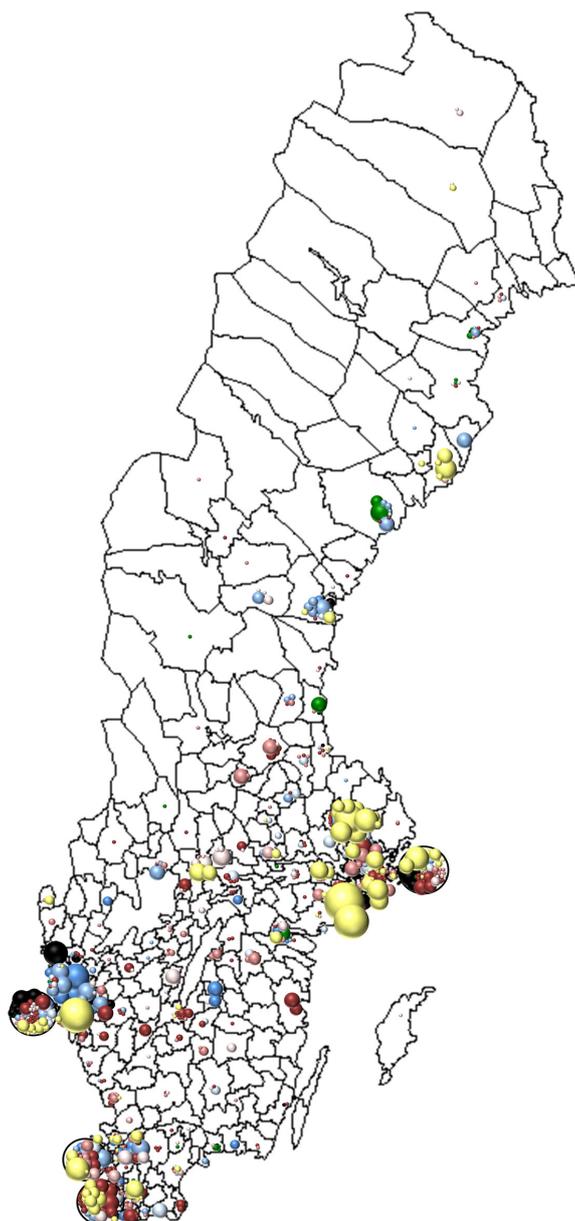




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# CHEMICAL INDUSTRY COMPANIES IN SWEDEN

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## **VINNOVA - strengthening Sweden's innovativeness**

VINNOVA is Sweden's innovation agency. Our mission is to promote sustainable growth by improving the conditions for innovation, as well as funding needs-driven research.

VINNOVA's vision is for Sweden to be a world-leading country in research and innovation, an attractive place in which to invest and conduct business. We promote collaborations between companies, universities, research institutes and the public sector. We do this by stimulating a greater use of research, by making long-term investment in strong research and innovation milieus and by developing catalytic meeting places. VINNOVA's activities also focus on strengthening international cooperation. In order to increase our impact, we are also dedicated to interacting with other research financiers and innovation-promoting organisations. Every year VINNOVA invests about SEK 2 billion in various initiatives.

VINNOVA is a Swedish government agency working under the Ministry of Enterprise, Energy and Communications and acts as the national contact agency for the EU Framework Programme for R&D. We are also the Swedish government's expert agency within the field of innovation policy. VINNOVA was founded in January 2001. About 200 people work here and we have offices in Stockholm and Brussels. Our Director General is Charlotte Brogren.

The VINNOVA Analysis series includes publications of studies, analyses, official reports and evaluations that have been produced or commissioned by VINNOVA's Operational Development Division.

# Chemical Industry Companies in Sweden

by

Johanna Mossberg – SP Technical Research Institute of Sweden

SP: PX18251



## Preface

Operations at VINNOVA – the Swedish innovation agency – require a solid knowledge of the Swedish national, regional and sectorial systems for innovation in an international perspective. This includes knowledge of the stakeholders in the innovation system as well as their respective roles, global context, networks and innovation processes. The knowledge base is used in strategy processes, in dialogues with stakeholders in the innovation system, in operative activities and as a support during follow-up, evaluation and effect analyses of VINNOVA activities.

The following components are part of the knowledge needed about innovation systems. These affect the ability for innovation, and therefore Swedish competitiveness:

- The economy and industrial trends
- Policies and systems
- Research, development and innovation
- The needs and challenges of society

Within its framework of strategic monitoring VINNOVA has embarked on a series of analyses of trends for several branches of industry. Parameters examined include business structure, strategic areas for renewal and cooperation in research, and innovation. On-going or recently completed studies include: Life Science; Automotive; Chemicals; Mines and minerals; Metals; Maritime; Forest, pulp and paper; Information and communications technology; Environmental Technology and finally, Energy. The studies are conducted using the same overall methodology, but with certain adaptations to suit the specific characteristics of each branch. VINNOVA intends to supplement these studies with analyses of other branches of industry as well as additional aspects of the innovation systems while taking an international context into consideration. Furthermore these studies will be updated in order to reveal trends, renewals and structural alterations. The present study analyses businesses in the chemical industry.

This work has been carried out in close co-operation with stakeholders in the innovation system, either as participants in working groups or reference groups. The processes and their results are an important part of the VINNOVA dialogue with the regions and the value VINNOVA can offer back to them. The factual material is intended for use in strategic discussions by various stakeholders and stakeholder clusters. In addition to the reports, it is intended to create databases of the collected information, as well as a graphic interface for the presentation of results from the database. This, in turn, will enable the creation of presentations that can be adapted for different contexts and intentions.

The study has been carried out by Johanna Mossberg of SP, Technical Research Institute of Sweden the consultant companies Addendi and Okatima in close cooperation with VINNOVA. The VINNOVA process managers involved were Anna Sandström and Göran Andersson. The reference group included representatives from Kemira, Processum, INEOS, AstraZeneca, Borealis, The Swedish Plastics and Chemicals Federation, Nynäs and VINNOVA.

VINNOVA in February 2013

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# Sammanfattning

Denna rapport ger en översikt över kemiindustrin i Sverige så som den såg ut år 2010. Rapporten belyser några viktiga karaktärsdrag och diskuterar industristrukturen för kemiindustrin i Sverige. Rapporten är kortfattad och dess huvudsakliga syfte är att, med hjälp av de presenterade figurerna, fungera som en grund för strategidiskussioner och ge insikter och idéer till vidare studier av kemiindustrin och andra delar av innovationssystemet kring industrin.

Studien omfattar cirka 450 företag och ger en ögonblicksbild av företagens verksamhet i Sverige år 2010. Bolagen har grupperats baserat på branschsegment, typ av verksamhet, region och exportintensitet. Företag som enbart sysslar med handel, marknadsföring och/eller transport av kemiska produkter har exkluderats. År 2010 svarade den kemiska industrin i Sverige för cirka 34 000 heltidsekvivalenter. Motsvarande siffra år 2007 var cirka 37 500, det vill säga en minskning med cirka 3 500 anställda eller ~ 7 %. Minskningen har till största delen skett inom branschsegmenten "Läkemedel, Reagenser etc." och "Organiska och oorganiska baskemikalier".

Kemiindustrin i Sverige domineras av ett begränsat antal stora företag och koncerner vilket exemplifieras av att 13 % av företagen står för 80 % av de anställda. De tio största företagen och företagsgrupperna svarar för mer än 50 % av de anställda. AstraZeneca och Akzo Nobel koncernen är de två största arbetsgivarna med totalt mer än 10 000 heltidsekvivalenter. Förutom de stora företagen utgörs industrin av ett begränsat antal medelstora företag och ett stort antal små- och mikroföretag.

Kemiindustrin i Sverige är i huvudsak lokaliserad kring de tre storstadsregionerna Stockholm/Uppsala, Göteborg och Malmö/Lund. En högre koncentration av kemiföretag återfinns även i de större städerna längs Norrlandskusten. En majoritet, 61 %, av företagen inom den kemiska industrin visade positiva resultat efter finansiella poster under 2010, men hela 87 % av de anställda jobbade i företag med positiva relativa resultat för samma år. Stora företag är överrepresenterade bland företag med positivt resultat medan företag med negativt resultat är jämnt fördelade mellan företag utan export och företag med betydande export och mellan företag med endast produktion och företag med en högre FoU. Utlandsägda företag visar bättre resultat och har högre export än svenskägda företag. En majoritet av företagen (300+) är svenskägda men en majoritet av de anställda (~ 80 %) arbetar i utlandsägda företag. I genomsnitt är de utlandsägda företagen cirka åtta gånger större än de svenskägda (sett till antalet heltidsekvivalenter).

Majoriteten av företagen är främst inriktade på produktion och bortsett från företag inom branschsegmentet "Läkemedel, reagenser, etc", är endast ett fåtal företag aktiva inom forskning och utveckling.

# Summary

This report gives an overview of the chemical industry in Sweden in the year 2010. The report highlights some important industry features and discusses the structure of the chemical industry. The report is brief and its main aim is to serve as a basis for discussion as well as give insights and ideas for further studies of the chemical industry in Sweden including other parts of the innovation system connected to it.

This study covers about 450 companies and gives a snapshot of the companies' activities in Sweden in the year 2010. The companies are grouped by business segment, activity category, region and export intensity. Companies involved only in sales, marketing and/or transport of chemical products have not been included. In the year 2010 the chemical industry in Sweden accounted for about 34 000 FTE (full time employments). For the year 2007 the corresponding number was about 37 500, i.e. a reduction with about 3 500 employees or ~7%. The decrease is most significant within the business segments "Pharmaceutical products, reagents, etc." and the "Organic and inorganic basic chemicals".

The chemical industry in Sweden is dominated by a limited number of large companies and corporate groups and 13% of the companies account for 80% of the employees. The ten largest companies and corporate groups account for more than 50% of the employees, AstraZeneca and the Akzo Nobel group being the two largest employers. In addition to the large companies, there are a limited number of medium sized companies, and then, a vast number of small and micro-scale companies.

The chemical industry in Sweden is mainly located around its three major metropolitan areas—Stockholm/Uppsala, Göteborg, and Malmö/Lund. There is also a higher concentration of companies in the larger cities on the northern coast of Sweden. A majority, 61%, of the companies in the chemical industry, showed positive results after financial items in 2010, however, as many as 87% of the employees worked in companies with positive relative results 2010. Large companies are overrepresented among companies with positive results. Companies with negative results are evenly distributed between companies with no exports and companies with significant exports, and between companies whose business is only production and companies with a larger R&D department. Foreign owned companies show better results and have higher exports than the Swedish owned. Furthermore, a majority of the companies (300+) are Swedish owned, yet a majority of the employees (~80%) work in foreign owned companies. On average, the foreign owned companies are eight times larger than the Swedish owned, utilising the number of FTEs.

