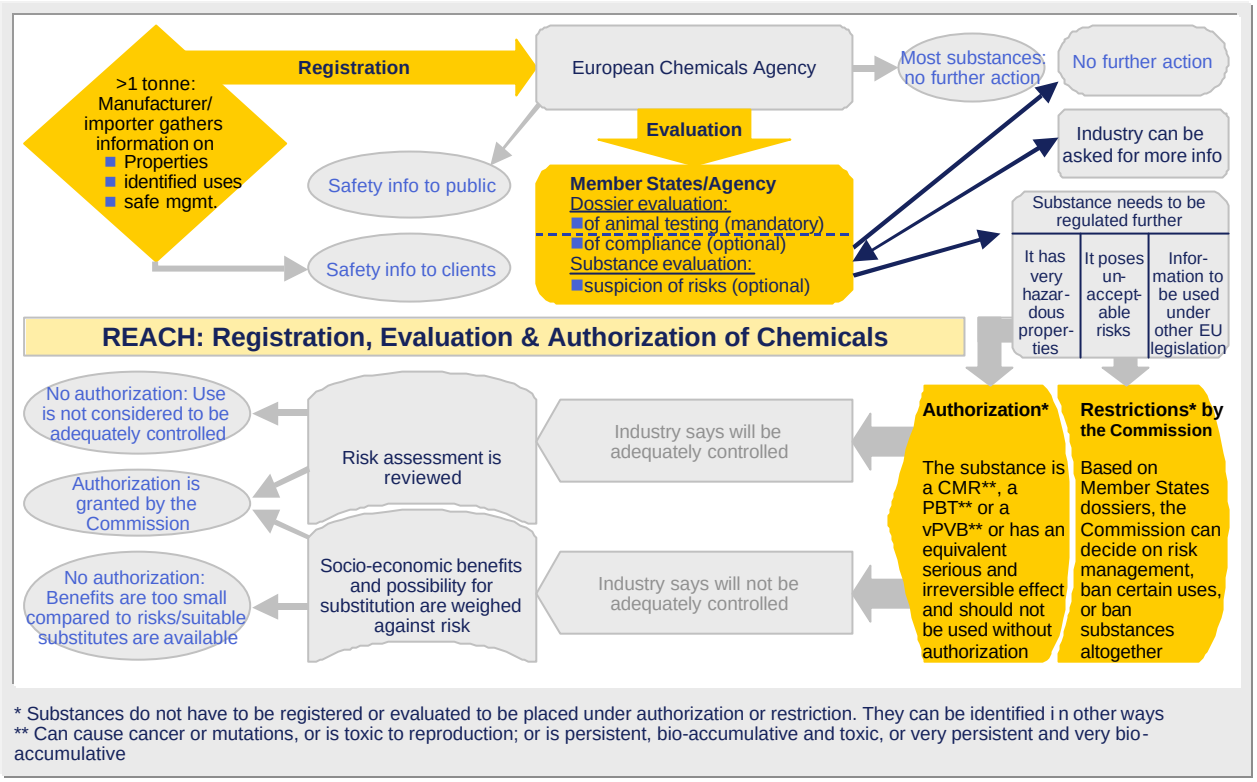
- **System and consequences**

The basic philosophy of the new legislation, which is to treat all substances (i.e. existing, new and those not listed in EINECS) in the same way, inevitably leads to the problem that a very large number of existing substances must be registered and evaluated in a relatively short time. The REACH system is designed to accomplish this by concentrating the resources of the authorities on substances produced in volumes >100 t per annum and on certain substances that give rise to particular concern.

The lowest level of the REACH system involves the **Registration** of some 30,000 substances that are produced in quantities exceeding 1 t per annum. For substances produced in quantities < 100 t per annum, spot-checks of registration details are generally made and are adequate. For the 5000 or so substances (15%) produced in quantities exceeding 100 t per annum and for substances produced in small quantities but which give

rise to particular concern, the authorities undertake an **Evaluation**, which focuses on long-term exposure among other things.

The highest level of the REACH system involves the **Authorisation** of substances with certain hazardous properties that give rise to very high concern. These are primarily CMR substances (carcinogenic, mutagenic and reprotoxic) and substances with POP characteristics (persistent organic pollutants). They require specific permission (authorisation) from the authorities before they can be used for a particular purpose. The European Commission estimates that there are some 1,400 (5%) of these substances.



* Substances do not have to be registered or evaluated to be placed under authorisation or restriction. They can be identified in other ways.

** Can cause cancer or mutations, or is toxic to reproduction; or is persistent, bio-accumulative and toxic, or very persistent and very bio-accumulative.

Figure 5: Overview of the intended REACH-process (source: DG Enterprise /7/)

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Under the present regulations, manufacturers and importers of substances are obliged to submit information. According to the recommendations of the new legislation proposal, downstream users, i.e. industrial users and processors, should also submit information, particularly about use and exposure of the substances. The basic principle is that downstream users are responsible for all safety aspects of their own products.

In practice, this means that manufacturers of preparations and other downstream users can be required by the authorities to carry out additional testing where their uses differ from those originally envisaged by the supplying manufacturer or importer. Additional testing

programmes should be developed to cover risks arising from the new exposure patterns in the uses not previously envisaged.

The Commission proposes that to enable the authorities to find out about new uses, downstream users will in future be obliged to inform the authorities of any downstream uses not envisaged by the supplying manufacture or importer.

Substances which give high cause for concern because of certain properties such as carcinogenicity, mutagenicity and toxicity to reproduction will in future require use-specific authorisation. Only when such authorisation has been obtained can the substance be employed for the particular use. Before permission is granted, the substance will be tested to ascertain whether the use is justifiable, because the risks are negligible or acceptable and the benefits derived from use of the substance are significant.

- **Existing studies on new legislation**

Many comments, case studies and scientific studies have tried to analyse and evaluate the consequences of the introduction of the REACH concept on the industry. For the purpose of this study, only the most relevant studies are quoted here and the main issues are elucidated.