The majority of the companies are focused on production, and apart from companies in the business segment "Pharmaceutical products, reagents, etc.", only very few companies are active in R&D.

# 1 Introduction

The chemical industry is today producing a broad range of products which we use in our daily lives. More accurately, the chemical industry is providing modern materials and enabling technical solutions in virtually all sectors of the economy. Chemical products are, for example, essential for the development of new and improved products and services in the food industry, the car industry and the pulp and paper industry. New ways to produce energy as well as reducing energy demand, diversifying the raw material base, having clean water, better food and progress in health care are all examples of challenges that could be addressed by the chemical industry as well as by research and development in the field of chemistry.

Compared to, for example, Germany and the Netherlands, the chemical industry in Sweden may seem small. It is, however, an important export industry in Sweden, and as one of our basic industries, it provides an important foundation for other industries and industrial development.

Accurate knowledge of the extent, structure and development of different industry sectors, combined with information about international industrial and scientific trends, is essential for sound policy decisions and for the design of relevant public measures. For this purpose, VINNOVA has initiated a number of consistently performed analyses of different industry sectors. The analysis presented for the chemical industry in this report is one of them. Some of the technologies and processes used by the chemical industry are also used by other sectors, such as the pulp and paper industry and the food industry. In this study, however, only companies with their main activities within the business segments described in the section below are included and analysed. This analysis focuses solely on one part of the innovation system, the companies. It does not, however, include or account for other important parts of the innovation system, such as public authorities, universities or other research organisations.

The overview given in this report presents different aspects of the chemical industry in Sweden, and is based on a database created and categorised by SP Technical Research Institute of Sweden in dialogue with VINNOVA and Region Västra Götaland. The analysis only reflects the companies' activities in Sweden. The total company population has been identified using NACE<sup>1</sup>-codes<sup>2</sup> together with other sources of information, such as membership lists for trade organisations and lists from cluster organisations. It should be noted that there is a delay in the publication of statistics and thus the latest data available when preparing this report was data for the year 2010. Further, changes due to mergers, acquisitions and liquidations appear with some delay in the statistics. The analysed companies have been classified into different business

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<sup>1</sup> Statistical Classification of Economic Activities in the European Community

<sup>2</sup>The NACE-codes used in this analysis are: 19, 20 and 21 including sub-groups.

segments, activity categories and degrees of exports. The business segments included are: Refinery (including grease), Biorefinery, Basic chemicals (with sub-segments), Production of chemical products (also with sub-segments) and “Pharmaceutical products, reagents, etc.” The companies’ activities are categorised under the following headings with increasing R&D content: Supporting activities, Manufacturing, Product development, Product development together with R&D operator, Business with R&D, and R&D units. The methodology and how the companies have been categorised into business segments and activities is presented in the following section.

The analyses of the different industry sectors results in comparable figures which show cluster profiles for regions, business segments and the chemical industry as a whole, development of employment and the development of relative results, etc. The cluster profiles are based on the size of the companies in terms of employees, business segments, geographical location, exports and core activities.

This study thus aims to give insights into the size, structure, development and performance of the chemical industry in Sweden between the years 2007 and 2010, and aims to be a foundation for future follow-up studies and analyses.

The report is only one of the subsequent results from the project. The results also include the database and an interactive graphical interface of the aggregated results. The list of companies and some of the information compiled will be made available to individual regions for use in their activities to promote regional development. The main aim of the project is to generate easily accessible information, compiling complex quality assured data to be used as input for strategic discussions among different combinations of organisations and players in the innovation system. It is VINNOVA’s ambition to update the database every several years and in this way follow the development of the chemical industry.

## 2 Scope of the analysis

This study is an analysis of the chemical industry in Sweden. The analysis partly uses statistical data, but should not be viewed as a typical statistical study. Compared to general statistical excerpts and summaries, this study holds a higher quality since both the population and the information about each company have been assessed by experts in the field. The information for each company is based on various sources<sup>3</sup> and stored in a database to which a graphical interface is connected.

The text in this report is rather brief and the material and images are primarily designed as a basis for oral presentations and discussions. Thus, the reader is encouraged to draw her own conclusions by studying the graphic illustrations.

The work presented in this report has been performed in dialogue with a reference group including representatives from the chemical industry, trade associations and public stakeholders. However, all assessments and comments included in the report are the author's own.

Members of the reference group: Lars Josefsson, INEOS; Anders Fröberg, Borealis; Lennart Albertsson, Kemira; Claes Engström, Processum; Staffan Folestad, AstraZeneca; Magnus Huss and Ulla Nyman, Plast- & Kemiföretagen; Per Redelius, Nynäs; Mats Robertsson, VINNOVA.

### 2.1 Companies included and process for selection

For the activity category and export matrix, companies which had as their major activity one of the business segments described in Section 2.3 and had at least one employee in 2010 are included. Similarly, the dynamic diagrams included data for companies which have their major activity within the defined business segments and had one or more employees in any of the years 2007-2010.

The population was identified through scanning companies with primary NACE code 19-21<sup>4</sup> (removing the companies that were not relevant), and through scanning of chemical clusters and cluster initiatives, membership lists of trade associations and relevant knowledge centres and platforms.

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<sup>3</sup> Statistics, websites, annual reports, personal knowledge and for some companies contact with the individual companies.

<sup>4</sup> 19:Coke and refined petroleum products, 20:Production of chemicals and chemical products and 21:Basic pharmaceutical products and pharmaceuticals.

## 2.2 Excluded companies

Companies devoted to sales, marketing, or transport of chemical products are not included. Subcontractors to companies within the selection of business segments which do not have their core activity within these fields of expertise are not included. Also excluded are companies in other industrial sectors which may have some chemical industry related activities, but not as their core competence or main activity. Examples of such sectors are energy companies and energy service companies, recyclers and the food industry. Intersections of the chemical industry with other industry sectors are most common between the emerging biorefinery business segment and will increase in all likelihood if more focus is placed on developing and producing chemicals and chemical products based on biogenic feedstock.

### Companies producing biogas<sup>5</sup>

Today, most biogas produced is used in the transportation sector. The biogas could, however, just as well be used as feedstock for production of chemicals. In 2010 there were 31 companies which had biogas production as their main activity. However, only six out of these reported having any employees. The reason for this is that many of the biogas companies are associated with other companies that have other main activities such as agriculture or energy companies (e.g., Tekniska Verken i Linköping). Thus the employees employed in the companies producing biogas are counted under other sectors and hard to extract for the biogas producing activities.

### The pulp and paper industry

In the case of developing biorefineries the pulp and paper industry and chemical industry have quite a few intersections. In principal, biorefineries producing more or less the same products could be introduced in both the pulp and paper industry and the chemical industry. Further, through the development of biorefineries or biobased products these two sectors could be even more closely linked to each other, exchanging intermediate products with each other and/or developing and applying similar processes throughout. One example is Smurfitt Kappa which hosts Chemrec's demonstration plant of black liquor gasification and also sells tall oil to Sunpine. Other examples are the expanding biorefinery units of SCA and Holmen. In 2009 they had zero employees devoted to biorefinery and now (2012) they together have roughly ten people working with these issues.

### Consultants and service companies

In recent years, larger companies within the chemical industry have to some extent started to outsource some of their activities as have most of the large companies within the process industry. Further, a number of staffing companies providing personnel to the process industry have appeared. The types of services which are most common to

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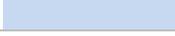
<sup>5</sup> Companies producing biogas were prior to 2009 included in the group of companies producing chemicals and chemical products (in the SIC-code 20, now they have their own code as a subgroup to Sic-code 35:Electricity, gas, steam and air conditioning supply)

outsource include: engineering services, service and maintenance, security and guard and restaurant and food service. The companies providing these services are not included in this study since they are also usually providing services to other industry sectors, and thus, the portion of the companies devoted to the chemical industry is difficult to separate from the rest. The scope of all these activities is difficult to estimate, however, an example and further discussion is given in Section 6. Nevertheless, a limited number of small consultant firms which clearly state that they solely work for the chemical industry have been included.

## 2.3 Business segments

Each company has been individually categorised into a business segment according to each company's *main* business (thus all bubbles related to one individual company have the same colour in the visualisation even if the business may vary somewhat between different locations). Companies with their main activity in business segments other than those listed below are not included in the study, even if their business includes such activities to some extent<sup>6</sup>. It should be noted that compared to, for example, the automotive industry the chemical industry is very diverse, even within the different business segments, and the myriad of different products available is significant.

**Table 1 - Presentation of the business segments and their colour in the graphic visualisations**

Business segment	Colour in visualisations
Refinery (incl. grease)	
Biorefinery	
Basic chemicals	
- <i>Plastics in primary forms</i>	
- <i>Organic and inorganic basic chemicals</i>	
- <i>Other</i>	
Chemical products	
- <i>Paint, coating, adhesives, etc.</i>	
- <i>Detergents, hygiene products, etc.</i>	
- <i>Agrochemical, etc.</i>	
- <i>Other</i>	
Pharmaceutical products, reagents, etc.	

### Refinery (including grease)

This business segment includes companies with their main activity in one of the following areas: petroleum refining, graphite production as well as production of oils and grease. The majority of the companies have petroleum refining as their main business, producing e.g., petrol, diesel, oils and bitumen. The largest company in this

<sup>6</sup> One such example is Anticimex AB which produces pesticides in a factory (which would fall under the chemical industry), but have their main activities and number of employees listed under the business of consultancy and insurance.

business segment is Preem. Examples of other companies in this business segment are St1 Refinery, Axel Christersson, Superior Graphite Europe Ltd., Göteborgs Smörjmedelsfabrik (Scanlube) and Nynäs.

### **Biorefinery**

In the business segment of chemical biorefineries, companies have been selected which fulfil the following criteria for their main activities: 1) The absolute majority of the raw materials used should be biogenic, 2) The main product should be a “chemical product”, that is, it should be a product which would make the company fall into any of the other business segments if it would not have been for the biogenic raw material, 3) The product or the production process should be innovative or “new”.<sup>7</sup> Using this definition companies producing e.g., ethanol or biodiesel, are included, whereas companies producing hygiene products based on imported palm oil are excluded<sup>8</sup>. The largest company in this business segment is Domsjö fabriker. Examples of other companies in this business segment are Sunpine, Arizona Chemicals, Perstorp Bioproducts, Lantmännen Agroetanol, Värmlandsmetanol, Bioendev (Bio Energy Development North) and Swedish Biofuels.

The main objective of including/defining this business segment is to identify a possible movement or a potential change in the structure of the chemical industry and to give the opportunity to study this change over time (in future work). However, the reader should be aware that as of today there exists no broad consensus regarding the definition of biorefineries, and thus the definition of this business segment and the selection of companies included can, and should, be discussed. Some further perspectives regarding this issue and a discussion regarding the use of biogenic feedstock in other business segments are given in the Appendix.

### **Basic chemicals**

The business segments in this group include companies with their main activity in the field of transformation of organic and inorganic raw materials using chemical processes. The segment comprises the manufacture of basic chemicals which are further processed within other segments or industries.

#### *Plastics in primary forms*

This business segment comprises companies which have as their main activity the area of development and manufacture of plastics in primary forms, such as polymers (including those of ethylene, propylene, styrene, vinyl chloride, vinyl acetate and acrylics), polyamides, phenolic and epoxide resins and polyurethanes, alkyd and

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<sup>7</sup> The EU definition of a biorefinery as producing at least two products based on biogenic raw material has thus been discarded as too broad, and thereby companies such as Skellefteå Kraft with their facility Biostor (which produce power, heat and pellets) have been excluded from this study.

<sup>8</sup> This definition also excludes companies or applications which have used biogenic raw material for a long time, and where using the biogenic raw material, it has not been judged as a novelty or innovation such as e.g., for production of some pharmaceuticals, pesticides or chemicals (e.g., many of the products produced by Akzo Nobel companies).

polyester resins and polyethers, silicones and also the manufacture of chemical derivatives. The largest company in this business segment is Borealis producing e.g., polyethylene. Examples of other companies in this sub-segment are INEOS Sverige, Chemiplastica, PA Resins, Habia Teknoflour and BIM Kemi.

#### *Organic and inorganic basic chemicals*

This business segment comprises a variety of companies developing and producing organic and inorganic basic chemicals for further use in other segments and industries, e.g., the iron and steel industry (Ask Chemicals Scandinavia) and the pulp and paper industry (Eka Chemicals and Marenordic). Companies producing mineral fillers are also included (Imerys Minerals). The largest company in this business segment is Eka Chemicals which produces chemicals for the pulp and paper industry. Examples of other companies in this sub-segment are Kemira, Akzo Nobel Functional Chemicals, Perstorp Speciality Chemicals, Element Six, Sellukem, Carbide Sweden and Feralco Nordic.

#### *Other*

This business segment includes mainly companies producing industrial gases, dry ice and some other speciality chemicals. The largest company in this business segment is AGA Gas and examples of other companies in this sub-segment are Air Liquide Gas, Polyone Sweden and Isblästring Sverige.

### **Chemical products**

The segment includes the transformation of organic and inorganic raw materials through chemical processes and the general formation of products. It comprises the production of intermediate and end products through further processing of base chemicals.

#### *Paint, coating, adhesives, etc.*

This business segment includes production and development of paint, coating, ink, varnish, adhesives, solvents, thinners, prepared pigments, etc. Thus, the population of companies is rather diverse, including everything from small companies producing linseed oil (e.g. RHL i Högsta) to large companies producing industrial coatings and adhesives (e.g. Akzo Nobel Decorative Coating and Casco Adhesives). Examples of companies in this business segment are Alcro-Beckers, Boastik, Bona, Caparol, Linotech, Bacca Byggkemi, Akzo Nobel Industrial Finishes and Arboritech. The largest companies in this sub-segment are Casco Adhesives and Flügger.

#### *Detergents, hygiene products, etc.*

Here both companies developing and producing hygiene products, such as facial creams (e.g. Oriflame Products Sweden), wet wipes (e.g. K.Ungh) and hair care products (e.g., Scandinavian Hair), and detergents and cleaning products for both industry and private consumers (e.g., A Clean Partner International) are represented. Companies producing perfumes and essential oils and fragranced soaps and candles are also included (e.g., Natural Fragrance of Sweden and Klockargårdens i Norberg). Many companies are contract manufacturers (e.g., Cleano International and PLS Produkter). The largest

company in this sub-segment is Cederroth. Examples of other companies in this sub-segment are Svenska Diskbolaget, Petefa, Nordic Biocosmetic Production, Chemex, Weba Kemi and Dermanord Svensk Hudvård,

#### *Agrochemical, etc.*

Here manufacture and development of pesticides and other agrochemical products (as well as sprout and growth regulators) are included. The products include insecticides, fungicides, herbicides, rodenticides and biocides. The business segment also includes companies which have their main activity in the field of fertilizers and plant nutrition. The largest company in this sub-segment is Yara. Examples of other companies in this business segment are Nya Bionema, BioBact, SweTree Technologies and Binab Bio-Innovation.

#### *Other*

This business segment includes the manufacture of explosives and pyrotechnics, essential oils, artificial fibres and other chemical products such as photochemical products (including film and photosensitive paper). This business segment also comprises some companies with diverse activities, which due to the lack of one dominating product, could not be placed in other business segments. The largest company in this sub-segment is Orica Sweden<sup>9</sup> and examples of other companies in the sub-segment are EPC Sverige, Pyroswe, Swedish Match Industries, Eurenco Bofors, Textilfilter Scandinavia and Bycotest.

#### **Pharmaceutical products, reagents, etc.**

This business segment includes the manufacture of basic pharmaceutical products and medicines. Also included is the production of medical chemicals, reagents and diagnostic products. The largest company is Astra Zeneca. There exists a similar study to this one for this business segment regarding the Swedish Life science industry<sup>10</sup>. At least 15 of the manufacturing companies in this business segment are contract manufacturers.

## **2.4 Activity category**

Each company, or company site, has been assigned to one activity category according to its activities in specific business units (establishments) in Sweden. Companies with more than 450 employees have been divided into different activity categories shown as separate bubbles. Companies with fewer than 450 employees and several activity categories within the company have been placed in the activity category which is highest on the vertical axis<sup>11</sup>. This means that if the company has both product

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<sup>9</sup> Formerly known as Dyno Nobel Sweden.

<sup>10</sup> See <http://www.vinnova.se/upload/EPiStorePDF/va-11-03.pdf>

<sup>11</sup> For a few companies, however, information was available regarding number of employees in different activity categories and these companies have been divided accordingly. This mainly concerns companies with both production and supporting activity in the same region (but at different sites).

development and manufacturing activities, they appear under “Product development” on the vertical axis.

### **R&D units and R&D parts of larger companies**

In this activity category, the bubble actually represents the number of persons engaged in R&D work.

### **Business or production unit - with R&D**

Here companies with their own research within one or a few key areas are included. These companies usually also have production activities. The size of the bubble in the bubble diagram, however, reflects the total number of employees, and not only the ones engaged in R&D- unless the company has more than 450 employees as previously mentioned.

### **Business or production unit - with product development in cooperation with R&D operator**

Here companies that mainly design and manufacture their own or other companies' products/services are included. They do not have their own research, but they have recently been, or are involved in, national research programmes or conduct product development together with universities or research institutes. These connections and cooperation with R&D actors may be a first step for the companies to develop their competitive edge. This category also includes consultants whom have their whole business in the field of supporting chemical companies with their R&D and R&D processes.

### **Business or production unit - with product development**

The companies in this category develop products and services in their own business, i.e. incremental product development without elements of exploratory research.

### **Production**

This activity category refers to companies or sites which manufacture products. This category also includes a small number of consultants who have no R&D content in their business and produce services solely for the chemical industry.

### **Supporting activities, head office, administration, retail, storage or production of non-chemical products, etc.**

This activity category refers to activities which the company or company site might engage in, but which are not related to production or development of chemical products. Such activities are e.g., a separate unit for administration, marketing, sales, etc. (e.g., Syrgis Performance Initiators office in Mölnlycke), sites for storage of products/intermediate products (e.g., Nynäs activities in Kalmar, Malmö, Västerås, etc) or stores where the products produced are sold (common for the business segment “Paint, coating, adhesives”, etc. where Flügger, for example, have one production facility and a vast number of retail stores).

## 2.5 Number of employees

In the graphic illustrations, the size of companies, measured by number of full-time equivalent (FTE) employees, is given as a bubble where the size of the company or operation is proportional to the volume of the bubble<sup>12</sup>.

Following contact with the companies, those with more than 450 employees have been divided into different activity categories (rather than different business segments). The bubble highest on the vertical axis is downsized according to the number of employees in other activity categories and new bubbles are created for those units. The procedure has been done for the companies which clearly expressed that they have a separate R&D department. Further, companies with operations in different regions are divided into the corresponding number of bubbles, where the volume is proportional to the number of employees in each region.

## 2.6 Regions

For the activity category and export matrix (see e.g., Fig. 4) Sweden has been divided into five regions: North, Central, West, East and South. For companies with operations in several regions, their activity in each region is shown. The regions are comprised of their respective list of counties below.

### **Region North:**

Norrbottnen, Västerbotten, Jämtland, Västernorrland, Gävleborg and Dalarna.

### **Region Central:**

Uppsala, Stockholm, Södermanland, Västmanland and Örebro.

### **Region West:**

Västra Götaland, Värmland and Halland.

### **Region East:**

Östergötland, Jönköping, Kalmar and Gotland.

### **Region South:**

Kronoberg, Blekinge and Skåne.

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<sup>12</sup> The number of full-time equivalent employees is reported by companies in their annual report to the Swedish Companies Registration Office. The actual number of people employed in companies may be 20-30% higher due to part-time posts, leave of absence etc.

## 2.7 Exports

In the statistics used, the export data for each company is given in the following intervals<sup>13</sup>:

- 1 – 249 kSEK/year
- 250 – 999 kSEK/year
- 1 – 1.0 MSEK/year
- 2 – 4.9 MSEK/year
- 5 – 9.9 MSEK/year
- 10 – 49.9 MSEK/year
- 50 – 99.9 MSEK/year
- More than 100 MSEK/year

The export data given in absolute numbers have then been divided by the net turnover for each company giving the export in relation to turnover [%]. For the graphical illustrations in this report three different export categories have been used: **No exports**, **Some exports**, and **Significant exports**. Where “Some exports” is defined as exports of 1-50% of annual turnover and “Significant exports” as more than 50% in relation to company turnover. All companies with exports of more than 100 MSEK/year have been placed in the “Significant exports” category, even if their turnover is more than 200 MSEK/year.