Diverse Studies on Costs
/8/
Conductor: Risk Policy Analysts
Sponsor: DG Enterprise

The basic work of analysis and investigation on the consequences of the new legislation has been done by RPA (Risk Policy Analysts) mainly on behalf of the DG Environment and Enterprise. The studies concern mainly the costs directly generated by the new legislation. They concentrated to estimate the number of chemicals to be registered, evaluated and authorized and to calculate the specific costs for the registration, evaluation and authorization processes.

On behalf of DG Enterprise, RPA also conducted specific studies on questions which became evident during the whole discussion process:

– Chance and necessity to register substances in products

– Potential degree of product rationalisation in the small volume chemicals

– Inclusion of administration costs of a new European central entity being responsible for REACH on basis of /16/

As developed above there is a very strong connection between the chemicals industry and the whole area of the manufacturing industry. Every severe change in the area of chemicals legislation might therefore have also significant effects on the industry sector following in the different value chains. Four main studies have evaluated the overall consequences of the effects on the whole economic systems. Due to the different sponsors for the studies the studies concentrated on different regions within the EU.

"The impact of REACH on innovation in the chemical industry"
2003 /17/
Conductor and Sponsor: Joint Research Centre (DG JRC), Institute for Prospective Technological Studies

One of the main drivers for competitiveness is the innovation power of the chemical industry in Europe. Therefore, the study of the DG Joint Research Centre concentrated on the potential effects of the new legislation on this part of competitiveness.

The review of different studies undertaken in this paper reveals a divided picture of the impact of REACH on innovation in the European chemicals sector. It is surprising that the results of the various studies differ to a large extent between a predicted positive or negative impact of the new regulation.

A lot of these differences stem from different interpretations of the same facts and arguments. However, the review shows that the discussion can be focused on a few arguments, which basically are grouped around two poles.

The first group of arguments can be summarized under the headline "The new regulation induces higher costs for industry, which in turn might lower innovation activities". In detail this means that testing and registration costs will shift resources away from R&D, that some substances will be removed completely from the market and therefore are no longer available for the formulation of new products, and that a lot of SMEs, which are the driver of innovation in fine chemicals and specialties, will be pushed out of the market as a consequence of the increased costs.

The second group of arguments, forming the opposite pole, can be described with the statement "REACH takes into account the debate on innovation in the chemicals industry and addresses past bottlenecks for innovation through a series of appropriate provisions". The main arguments here are that the exemptions for R&D, for isolated intermediates and (probably) for polymers respond to the needs which have been articulated by the industry, and that additional reform such as the 100 times higher tonnage criterion and the long phase-in period smooth the cost impact of REACH.

The study recommends an analysis taking all costs and benefits into account, and making explicit the uncertainties of a cost-benefit-analysis at this point in time. Only such an analysis would help to avoid distortions which tend to dominate the debate about potential effects. The authors did not show or indicate in which way he believes to realize such an analysis.

"Future European Chemicals Policy Impact Study"
April 2004 /9/
Conductor: Mercer Management Consultants
Sponsor: Union Industry Chemique (UIC)

The study targets to evaluate the macroeconomic effects in France, which might be provoked by the new legislation.

This study has analysed the influences for different industry segments in the manufacturing industry. The basis of analysis has been interviews and workshops with relevant companies being active within the chosen segments. In total 14 pilot segments and relevant companies have been chosen out off the chemical areas base chemicals, intermediates, specialties and formulation as well as out off the downstream user area.

On basis of the results generated for the 14 pilot segments, Mercer defined the input into a macroeconomic model for France. The applied model REMI has been developed by the National Economic Research Associates.

According to this study the industry in France will potentially experience a decrease of 1.6% in Gross Domestic Product in comparison to the reference scenario without the new chemicals legislation after a time period of 10 years. This decrease correlates with the loss of 360,000 working places (1.5%) in France over the same time period.

The chosen bottom-up approach on basis of the 14 pilots allows estimating the effects of REACH on the different industry sectors and sub-segments of the chemical industry.

The study forecasts a decrease of value added over the next ten years by 6.8% for the chemical industry and 8.3% for plastics and rubber industry – both values refer to France.

The split of the chemistry industry into sub-segments indicates that those segments serving the end consumer (formulators as well as producers of cosmetics, soaps and detergents) will suffer most. As an indication for the potential burden, the study gives estimates for cost increases and for potential drops in production.

Sector of Chemical industry	Increase in costs (%)	Risk of drop in production (%)
Inorganic Chemistry	0,9	4,1
Organic Chemistry	1,5	1,1
Parachemistry (Formulators)	1,3	8,2
Pharmaceuticals	0,0	0,0
Cosmetics, soaps and detergents	3,0	11,2

Table 4: Results of UIC/Mercer-study for effects of the new chemical legislation to the sub-segments of the Chemical Industry

The high risks for production losses are based in significant losses in competitiveness mainly driven by loss in innovative power. Both sub-segments of formulators and producers of cosmetics, soaps and detergents are significantly dominated by SMEs.

"A Microeconomic Model to Assess the Economic Impacts of the EU's New Chemicals Policy"
November 2003 /10/
Conductor and Sponsor: DG Enterprise

DG Enterprise has developed a calibrated microeconomic model for the European economic area to assess the economic impact of the new chemicals policy. The chemicals industry is disaggregated into five sectors: basic chemicals; pesticides and other agrochemicals products; paints, varnishes, and similar coatings; soap and detergents; and other chemicals. The model is calibrated on 1998 data for the chemicals industry from the Eurostat Structural Business Statistics database. The analysis aims at assessing the economic costs of the new chemicals policy and not its benefits notably for human health and the environment.

The exact size of the additional costs to downstream industries depends crucially on two factors. First, the extent to which the withdrawal of chemical substances has an effect on

the chemicals supply-chain, resulting in an increase in substitution costs and a reduction in the efficiency of chemical products. Secondly, it depends on the time frame of any such disruption or temporary increase in market power.

Two scenarios for the costs of REACH to downstream users have been investigated: a "normal expectations" scenario and a "higher substitution costs" scenario. Both scenarios are based upon estimated testing and registration costs of € 2.3 billion. In each case a lower and upper estimate of the costs are derived for two time periods: 11 years (the time to register all substances currently on the EU market) and 15 years (to allow for a longer adjustment period).

The "normal expectation" case examines the impact of the introduction of REACH, where the implications for downstream users come solely from the pass-through of testing and registration costs and the effects of the withdrawal of chemical substances on individual downstream users.

A "higher substitution costs" scenario illustrates the effects where the withdrawal of substances further increases the costs of substitution, through the cumulative effects of the withdrawal of substances in terms of adaptation to the whole of the chemicals supply chain. In this case, it has been assumed that the efficiency of the chemicals industry is reduced marginally in proportion with the withdrawal of chemical substances. It also results in some increase in the market power of the suppliers of substitution substances. In this case, higher downstream user costs would be expected.

	Alternative present value estimates of costs to downstream users	
	Lower estimate (11 years)	**Upper estimate (15 years)**
Normal expectation	€ 2.8 billion	€ 3.6 billion
Higher substitution cost	€ 4.0 billion	€ 5.2 billion

Table 5: Results of microeconomic modelling the new legislation on chemicals by DG Enterprise Alternative present value estimates of costs to downstream users

Depending on the scenario the costs for the downstream users of chemicals will be between €2.8 billion and €5.2 billion.

In consequence, the whole costs for the industry of introducing REACH will amount to €5.1 billion to €7.5 billion.

In either case, the use of the microeconomic model suggests that only some 0.5% of the overall value of chemical substances, approximately 1-2% of all substances, will be withdrawn from the market as a result of REACH.

No specific analysis has been done for the Chemical Industry itself.

A major weakness of this model is the view of Europe being a micro-economy, i.e. having no exchange with the global economy.

"New Chemicals Policy (R.E.A.CH) – Evaluation of the Business Impact on the Chemical Industry and on Textile Sector on Italy"
February 2004 /11/
Conductor: Centro per l'innovazione e la Ricera Chimica (CIRC)

The Italian study estimates the influence of the new legislation on the different Italian industry sectors by defining the vulnerability index. This index is developed on basis on of three issues: pressure on EBITDA, competitiveness vs. extra EU15 countries and the elasticity factor cost/price. As higher the index as more the industry sector considered will suffer.

Industrial Sectors	Pressure on EBITDA	Competitiveness vs. extra EU15 countries	Elasticity factor "cost/price"	Vulnerability Index
Leather and leather products	76.4	100.0	99.5	100.0
Rubber and plastic products (processing)	100.0	38.4	96.9	78.8
Textile and textile products	35.8	72.1	100.0	69.8
Paper, publishing and printing	77.2	22.9	96.8	60.9
Transport equipment	13.4	64.1	97.4	47.9
Wood and furnishing	14.7	48.3	97.9	45.1
Basic metals and fabricated metal products	7.8	46.9	98.8	36.3
Electrical and optical equipment	4.7	71.2	95.9	34.8
Coke, refined petroleum products and nuclear fuel	9.6	29.7	92.8	32.6
Other non-metallic mineral products	10.7	21.3	93.2	30.4
Machinery and equipment	3.4	53.3	99.1	28.8
Food products, beverages and tobacco	5.3	21.9	95.3	24.4

Table 6: Vulnerability of different industry sectors in Italy against the new legislation for Chemicals

The study concludes four sectors being very vulnerable: leather and leather products, rubber and plastic products, textile and textile products and paper, publishing & printing.

The Chemical Industry itself has been analysed according to the different segments similar to those as described above. The estimates for the potential risk of loosing competitiveness have been developed on basis of the ratios between the additional costs stimulated by introduction of REACH and the EBITDA of the segment. As higher the ratio as higher is the risk to loose competitiveness.

PRODUCTS	EBITDA (million euros)	REACH costs (million euros)	% on EBITDA
Manufacture of basic chemicals	1569,1	51,4	3,27
Manufacture of industrial gases	*323,7*	*0,00*	*0,00*
Manufacture of inorganic basic chemicals	*338,9*	*1,20*	*0,36*
Manufacture of organic basic intermediates	*287,6*	*45,88*	*15,95*
Manufacture of fertilizers and nitrogen compounds	*81,5*	*0,51*	*0,63*
Manufacture plastics in primary forms	*579,6*	*3,76*	*0,65*
Manufacture of synthetic rubber in primary forms	*-42,2*	*0,00*	*0,00*
Manufacture of man-made fibre	194,3	0,00	0,00
Manufacture of dyes and pigments	107,2	36,66	34,20
Manufacture of pesticides and other agro-chemical products	114,6	23,59	20,59
Manufacture of paints, varnishes and similar coating, printing ink and mastics	481,9	112,93	23,44
Manufacture of soap, detergents, cleaning and polishing preparations, perfumes and toilet	1093,7	47,6	4,35
Manufacture of other fine chemicals Manufacture of fine organic intermediates	849,7 287,6	226,1 107,06	26,61 37,23

Table 7: Ratio REACH costs to EBITDA for different Chemical Industry sectors according to the CIRC study

The analysis indicates as high risk segments those areas being in the fine & specialty segment or nearby the end consumer:

– Organic fine chemicals
– Dyes and pigments
– Other fine chemicals
– Paints and varnishes

Sectors of minor risks according to this study are the segments belonging to the base chemicals area:

– Fertilizers and nitrogen compounds
– Rubber in primary form (without additives)
– Industrial gases

Direct losses in gross value added or potential drops in production are not developed within this study.

The approach for this study is described in more detail. The approach for quantitative evaluation of the influence of the new legislation will be applied later-on in this study to get quantitative estimates of effects on the Chemical Industry in Europe.

The Confederation of German Industry (Bundesverband der Deutschen Industrie or BDI) commissioned the business consultants Arthur D. Little GmbH to study the economic effects of the EU substances policy on German industry. Balancing the economic effects against effects that the substances policy could have on humans and the environment was explicitly not part of the brief. Similarly, the socio-economic effects due to possible loss of efficient products, e.g. for corrosion protection, were not studied.

In addition to analysing the purely economic effects, it was also intended that the study should highlight recommendations for action on specific industry-compatible reforms without losing sight of the ideas in the White Paper.