## 2.8 Comments regarding graphic illustrations

### Activity category and export matrix

The activity category and export matrix presented in this study shows five variables simultaneously:

- Activity category (vertical axis)
- Exports (horizontal axis)
- Geographical location (horizontal axis)
- Business segment (colour of bubble)
- Company size in terms of the number of full time employees (bubble size)

The reader is encouraged to draw her own conclusions based on different combinations of these variables.

### Dynamic diagrams

The database used for this report dates back to 2007. It includes some companies which no longer exist as well as the number of employees and financial data for these companies. Thus, dynamic diagrams regarding such indicators can be obtained for the

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<sup>13</sup> Where kSEK stands for thousand SEK and MSEK stands for million SEK.

period 2007<sup>14</sup>-2010. The data is based on the information that companies submit to the Companies' Registration Office in their annual reports. These values are available in October the year following the fiscal year. Thus, when this report was prepared data for 2010 was the most recent data available. This delay may be perceived as long, however, experience from similar structural analysis has determined that changes in the industry are slow and that change also requires long-term action.

### **Map visualisation**

In the map visualisation (Figure 6), all bubbles in the diagram are distributed by county according to their geographic location. They have been randomly distributed within each municipality. The four circles with bubbles in them just outside the map represent the municipalities of Stockholm, Göteborg, Lund and Malmö where the concentration of companies/bubbles is larger than the area available for visualisation on the map.

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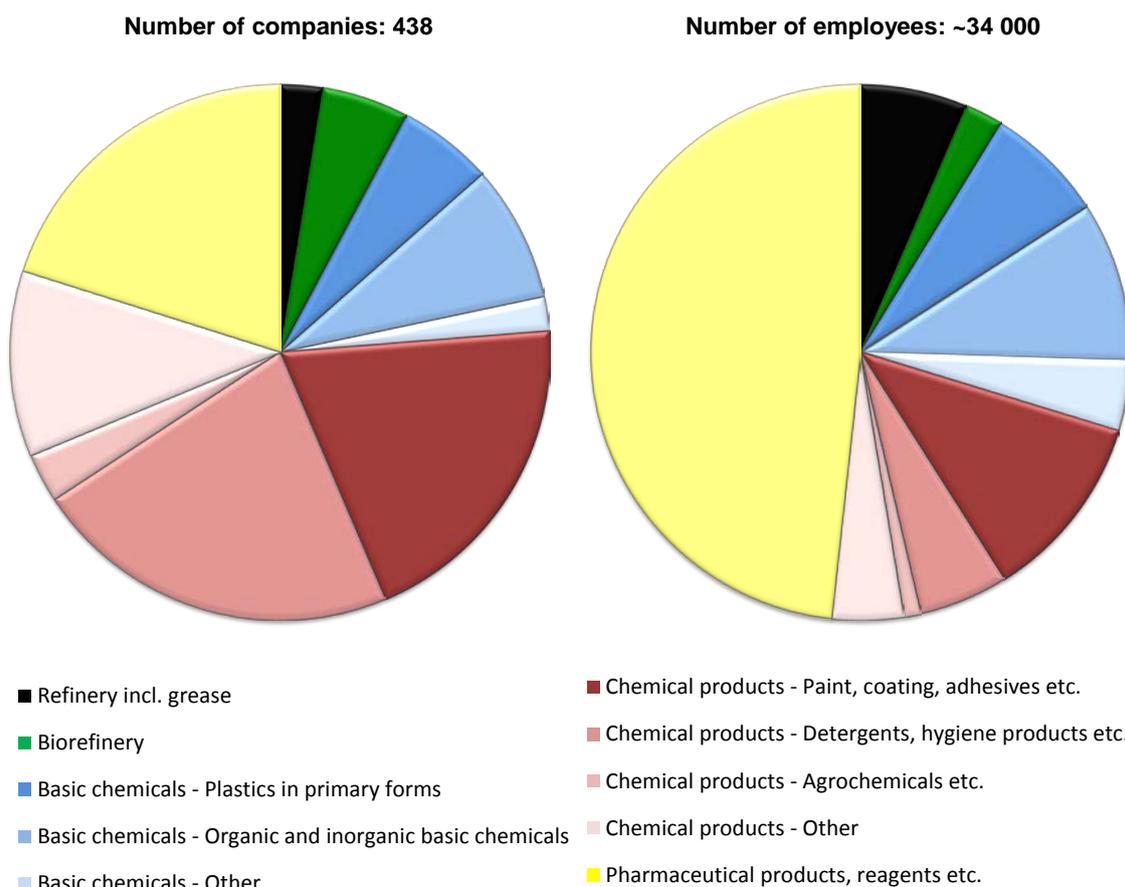
<sup>14</sup> This was when a new industry classification standard of Swedish industry was introduced. A general problem with the introduction of a new industrial classification is the conflict between the interests of the new standard will provide better opportunities to highlight the changes in industry structure, while it is important that as much as possible to maintain reasonably intact time series. For this work consistent time series prior to 2007 were not possible to obtain.

### 3 Chemical industry in Sweden 2010

#### 3.1 All companies

The total number of companies identified in the present study as active in research and development, product development, consulting or manufacturing within the included business segments of the chemical industry in Sweden is about 440, with a total of 34,000 employees. This does not include companies focusing on sales, marketing or transportation of chemical products. Figure 1 shows that the companies in the business segment “Pharmaceutical products, reagents, etc.” reflects almost half of the employment in the chemical industry, but only contains about 20% of the number of companies. The chemical industry is dominated by a limited number of large companies, a structure which is further discussed in Section 3.2. The majority of the companies have their main business in production of chemical products.

**Figure 1 - The chemical industry in Sweden 2010 divided by companies and employees in the different business segments**



### 3.2 Large companies and corporate groups

The chemical industry in Sweden is dominated by a small number of large companies and corporate groups. Essentially 14% (61) of the companies jointly employ 27 300 FTE which corresponds to 80% of the total employment in the Swedish chemical industry. The fifteen largest companies are listed in Table 2. Only three of these companies are Swedish owned and they are all in the business segment of Pharmaceutical products, etc. (Octapharma, Apoteket Produktion och Laboratorier and Swedish Orphan Biovitrum). Out of the employees in the 15 largest companies only 8% (1 429) work in companies with Swedish ownership.

As can be seen in the table, the number of employees in the fifteen largest companies decreased by roughly 2 800 people between the year 2007 and the year 2010. This is equal to 75% of the total decrease of employment in the Swedish chemical industry during these years<sup>15</sup>.

**Table 2 - The fifteen largest chemical industry companies in Sweden 2010**

The 15 largest companies	Business segment (colour)	Country affiliation for parent company	Number of employees 2010	Number of employees 2007
AstraZeneca	Yellow	GB	7 277	9 407
GE Healthcare Bio-Sciences	Yellow	US	1 632	1 689
Preem	Black	CY	1 315	1 445
Borealis	Blue	AE	936	1 034
Fresenius Kabi	Yellow	DE	926	887
Eka Chemicals*	Light blue	NL	908	1 231
AGA Gas	Light blue	DE	907	915
McNeil	Yellow	US	756	867
Octapharma	Yellow	SE	557	514
Flügger	Red	DK	474	436
Apoteket produktion och laboratorier	Yellow	SE	438	460 <sup>16</sup>
Swedish Orphan Biovitrum	Yellow	SE	434	539
Phadia	Yellow	LU	418	444
Akzo Nobel Functional Chemicals*	Light blue	NL	407	415
Akzo Nobel Surface Chemistry*	Light blue	NL	399	328
<b>Total</b>			<b>17 784</b>	<b>20 611</b>

*\*Part of the Akzo Nobel Group (in total the group consists of > 10 companies in Sweden)*

Together with AstraZeneca, Akzo Nobel is a major employer; in fact in 2010 these two company groups comprised more than 25% of the total employment in the Swedish Chemical industry, see Figure 2. In 2010 AstraZeneca was located in Mölndal, Södertälje and Lund. The Akzo Nobel group are more spread out, conducting business in all five geographic regions described in the present study and at more than 10 sites.

<sup>15</sup> However, these jobs could have moved to another sector, see Section 6 for discussion.

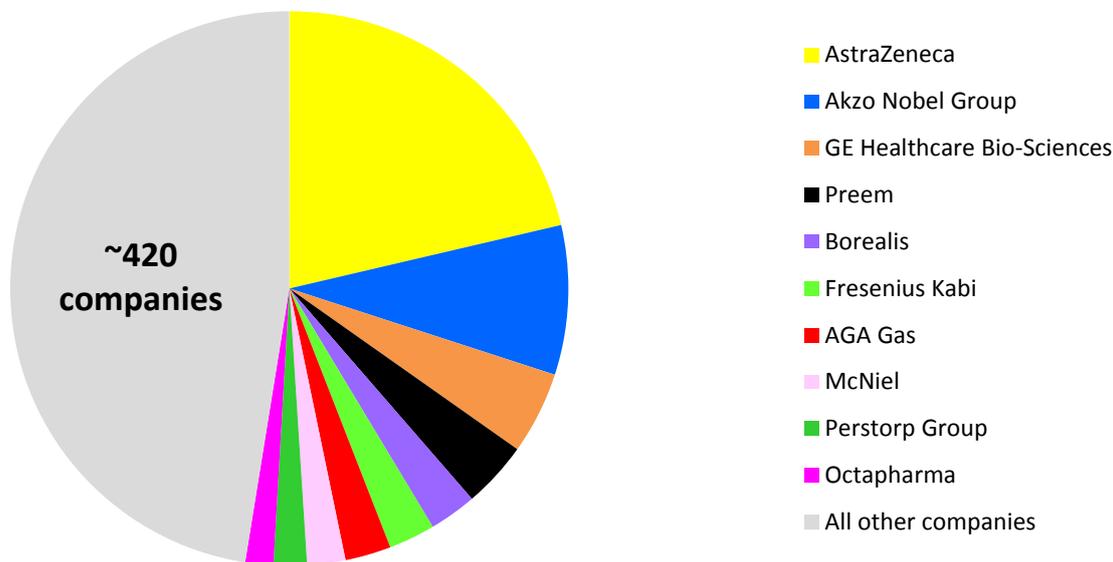
<sup>16</sup> Started in 2008 with 460 FTE.

Furthermore, both these two company groups have significant R&D in Sweden-- AstraZeneca in Södertälje and Mölndal; and Akzo Nobel in Sundsvall, Nacka, Stenungsund, Bohus and Malmö. Together with Borealis these two company groups employ the majority of the people in the activity category R&D units and R&D parts of larger companies. This structure of the chemical industry infers that changes (expansions or cutbacks) in a limited number of companies or corporate groups can have significant effects on the industry as a whole.

Since 2010 both AstraZeneca and Akzo Nobel have announced cut backs in their operations, e.g., Astra Zeneca is closing down two R&D-units<sup>17</sup>, Lund and Södertälje<sup>18</sup>, and Akzo Nobel has announced closure of the production facilities in Trollhättan and Borås and cut backs of personnel in Malmö (they have, however, announced further investments in and expansion of their operations in Örnsköldsvik run by Akzo Nobel Functional Chemicals). Although these cut backs significantly affect the number of employees in these two companies in Sweden, they are still (as of year 2012) the largest employers in the Chemical industry in Sweden.

It can also be noted that the structure of the chemical industry is such that there are 31 large companies (with more than 250 employees, the largest can be seen in Table 2), 75 medium sized companies (with between 50 and 249 employees) and 332 small companies (<50 employees).

**Figure 2 - The ten largest companies and corporate groups and their share of total employment in the Chemical industry 2010**



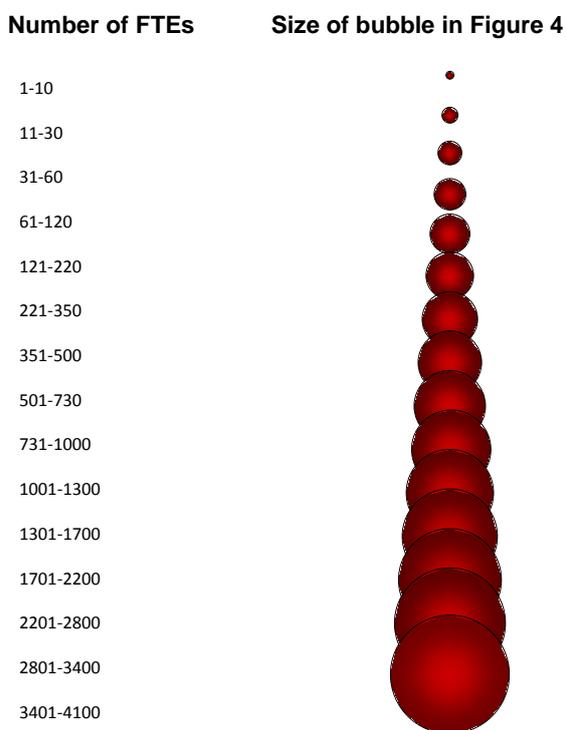
<sup>17</sup> Sandström A. "Svensk Life Science industri efter AstraZenecas nedskärningar" VINNOVA Analysis VA 2012:07 (2012) [available only in Swedish]

<sup>18</sup> The Lund R&D-unit is already closed and the R&D-unit in Södertälje will be closed by 2013.

### 3.3 Activity category and export matrix

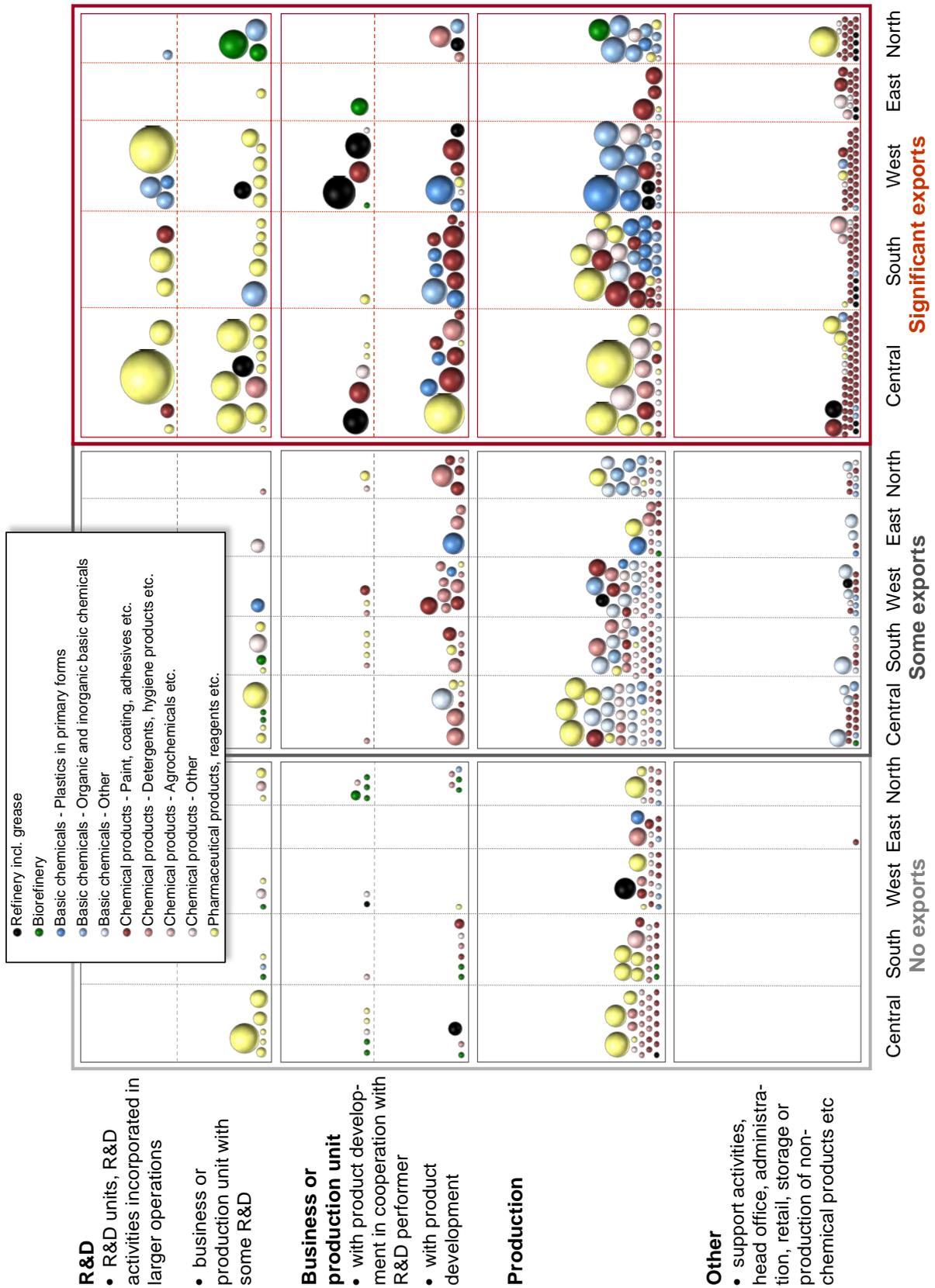
The chemical industry's activity and export matrix (bubble diagram) is presented in Figure 4. The size of the bubbles has been adjusted to be comparable with a previous similar analysis of the automotive industry<sup>19</sup>. The figure shows that the majority of the companies are focused on production, and apart from companies in the business segment of "Pharmaceutical products, reagents, etc.", only very few of the companies are active in R&D. This may hamper the ability and interest of the industry in Sweden to collaborate with academia or to commission R&D services from both academia and industrial research institutes. Regarding the chemistry area, the significant knowledge assets and the innovation potential of academia and industrial research institutes in Sweden are both probably far from being fully utilised by the industry. Some level of in-house R&D improves the capability to make use of results from different types of R&D organisations. This is important for the ability to adapt to changing markets and new regulations as well as improving the overall innovative capacity. Since many of the larger companies are foreign owned or part of large global corporate groups, in-house R&D is, however, often performed in other countries. There is an opportunity to strengthen the chemical industry in Sweden by increased R&D and/or increased exports. The figure also shows that the export intensive companies in general are larger than the companies without any export.

Figure 3 - Scale for bubbles in Figure 4



<sup>19</sup> VINNOVA Analys VA 2012:06 <http://www.vinnova.se/sv/Aktuellt--publicerat/Publikationer/Produkter/Nationella-och-regionala-klusterprofiler2/>

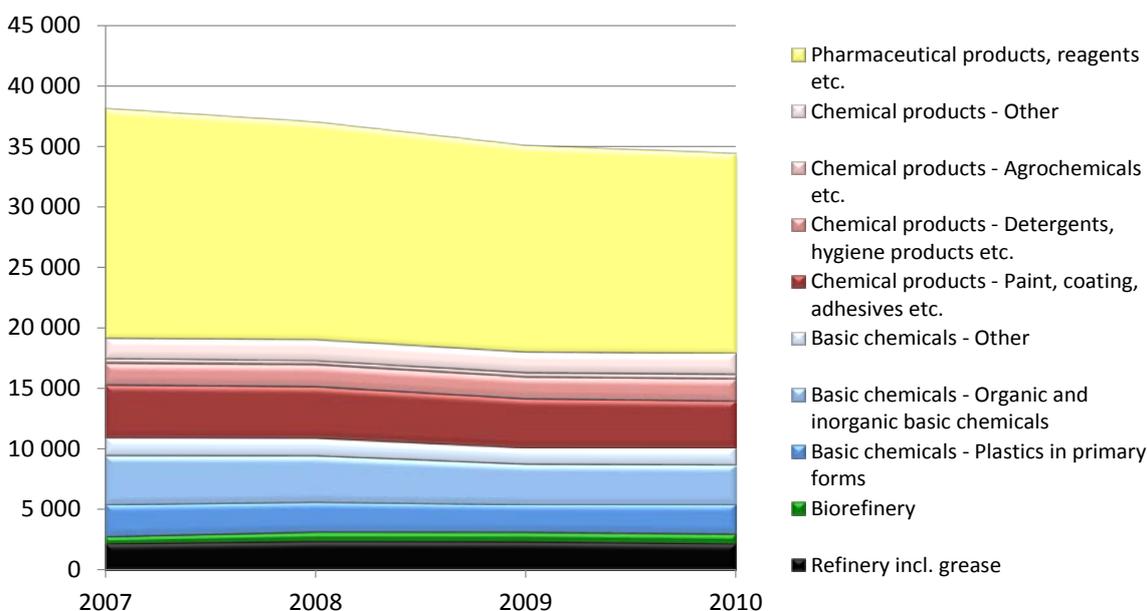
**Figure 4 - Activity and export matrix (bubble diagram) for the Chemical industry in Sweden 2010**  
 (The size of the bubbles represents the sizes of the companies or operations given in terms of number of FTE and is proportional to the volume, not the area, of the bubble)



### 3.4 Development during years 2007 to 2010

Between the years 2007 and 2010 the employment in the included companies decreased by 3 700 FTE. As seen in Figure 5, however, the largest reduction occurred in the business segment “Pharmaceutical products, reagents, etc.” The cut backs of AstraZeneca are partly behind these numbers. The largest decrease in the number of employees occurred between the years 2008 and 2009, in the aftermath of the economic crisis of 2008. Apart from the business segment “Pharmaceutical products, reagents, etc.” the largest decrease of employment during the analysed period has occurred within the sub- segment “Organic and inorganic base chemicals” where, for example, large companies such as Eka Chemicals, Perstorp Oxo, Element Six and Böhler Welding Group Nordic have made significant cut backs in their staffing. The decrease in employment is, however, widespread in the whole chemical industry; out of the companies active between the years 2007 and 2010, only about 20 increased their number of employees.