To assess the economic effects on German industry, a calculation model has been developed. A bottom-up approach has been selected for this. The study comprised three stages:

Stage 1: Determination of the effects on the value chains and industries studied

Stage 2: Extrapolation of the results to manufacturing industry

Stage 3: Extrapolation of the results to all economic sectors

Bottom-up therefore means that the effects are first assessed in relation to specific value chains and industries and then, on the basis of these analyses, are extrapolated to determine the overall effect on industry as a whole. The parameters to be discussed are changes in production volume at the industry level and change in value added at the economy view. Changes in number of working places directly correlate with the changes in production volume and therefore can be evaluated for each industry level

The starting point for collecting the necessary industry data was to determine the key success factors for the individual industries. Following on from this, possible economic effects of the EU substances policy on these key success factors were studied to identify the effects that were important to the success of an industry. To ensure a more in-depth analysis at industry level, three industries were selected for detailed analysis, i.e. the automotive industry, textile industry and electrical/electronics industry.

The BDI study states elaborated that the potential effects of the EU substances policy can be described by four parameters:

- the ***cost parameter*** takes into account all the additional costs or cost savings (e.g. costs of substance registration) resulting from the EU substances policy

- the ***time parameter*** takes into account the time implications of the policy for users of substances and preparations (e.g. time taken up by the registration procedure)

- the ***duty of authorisation*** parameter takes into account restrictions in the use of certain very dangerous substances

- the ***degree of disclosure*** takes into account effects arising from the requirement of the EU substances policy to disclose data on substances and their uses, i.e. potential know how losses of the industry due to the publication of data and application as potentially demanded by REACH

Each of these parameters can in principle have both a positive and a negative effect on industry.

The model forecasts an economic effect for Germany between 2.7% and 3.3% loss in Goss Value Added. The range is determined by the scenario assumed with respect to degree of disclosure. The interpretation of the actual legislative proposal concerning this parameter is not clear.

	Gross added value loss in all industry sectors	**Job losses in all industry sectors**
Legislation Draft 10/2003 – potential know how loss	3.3%	1,230,000
Legislation Draft 10/2003 – clear protection of know how	2.7%	1,000,000

Table 8: Effects of REACH on the German economy

The loss is mainly driven by losses in the industry sectors “paper, publishing and printing industry” (1.6%), “chemical industry” (2.4%) and “production of rubber and plastic goods” (2.1%).

But these sectors are not the only ones of potential high burden by the new legislation. Other sectors have a minor contribution to the overall gross value added, and therefore any change in these sectors appears to be minor. More sensitive is the view on the production losses as derived by the calculation model. In addition to the three sectors mentioned above, the sectors of textile and leather industry as well as coking and oil refining will suffer significantly as indicated by production losses of over 30% up to 50%.

	Change in Gross value added (%)	Produc-tion loss (%)
Manufacturing industry in Germany	10.6	
Food and tobacco industries	0,3	3.6
Textile and apparel industry	0,8	38.8
Leather industry	0.1	57.2
Wood industry (excluding furniture manufacture)	0.1	5.9
Paper, publishing and printing industry	1.6	19.6
Coking, oil refining, production of fertile materials	0.4	33.1
Chemical industry incl. Pharmaceuticals	2.4	24.7
Production of rubber and plastic goods	2.1	44.6
Glass industry, ceramics, processing of rock, stone and mineral products	0.1	1.5
Metal production and processing, manufacture of metal products	0.6	4.6
Mechanical engineering	0,3	2.2
Production of office equipment, data processing equipment; electrical engineering	0.8	5.1
Vehicle construction	0.4	2.9
Production of furniture, jewellery, musical instruments, recycling	0.2	5.9

Table 9: Effects of REACH on the industry sectors within the German manufacturing industry

The Arthur D. Little model regards the Chemical Industry as two separate segments: one is producing consumer products (perfumes, soaps etc.), the second is producing the intermediates within the value chains of other areas from the manufacturing industry. This differentiation has been necessary to take the specific role of the chemical industry within the overall industry and its value chains into account.

– The first segment has to follow the drivers for competitiveness. If the new legislation hinders this segment to fulfil the drivers it will directly influence the performance of the chemical industry segment.

– The second segment depends on the production volumes of the following industries. The model does not assume a restriction of chemicals by the chemical industry itself; but it states that the chemical industry will deliver the chemicals under the new legislation and the potentially changed conditions (see below the chapter “relevant parameters”). If chemicals might become too expensive for the following industry or time-to-market will become too long, the downstream user industry will react and perhaps reduce its production volume. This reduction will then influence the chemistry industry and its production volume.

Looking at the two segment of German chemical industry of the Arthur D. Little calculation model, following potential production losses are foreseen:

Base and fine & specialty chemicals industry: 25.0%
End consumer chemicals industry excl. pharmaceuticals: 50.7%
Rubber industry: 44.6%

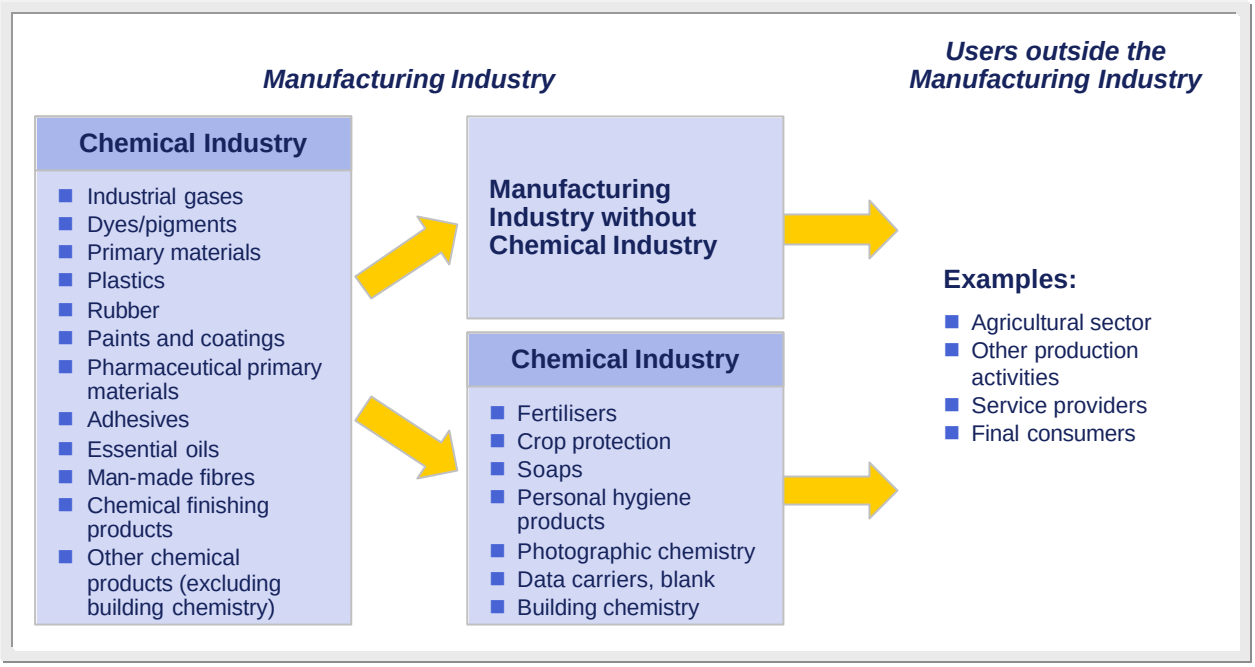

Figure 6: Sectors of Chemical Industry according to the Arthur D. Little calculation model

"Test Run in North Rhine Westphalia"
December 2003 /12/
Conductor: Companies and authorities with professional moderation
Sponsor: Government of North Rhine Westphalia

An intensive test run has been done for practicability of the new REACH system on basis of the Interservice paper 9/2003: 24 companies (big ones as well as SMEs) out off the area galvanic, paintings, textiles and plastics and authorities as well as NGOs (environmental and consumer associations) took part in the test run.

The study concentrated on the analysis of practicability of REACH within the four selected value chains. No specific effort has been done to specify the impact on the chemical industry.

In the area of small volume substances it has been admitted that the registration of new substances will be made easier by the new REACH system – this concerns both the R&D activities as well as the test requirements for substances between 1 to 10 t p.a. Effects on innovation might be possible. On the other hand, the existing main source for innovation (the pool of EINECS) will be dissolved and every chemical being not registered according to REACH has to be treated as a new chemical and has to be registered. In consequence, the innovation will become more expensive. The question concerning the strength of these two effects has been left open.

"The Social Costs of Chemicals – The costs and benefits of future chemicals policy in the European union"
/13/
Conductor: University College London
Sponsor: WWF

The study targets to assess only the health benefits since the environmental effects cannot be estimated without a detailed stated preference approach to valuing such effects, and without far better information about exposure response functions.

The study developed three models, two of them are based on the notion of a Disability Adjusted Life Year (DALY), a procedure for estimating the burden of disease and premature mortality in a single unit.

The authors of the study propose to take the view that neither employment effects nor competitiveness are likely to be serious issues in the context of REACH. There are several reasons quoted for this.

– There is little evidence that environmental regulations have significant effects on employment.
– It is unclear what competitiveness means in a European context in which the € (and non-€ currencies) float against competing countries.
– No evidence to suggest that firms relocate in response to environmental regulation is known by the author. Other costs are far more important to location decisions than regulatory compliance costs.
– In so far as regulation can be employment-enhancing this tends to be confined to those regulations that require significant labour or abatement equipment inputs and that appears not to be relevant to REACH.

The authors of the study tried on basis of three models a quantitative benefit cost calculation. Depending on the model the legislation will result in a negative of positive benefit/cost result.

None of the quoted studies specifically deals with the effects on competitiveness on chemical industry in Europe. In addition to these studies, many potential effects of the new legislation on the Chemicals Industry are discussed and evaluated by elaborating concrete examples and deriving the relevant conclusions: the potential effects based on such discussions are nearby all summarized in the **CEFIC Study "Barometer 2002":**

- Costs will predominantly fall on the fine and specialty chemicals sector which is made up of several thousands of small and medium-sized companies as well as a number of larger players.
- Increased costs mean elimination of substances and relocation of production outside the EU
- Investment in the EU will be at stake
- Innovation will be hampered
- Significant effects on trade are likely to occur

REACH on chemicals is a matter of competitiveness of European industry rather than the chemicals industry.

5. Effects on competitiveness of the European Chemical Industry

The model of Arthur D. Little allows to make specific analysis of quantitative effects of the new legislation on the industry sectors – also specifically for Chemical industry.

The model has been developed on basis of the industry structure of Germany. Knowing and accepting several framework conditions, the model can be applied to give a coarse estimate of the effects of the new legislation on the European industry. Basic assumptions have to be set in order to apply the Arthur D. Little model calculation:

- Same/similar industry structure within the different industry sectors in EU as considered for Germany
- Same/similar ratio between end user chemicals and intermediates in EU as in Germany
- Same/similar reaction of industry towards the new legislation in EU as experienced in Germany during the study by the interviews – as a consequence, the same production losses for each industry sector as derived for the German manufacturing industry are assumed for the sectors on the European base

- **EU15 – manufacturing industry**

Applying the Arthur D. Little calculation model under the given assumptions, the potential decrease of gross value added of the manufacturing industry is 12.6%.

This decrease is higher than that estimated for Germany with 10.6%. The difference bases of the different weights of the industry sectors to the overall gross value added of the manufacturing industry. This distribution of contribution in Europe differs significantly from that in Germany. In comparison to Germany, the industry sectors of chemical industry, paper, publishing and printing as well as the textiles and leather sector have a significantly higher contribution to the overall gross value added. Exactly these sectors are more sensitive against the new legislation as it has been shown in the quoted studies above.