Figure 5 - Dynamic diagram for employment structure



### 3.5 Map visualisation

As can be seen in Figure 6, the companies are primarily located in and around the three Swedish metropolitan areas, Stockholm/Uppsala, Göteborg and Malmö/Lund. However, there are also smaller clusters of companies around cities in northern Sweden, such as Sundsvall.

The figure also shows that the three different cluster regions all have different characteristics with respect to the types of companies located there. For example, the

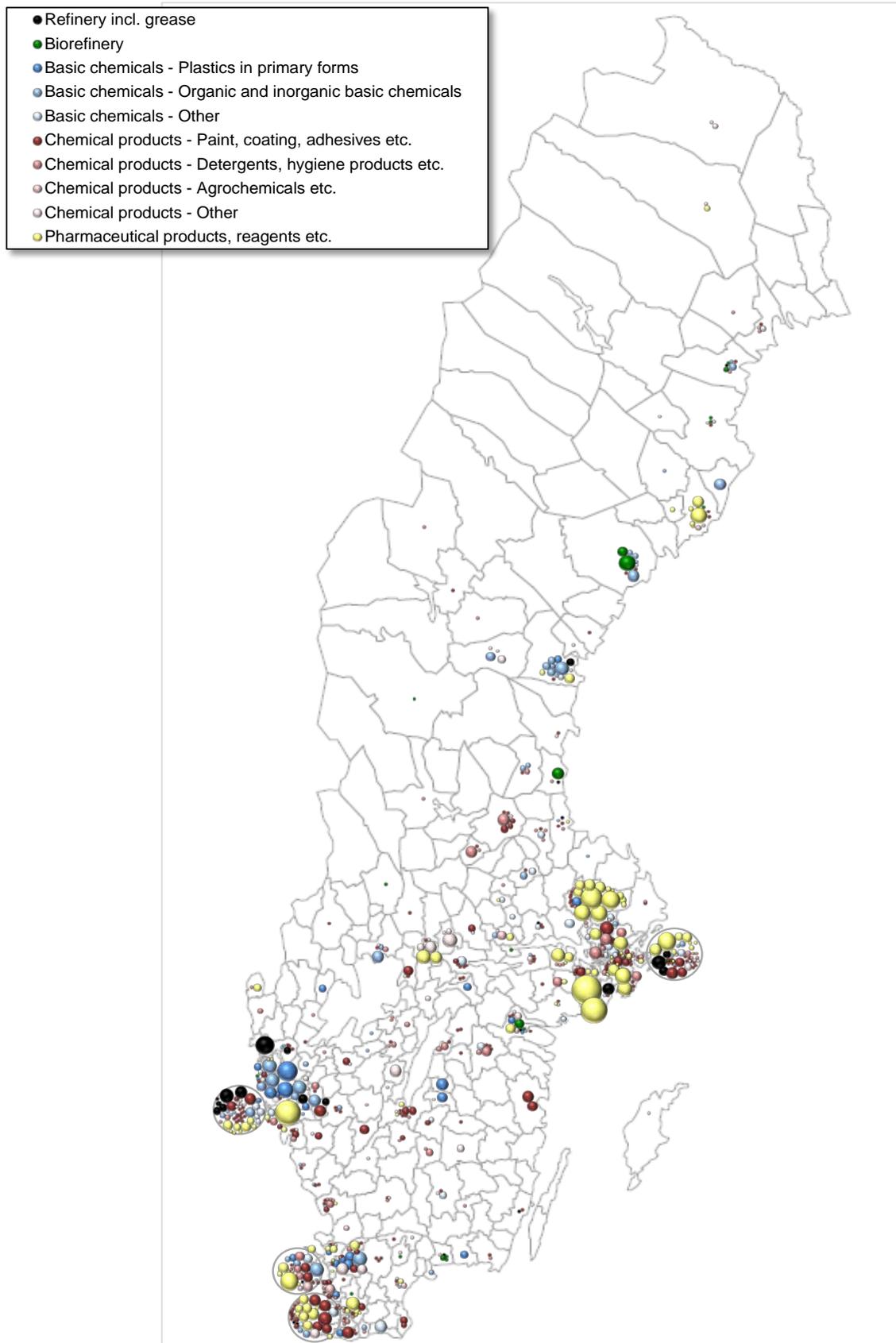
area around Stockholm and Uppsala is heavily populated with companies active in the Production and development of pharmaceutical products, reagents, etc. (yellow), something which mirrors the fact that this area is an important hub for Pharmaceutical and Life Science industry. In this region also strong public actors and universities are located such as Karoliska Institutet and Uppsala University. KTH, Royal Institute of Technology is also an important public actor in the region educating e.g., chemical engineers.

In Västra Götaland and around Göteborg, the majority of companies have their main activities within the Production and development of basic chemicals (blue) and Refinery (black). In Stenungsund, the region holds the largest chemical cluster of its kind in Sweden, producing plastic in primary forms and basic chemicals. Sweden's largest RME-plant is also located at this site (owned and run by companies in the Perstorp group). In the region, a cluster initiative for the chemical industry exists (hosted by Business Region Göteborg), also including other important actors besides the chemical industry companies themselves, such as Chalmers University of Technology, the Region of Västra Götaland, SP Technical Research Institute of Sweden, and companies from other industry sectors, such as Renova and Göteborg Energi.

The third cluster region, Malmö/Lund, have many companies in the Production and development of chemical products (red) Pharmaceutical products, reagents, etc. (yellow) and Basic chemicals (blue), with a slight emphasis towards production and development of chemical products. In the region, a strong public actor related to the chemical industry is Lund University, with strong competencies in e.g., agricultural biotechnology, something which is reflected in the population of companies in the region.

The Refinery industry (black) is mainly located in Västra Götaland and around Stockholm, whereas the biorefinery industry is strongly represented along the coast of Norrland. Similar to the strength of companies and research connected to agricultural technologies in southern Sweden, industry and academia in Northern Sweden have a long tradition in developing and producing forest based products. With respect to this fact, an initiative worth mentioning is Bio4Energy, which is a strategic research environment consisting of Luleå University of Technology, Umeå University and Swedish University of Agricultural Sciences (only the campus based in Umeå). Bio4Energy has a handful of associated industrial partners, e.g., SEKAB. Another actor in northern Sweden worth mentioning is the member owned company Processum. Processum started in 2003 as a technology park, but has since developed into a biorefinery cluster initiative. The major part of the activities within Processum lies within research and development in the areas of biotechnology, energy technology, inorganic and organic chemistry as well as sustainable raw materials.

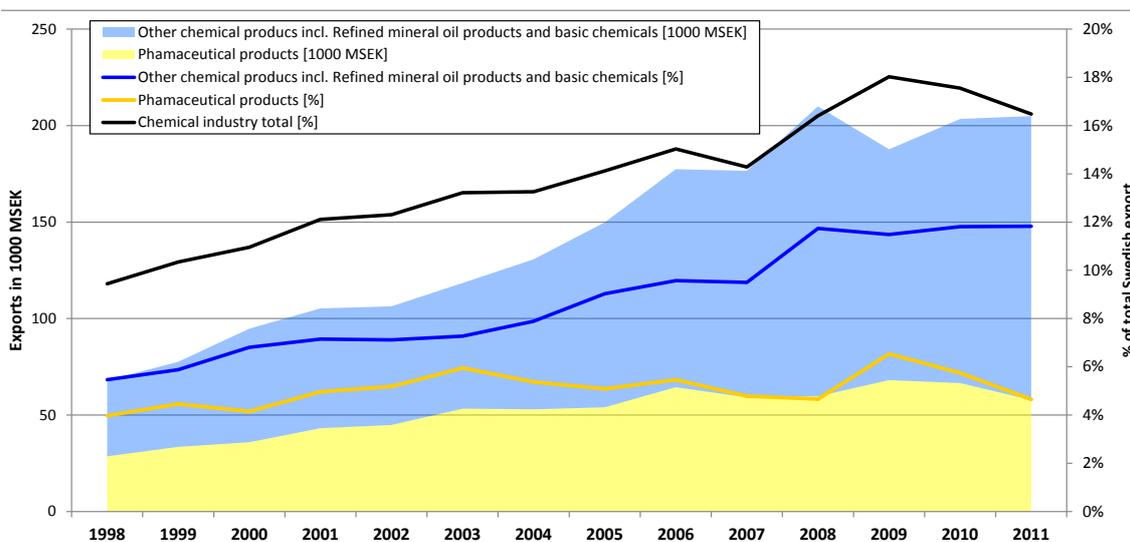
**Figure 6 - Map visualisation of the chemical industry location in Sweden 2010**



### 3.6 Exports

Aggregated export data for products produced by the chemical industry is presented in Figure 7. These numbers are not directly comparable with the export of the companies included in this study, but give an indication about the importance of the chemical industry as a large export category. The figure shows that, for the year 2011, the chemical industry in total accounted for approximately 16% of the Swedish exports (including pharmaceutical and mineral oil products). This can be compared to, for example, the automotive industry and the pulp and paper industry (excluding wood and wood products) which in the same year accounted for 11% and 8% respectively.

**Figure 7 - Aggregated export data for products produced by the chemical industry<sup>20</sup>**



Companies with significant exports can be found in the part furthest to the right in Figure 4. The figure shows that the business segment production of Detergents, hygiene products, etc. is underrepresented among companies with significant exports. Furthermore, the refinery industry and most companies producing basic chemicals, have international markets for their products, and are thus well represented in the significant exports category.

Naturally, large companies are well represented in the category of significant exports. However, 69 companies in this category have less than 50 employees. Out of these 69

<sup>20</sup> The SITC codes used for the figure are for “Pharmaceuticals”: 541 (Medical and pharmaceutical products, other than drugs) and 542 (Drugs) and for “Other Chemical products”: 334-335 (Mineral oil products); 342/344 (fossil gases both in both liquid and gaseous form); 511-516 (Organic compounds), 522-524 (inorganic compounds); 531/533 (dyes, pigments, paint and similar); 551 (Volatile oils and fragrances); 553-554 (hygiene products, detergents and similar); 562 (Manufactured fertilizers); 571-575 (Polymers, polyether and plastic in primary forms); 591 (Disinfectants and pesticides); 592 (Proteins, modified starches, glues, adhesives); 593 (Explosives); 597 (Additives for mineral oils); 598 (Other chemical products).

smaller companies, the majority has no element of R&D. The majority of the smaller companies are active in the fields of Pharmaceutical products, reagents, etc. (to a large extent reagents and products for diagnostics) and Paint, coating adhesives, etc. (mainly speciality products, e.g., industrial coatings and adhesives and products for drytech). Examples of smaller companies with significant exports are: Bycosine (producing additives for heavy oils); IDL Biotech (developing and producing diagnostic tests for use within the area of oncology); Lyckeby Industrial (developing producing adhesives for industrial users); Syrgis Performance Initiators (producing organic peroxides); and Bactiguard (developing coatings which reduce the risk of infection within healthcare).

As seen in Figure 4, the companies with high elements of R&D usually also have significant exports. Accordingly, the companies with no exports are mainly focused on production without any element of R&D.

### **3.7 Fixed assets and capital intensity**

By definition, capital intensive industries use a large portion of their capital to invest in expensive machines, or other fixed assets<sup>21</sup> compared to their labour costs. Due to significant expenses for fixed assets, these companies are subject to a greater financial risk compared to labour intensive companies.

For sectors and business segments which are capital intensive or demand investments in large fixed assets, there is a significant financial barrier to enter the marketplace or renew the production (to e.g., enter a new market or market niche). Significant financial barriers slow down the rate of technological innovation (especially if the access to capital is limited), and thus, for this type of capital intensive industry, new production units and companies with high tech machinery or new products and processes might hold a small share of the marketplace, even though they raise general productivity and output.

The companies with the highest levels of fixed assets are found almost exclusively amongst the Pharmaceutical companies and the Basic chemical companies. For the basic chemical companies the fixed assets are mainly material, that is machinery and process equipment, whereas for the pharmaceutical companies the fixed assets are to a higher degree both material and immaterial, such as patents and licensing rights. A lower value of fixed assets, however, does not necessarily reflect lower capital intensity; it could also reflect a situation where new investments have been neglected or postponed.

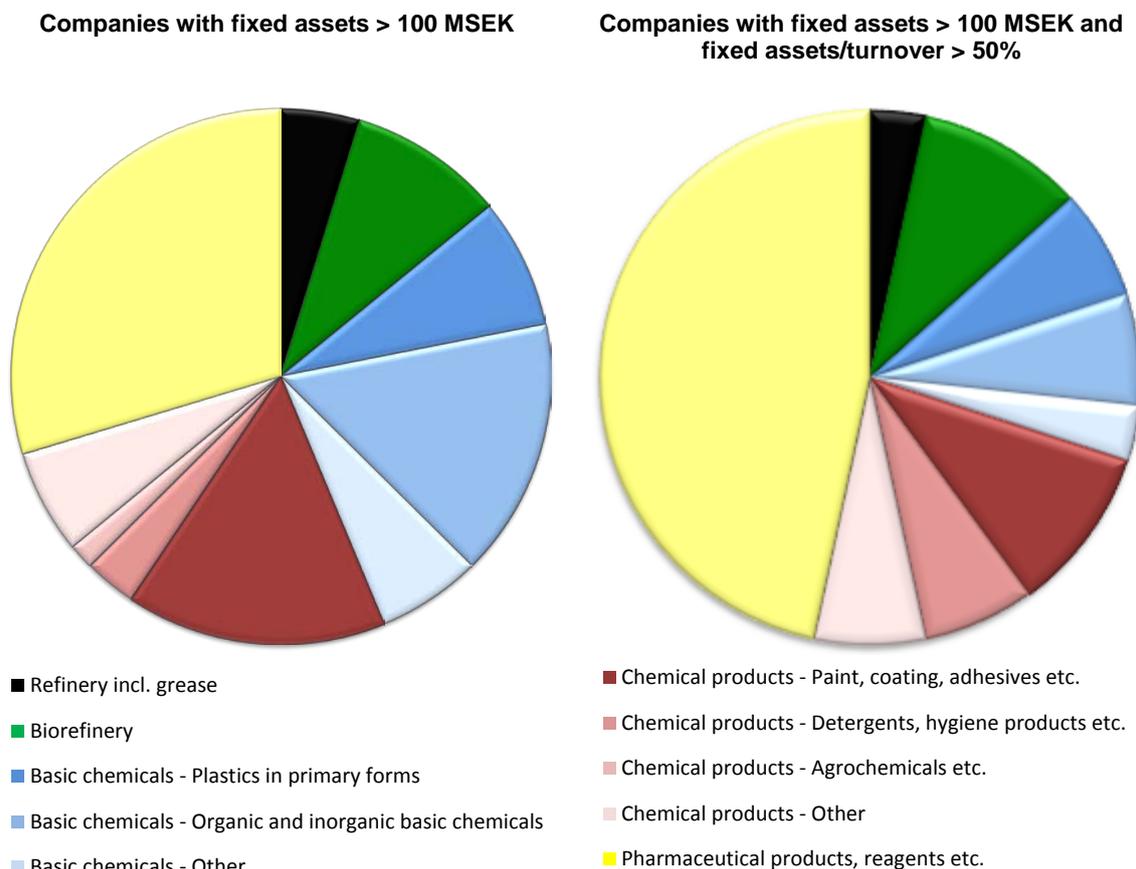
Innovation through investments in new processes and machinery demand large amounts of capital, and thus is associated with large financial risks. Therefore, cooperation and

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<sup>21</sup> Fixed assets are assets which cannot easily be converted into cash and which are intended to be used for a longer period of time. Fixed assets can be both material (e.g. machinery, equipment and buildings), immaterial (e.g. goodwill, patents and R&D) and financial (e.g. long-term receivables).

joint investment between companies in the industry (e.g., along the value chain), or with other sectors, might be an opportunity to enhance innovation. It is also important to remember that many of the big chemical companies in Sweden are foreign-owned, which means that investments in Sweden compete with investments in the companies' sites in other places around the world.

**Figure 8 - Fixed assets in different business segments**




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**The five companies with highest fixed assets 2010:** Astra Zeneca, AGA Gas, Preem, Borealis, Swedish Orphan Biovitrum.

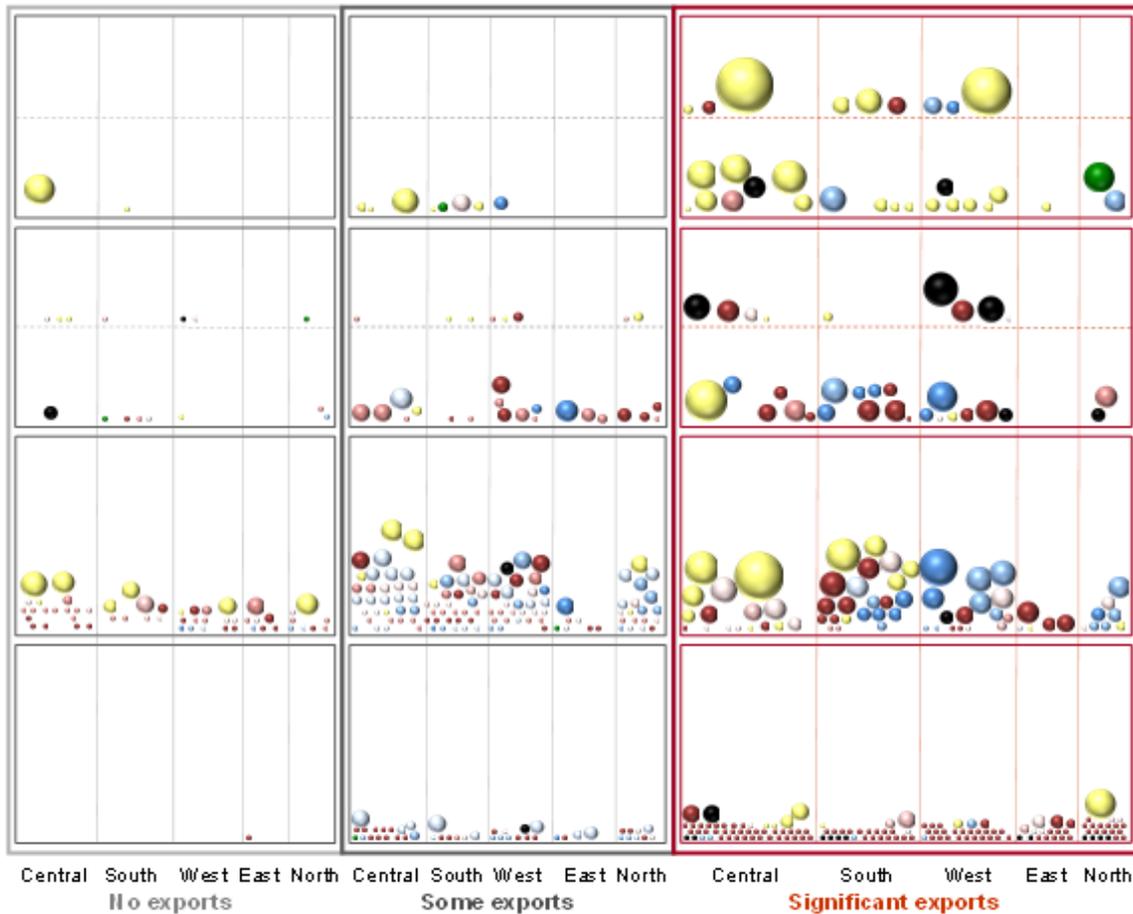
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### 3.8 Relative results and ownership structure

A majority, 61%, of the companies in the chemical industry showed positive results after financial items in 2010, however, as many as 87% of the employees worked in companies with positive relative results 2010. Large companies are overrepresented among companies with positive results. Companies with negative results are evenly distributed between companies with no exports and companies with significant exports and also between companies with only production and companies with a higher R&D content (see Figures 9 and 10). Concerning business segments, the segments Biorefineries, Organic and inorganic base chemicals and Detergents, hygiene products, etc. show a higher share of companies with negative relative results compared to the

other business segments. It can be noted that the companies which comprise also supporting activities (marketing, sales, and other parts of the value chain or other types of production) almost exclusively show positive results.