	Change in gross value added (%)	Production loss (%)
Manufacturing industry within the EU 15	12.6	10.6
Food and tobacco industries	0.4	3.6
Textile and apparel industry	1.4	38.8
Leather industry	0.5	57.2
Wood industry (excluding furniture manufacture)	0.1	5.9
Paper, publishing and printing industry	1.7	19.6
Coking, oil refining, production of fertile materials	0.7	33.1
Chemical industry incl. Pharmaceuticals	2.9	24.7
Production of rubber and plastic goods	2.1	44.6
Glass industry, ceramics, processing of rock, stone and mineral products	0.1	1.5
Metal production and processing, manufacture of metal products	0.6	4.6
Mechanical engineering	0,3	2.2
Production of office equipment, data processing equipment; electrical engineering	0.8	5.1
Vehicle construction	0.4	2.9
Production of furniture, jewellery, musical instruments, recycling	0.2	5.9

Table 9: Estimated effects of REACH on the industry sectors within the EU15 manufacturing industry on basis of German industry structure

The specific burden of these sectors becomes evident by analysing the gross value added losses as well as the production losses per industry sector. Because of the set assumptions, the production losses per sector are assumed to be the same as for Germany. Due to the different weights of sectors with respect to the generated gross value added in Europe the GVA losses derived for Europe are different from those derived for Germany.

- **EU15 - Chemical industry**

The Arthur D. Little calculation model regards the Chemistry Industry as the combination of two different segments: the base and fine & specialty chemicals industry is directly dependent on the success of the following industry whilst the industry producing products for the end consumer has to follow the drivers of success and competitiveness.

The Arthur D. Little calculation model allows calculating the potential production losses for these segments as well as for the rubber industry as an industry similar to /nearby to the chemical industry (same as for Germany):

Base and fine & specialty chemicals industry:	25.0%
End consumer chemicals industry excl. pharmaceuticals:	50.7%
Rubber industry:	44.6%

All three sectors are heavily burdened by the new legislation indicated by high production volume in Europe being at risk.

The obvious correlation between the business relevant drivers of competitiveness in the chemical industry with the four parameters of the new legislation as developed in the Arthur D. Little calculation model allows the discussion in more detail.

Business relevant drivers of competitiveness	REACH Parameters
Price	Costs
Differentiation Value Added Performance	Time to market Duty of authorization Degree of disclosure

Table 10: Correlation between the business relevant drivers of competitiveness and the parameters by which the new legislation will influence the industry

The direct correlation exists between the competitive driver price and the parameter cost. A price sensitive area is a strongly burden with any kind of cost increase. Therefore, the industry segment of **base chemicals** is mainly burdened by the parameter cost, if considering the influence of the new legislation. Most of the base chemicals are produced in high volumes. Therefore the forecasted cost burden by REACH will be diluted significantly so that finally the specific burden in € per kg product is rather low.

The second correlation exists between the business relevant drivers of competitiveness "product differentiation"/"value added performance" and the three parameters "time to market"/"duty of authorization"/"degree of disclosure". This correlation has to be analysed discussing the competitiveness of the **chemical industry delivering directly to the end consumer**. The product properties have to be adapted and modified according to the demands of the market and the end consumer. Therefore the industry has to be innovative and flexible. Any change of these three parameters by the new legislation will influence directly the competitiveness of these chemical segments – positively or negatively.

The industry in the sector "**fine & specialty business**" often has to fulfil all business relevant drivers. Therefore, this industry is burdened in the most significant way by the new legislation. All four parameters of influence by the new legislation become relevant for this industry sector.

The Arthur D. Little calculation model allows testing the influence of the new legislation according to the four parameters. In the case of the chemical industry, this analysis can be only done for the chemical industry supplying the end consumer area. As explained above, the model calculates the effects of the new legislation on the base chemicals and the fine & specialty chemicals sectors in direct correlation and dependency to the effects on the downstream users.

For this analysis the data for the rubber, the textile and the semiconductor industry are added to allow a better explanation and demonstrate the sensitivity of the analysis.

	Production loss due to the parameter				
	Costs	**Time**	**Duty of Authori-zation**	**Degree of Disclo-sure**	**Total**
Chemical (sales outside manufacturing industry without pharmaceuticals)	22.5%	29.2%	n.a.	10.0%	50.7%
Rubber	3.6%	36.2%	n.a.	10.0%	44.6%
Textile	*16.8%*	*25.7%*	*n.a.*	*31.3%*	*57.2%*
Semi-conductors	*4.6%*	*16.0%*	*n.a.*	*22.5%*	*37.9%*

Table 11: Production losses in different industry segments according to the parameters of Arthur D. Little's calculation model (The influence of the parameter Duty of Authorization has not been analysed)

The chemicals producers in the end consumer area are hit manifold. Of course, disadvantages experienced by this industry sector have to be judged in front of the ex EU competitors

- The burden by cost increase is significant because these producers often use fine and specialty chemicals (small volume chemicals) to create the demanded properties of their products.
- The direct contact to the end consumer demands quick reactions to market changes and therefore high flexibility and short time to market ranges. This success factor is not only relevant for European producers, because also importers into the European market have also to obey the new legislation. Therefore, the new legislation will potentially burden export oriented formulators, who will have significant problems if they have deficits in time-to-market in comparison to competitors outside the area of the new legislation.
- The degree of disclosure and the chance for competitors to learn the know how by simple internet research and combination of information specifically gives disadvantages to know how and innovation producers.

The rubber producers mainly produce tires for the vehicles.

- The cost parameter is not severe because specialties are only used at less than 5%, the main chemical itself is the primary, unmodified rubber.
- The main differentiation factor to keep this industry in Europe is certainly the know how for innovative tire properties. This success factor demands short time to market phases and strict protection of know-how. Therefore, any disadvantage generated by the new legislation concerning the two parameters immediately will lead to a potential drop in production.

To get a better understanding for these two cases, the equivalent evaluation has been given for two industry sectors outside the chemical industry.

The textile industry in Europe actually suffers economically because of strong import pressure. The only differentiation factor being necessary to survive in Europe is to produce high innovative textiles at attractive prices. Therefore this industry will be burden by changes in all three parameters, costs, time-to-market and duty to disclosure. In comparison to the chemical industry, the textile industry is a much worse situation, because it has to fight against import of products which are not the subject of the new legislation. Substances in products and the problem of controlling these has been the subject of many discussions. No clear solutions has been found so far.

The semiconductor industry is an international and global acting industry. The costs for chemicals to produce semiconductors are lower than 3% of the total material costs. Therefore a potential cost increase does not touch this industry. But this industry is very much dependent on innovation – the innovation cycle is about 24 months. The global industry character demands to use the same chemicals immediately after development and testing in each production unit of the world without delay in order to use the innovation cycle in an efficient way. A delay because of registration need in Europe will stimulate the global semiconductor industry in the medium to long term to change to production places outside Europe.

- **Accession countries – Chemical Industry**

In May 2004, 10 new member countries will join the EU community:

Cyprus,
Czech Republic,
Estonia, Hungary,
Latvia,
Lithuania,
Malta,
Poland,
Slovakia and
Slovenia.

The accession of Bulgaria and Romania is intended for 2007.

The chemical and rubber/plastics industry in the accession countries in total is significantly smaller than that in the EU15 countries. The gross value added achieved in these countries is at €8.696 mill. This value is about 4% of the gross value added (€210.759 mill) for the relevant industry sectors in the EU15.

The total number of employees is at about 628.000. This number is about 21% of the total number being employed in the EU15 countries in the chemicals and rubber/plastics industry.

	Chemical Industry and Rubber/Plastics Industry - Economic Data 2000 -		
Country	**Gross Value Added (mill €)**	**Employment (1000)**	**Production (mill €)**
EU15	**210,759**	**2,896**	**629,989**
Accession 1. May 2004:			
Cyprus	75	3	203
Czech Republic	1,544	101	5,806
Estonia	60	6	255
Hungary	1,315	67	4,339
Latvia	54	6	182
Lithuania	68	12	487
Malta	No data	No data	No data
Poland	3,887	233	12,276
Slovakia	329	34	1,612
Slovenia	549	No data	1,946
Accession intended 2007			
Bulgaria	250	50	973
Romania	565	116	2,159
All Accession Countries	**8,696**	**628**	**30,238**

Table 12: Economic data comparison EU15 and accession countries for the industry sectors of chemicals and rubber/plastics /3/

The whole output of the chemical and rubber/plastics industry is at € 30.238million. The benchmark output per employee gives an indication of the economic power. The comparison of this indicator shows that the economic power of the chemical industry in the accession countries (€ 48,000 output per employee) is much weaker than that in the EU15 countries (€ 220,000 output per employee).

In October 2000, ChemSystems published its study "Competitiveness of the Chemical Industry Sector in the CEE Candidates" on behalf of DG Enterprise in which most of the economic data and a judgement on the readiness of the chemical to enter the European competition has been done /15/.

As common issues for all accession countries following factors have been identified and ranked according to the criteria **S**trength, **W**eakness, **O**pportunity and **T**hreat

- Very low wages compared to EU industry (**S**)
- Intention of all countries to remove import tariffs or quotas as required by the EU; most are already exposed to competition from EU producers (**S**)
- Rising wage levels in most countries (**T**)
- Bureaucratic implementation competitiveness of EU law could hinder (**T**)
- Significant numbers of SMEs, particularly in the consumer goods sub-sectors, probably

requiring support in moving (**T**)

- Over-manning compared to EU industry; not usually a fixed cost disadvantage because of low wages, but an opportunity for rationalization (**O**)
- Foreign (EU) investors bring capital, skills, and can assist in progress to EU compliance (**O**)

Especially the identified threats might be strengthened by the new legislation on chemicals and therefore turn into additional weaknesses of competitiveness for the accession countries.

Bureaucracy: The industry in the accession countries will be certainly confronted with new and unknown bureaucratic issues, because of EU law. The new legislation will bring additional huge bureaucratic burdens especially during the implementation phase, which then will have to be smoothened or eliminated. Whilst the industry in the EU15 countries have been involved in the whole development of the EU chemicals legislation, the chemical industry in the accession countries will have to overcome not only the existing bureaucratic barriers, but also the new legislation – the size of this barrier is so far unpredictable, but appears to become high. In consequence, the disadvantage in competitiveness will increase.

Significant number of SMEs in the consumer goods sub-sectors: As learned above, especially the sectors producing for the end consumer will have potential significant burdens by the new legislation. In combination with the weaker power of SMEs with respect to handling the new legislation the threat might become a major disadvantage in competitiveness.

In order to analyse potential impacts of the new legislation on the chemical industry of accession countries in more detail, the application of the Arthur D. Little calculation model appears to be not suitable. The basic assumptions as set for the application (see above) are certainly not fulfilled.

In order to correlate the experience made from the previous studies on the new legislation, the sub-segments of the chemicals industry and their weight distribution in these countries have to be evaluated. This exercise has been done for those accession economies having a gross value added by the chemical and rubber/plastics industry higher than €1.000 mill: Poland (€ 3.887 mill), Czech Republic (€ 1.544 mill) and Hungary (€ 1.315 mill).

Poland /15/

The Polish chemical industry is the largest in Central Europe by a considerable margin. The industry was well established in the days of the Comecon bloc, built on indigenous feedstocks such as sulphur, salt, coal and limestone plus imports of hydrocarbon feedstocks from the Soviet Union. The industry declined in terms of output immediately after the political changes at the start of the 1990s, but then grew rapidly between 1993 and 1997. However, in spite of its substantial chemical industry, Poland has a considerable net import requirement of chemicals (by value).

By the end of 1998, the chemical industry consisted of around 16,000 enterprises employing over 130,000 people. Privatisation has been extensive in the industry, with a voucher scheme and national investment funds providing the mechanism in many cases. However, the state still has control or holdings in some of the biggest companies.

Component	Description	Sub-sector	Share (1)
Fertilizers	Nitrogenous and phosphatic fertilizers	Base Chemicals	14
Organic Chemicals	Includes basic chemicals: olefins, aromatics	Base Chemicals	11
Plastics	Plastics including PVC	Polymers	8
Plastic goods	Processed plastic semi-finished and finished products	Processed rubber and plastic products	11
Rubber	Synthetic rubber including SBR	Rubber	9
Household chemicals	Soaps, detergents cleaners, cosmetics household	End consumer	10
Paints and varnishes	Emulsions, solvent-borne paints, pigments and dry coatings	End consumer	7
Agrochemicals	Pesticides	Fine chemicals	3
Pharmaceuticals	Pharmaceutical chemicals	Fine chemicals	10
Other	Various	Fine chemicals	17

(1) Share of output in 1998 (source: The Polish Chemical Industry - Polish Agency for Foreign Investment; Government Statistics)

Table 13: Sub-Sectors of the Chemical industry in Poland

The sub-sectors include all types of chemical industry. A huge weight of the activities exists in fine chemicals and end consumer products covering about 50% of the overall output of the industry in Poland.

Exactly these areas are potentially burdened by the new legislation.

Czech Republic /15/

Chemical industry production is around six percent of manufacturing output, while employment has decreased from almost five to almost four percent.

Although the balance has changed in recent years, the Czech chemical industry is still dominated by basic chemical production. The basic chemicals sector as shown in Table 14 includes both the petrochemicals and commodity thermoplastics sub-sector and the fertilizer sub-sector.

The industry is also dominated by large enterprises. While there are around 250 enterprises classified as belonging to the chemical industry, over 60% of the revenue and 52% of employment is generated by enterprises employing over 1,000 people. Medium sized enterprises (250-999 employees) account for a further 20 percent of revenue.

Component	Sub-sector	Share (1)
Basic Chemicals	Base chemicals	55
Agrochemicals	Base chemicals	1
Paints	End consumer	6
Pharmaceuticals	Pharmaceuticals, Fine Chemicals	15
Soaps, detergents	End consumer	10
Fibres and other	Polymers	13

(1) Percentage of output 1998

Table 14: sub-sectors of the Chemical Industry in Czech Republic

Because of the domination by the base chemical industry, the overall effect on the chemical industry in Czech Republic might appear lower in comparison to the other two accession countries being analysed. The effects on the residual 20% output being in the area of end consumer products are expected to be the same as developed above.

Hungary /15/

The chemical industry is an important contributor to the Hungarian economy, accounting for around eight percent of manufacturing output in 1998. Prior to the disintegration of the Soviet Union and the subsequent political realignment, the Hungarian pharmaceutical industry was the strongest in Central Europe and was a dominant part of the Hungarian chemical industry. The relative importance of the pharmaceutical sector has declined, with loss of markets in Russia being a significant factor. (The pharmaceutical sector noted on Table 15 includes preparation of packaged products; pharmaceutical chemicals are a small proportion of the total). The organic and polymer sectors, on the other hand, have increased in importance to around 40% of the total. Although growing in some areas, the total production of the total chemical sector has not recovered to its 1990 position (expressed as revenue at constant prices). In addition to pharmaceuticals, other areas of decline have been fertilizers and fine chemicals, mainly agrochemicals.

The Hungarian chemical industry (NACE sector 24) employs around 37,000 people in 112 enterprises. Around 80% of employment is in large enterprises, employing 300 people or more.

Component	Sub-sector	Share (1)
Organic chemicals	Base chemicals	13
Plastics	Polymers	27,5
Fertilizers	Base chemicals	4,4
Detergents & cosmetics	End consumer	8,7
Paints & coatings	End consumer	4,4
Synthetic fibres	Polymers	1,4
Other fine chemicals	Fine chemicals	4,4
Other	Fine chemicals	5,8
Pharmaceutical	Pharmaceuticals	30,4

(1) Percentage of turnover 1997 (data from Hungarian Chemical Industry Association)

Table 15: sub-sectors of the Chemical Industry in Hungary

Due to the unstable situation of the sub-sector distribution in Hungary, a qualitative statement is difficult to do. Looking at the distribution of 1997 as given in Tab. 15, the weight of the fine chemicals and end consumer sectors are very strong and important. Under this condition, it is expected that the effects on competitiveness will be very negative, especially during the necessary phase of new orientation within the Hungarian chemical industry.

6. Conclusions and Recommendations

The review of existing studies and the estimate on a European level shows that burdens by the new legislation on chemicals in Europe will potentially affect the Chemical Industry in a dramatic manner.

The effect itself has to be discussed for the specific sub-sector in the view of all potential effects.

- Costs will burden mainly price-sensitive products.

- Changes in time to market, duty of authorization and duty for disclosure are issues, which touch the innovative power of the European chemical industry.

Positive effects are not identified in the model simulations, because only the additional time requirement for the substances that have so far been freely available in the EINECS pool was fed into the model.

Industry does not expect an immediate innovative push. For this to happen, global implementation of the EU substances policy would be a fundamental prerequisite. In such a situation, all products would be manufactured under comparable conditions and every producer would be confronted with the effects of the new substances policy. Through this equal pressure on all competitors, the producer with the most innovative product would have a competitive advantage and so there would be an incentive for innovation. However, as long as the global environment is not comparable and producers can manufacture their products outside Europe under easier conditions, then this hoped-for positive effect of an innovative push will tend to be transformed instead into the negative effect of a production loss.

The easing of registration requirements for newly developed substances tends to be regarded as insignificant in comparison with the additional burdens. The majority of innovations are not based on newly developed substances and their use but on the exploitation of known substances for new applications. Confirmation of this is provided by the low registration rate for newly developed substances over the last twenty years.

The fundamental aim of European legislation must be to achieve practical reform of the EU substances policy and so minimise the negative consequences for German industry.

This means among other things:

The **time demand** and **cost** of the system must be kept as low as possible to limit the burden on industry without losing sight of the objectives of the White Paper. The aims should be, e.g.:

– to limit the number of necessary test

– to reduce administration costs both within companies and externally

– to limit registration maintenance costs

– to take account of existing information as far as possible

The number of registered uses can be limited, for example, by introducing **exposure categories**.

Testing and evaluation of substances must be directed towards **specific risks** and guided by existing measures to use test resources optimally; exclusive orientation towards intrinsic substance properties or production quantities cannot be recommended.

The **time periods** required by the system (information/data generation, processing by the authorities) before the intended manufacture or use takes place must be kept short. They should not delay the market entry of new products.

Authorisations should be risk-based, if possible in conjunction with positive lists for categories of use.

The **process and product knowledge** of companies must be optimally protected – disclosure must be made with the participation of the affected companies

To limit the negative effect on the competitiveness of German industry, the EU should strive to achieve **standard regulations** for substances worldwide.

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