**Figure 9 - Companies with positive results**



Foreign-owned (in terms of parent company nationality) chemical industry companies are often large companies with significant exports and active in R&D and/or manufacturing. The business segments “Biorefineries” and “Detergents, hygiene products”, etc. are underrepresented among foreign-owned companies. These two business segments have rather local/national markets for their products as can be seen in Figures 11 and 12. Most companies with no or low exports are Swedish-owned. Similarly, most companies producing basic chemicals have international markets (and thus significant exports) and are foreign-owned.

**Figure 10 - Companies with negative results**

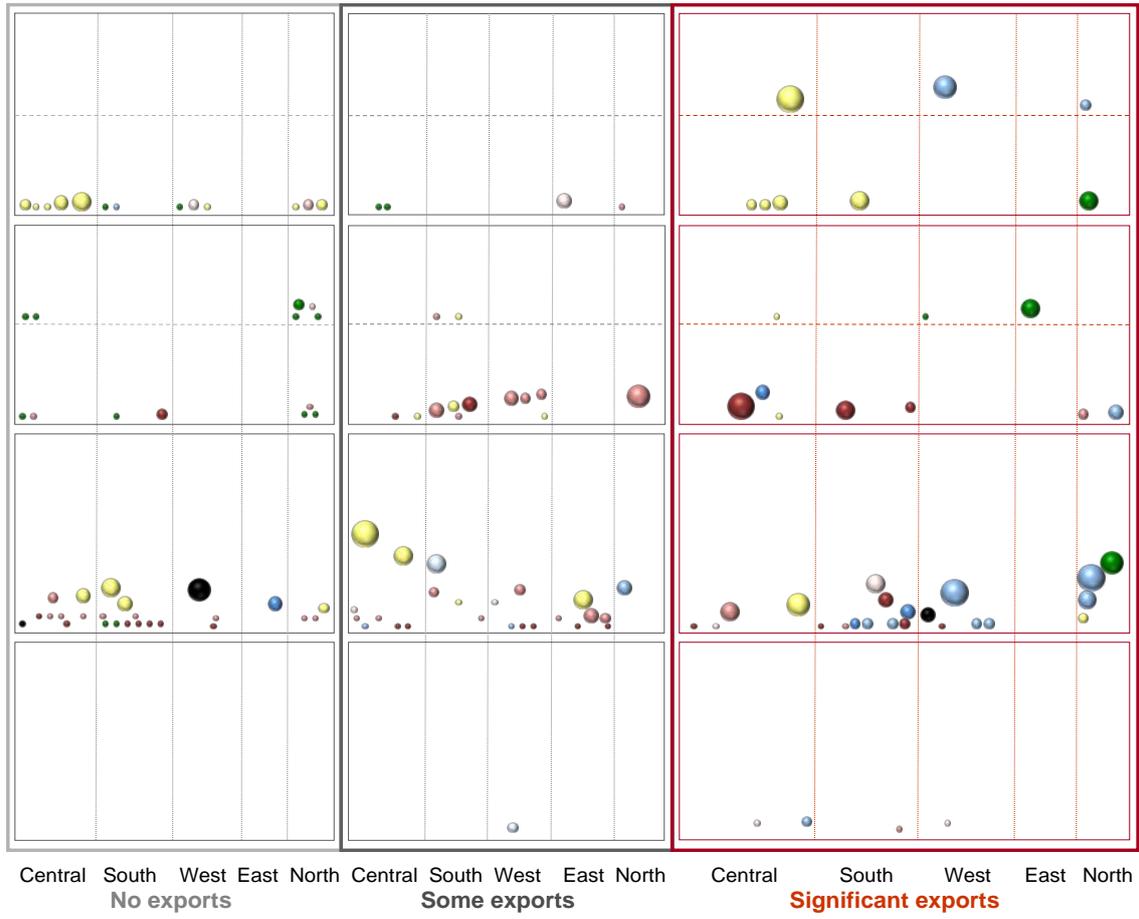
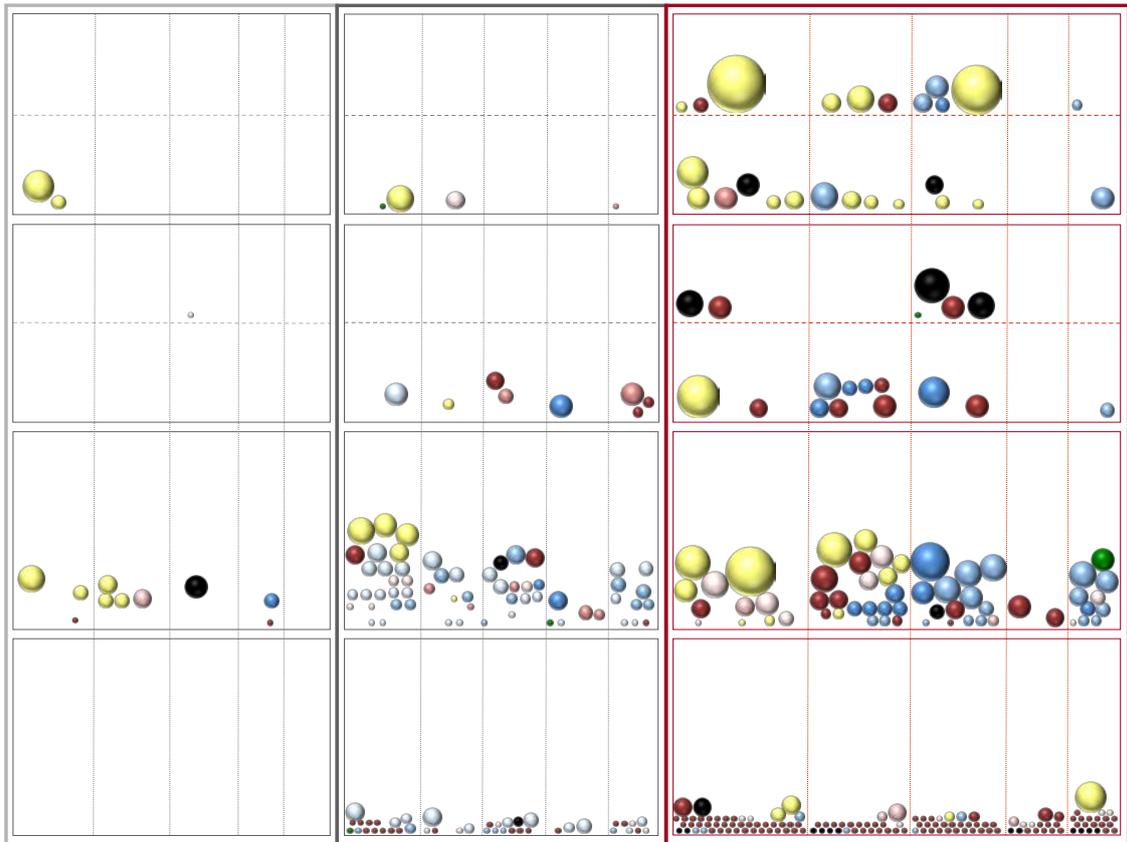
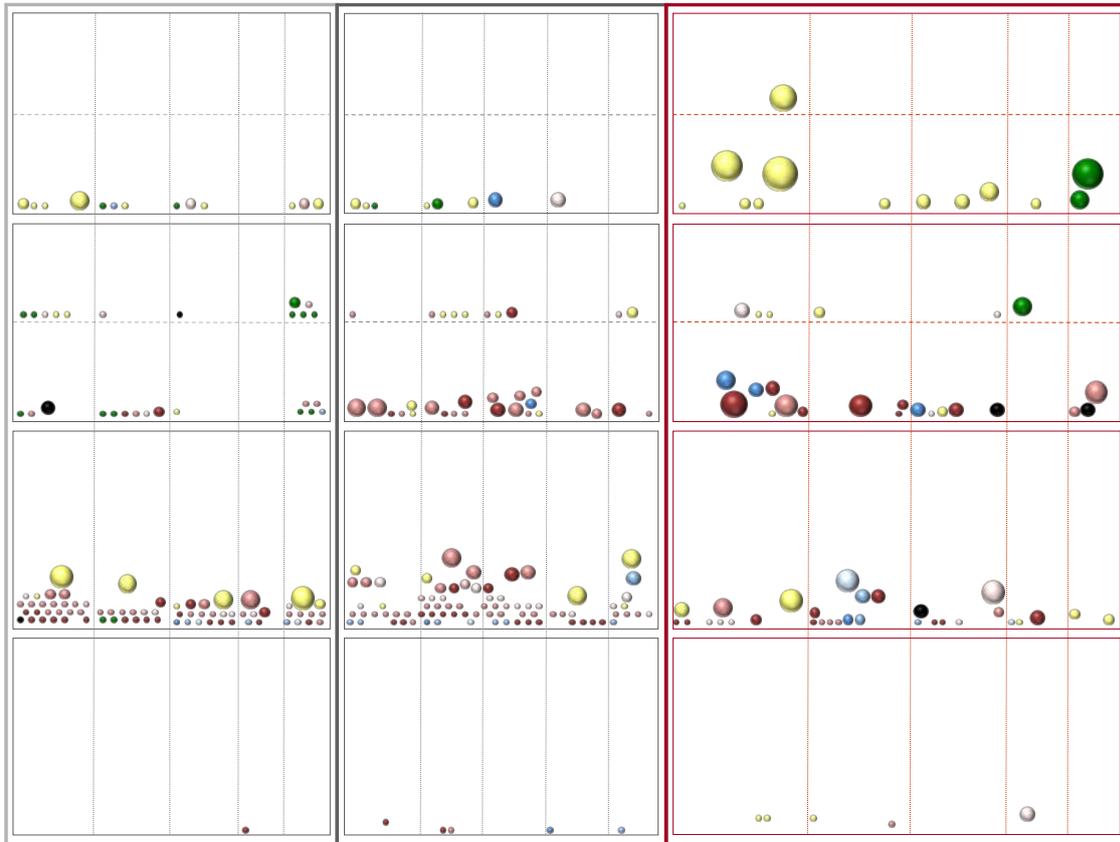


Figure 11 - Companies with foreign ownership



**Figure 12 - Companies with Swedish ownership**



Some key numbers are presented in Table 3 which show a comparison between foreign-owned and Swedish-owned companies in the chemical industry. The table shows that the average foreign owned company is roughly eight times larger than the average Swedish-owned company. Further, the foreign-owned companies are more prone to show positive relative results. They also have a higher share of employees in companies with large fixed assets (both in absolute numbers and relative to turnover).

**Table 3 - Comparable data for companies with foreign and Swedish ownership**

	Ownership		All companies
	Foreign	Swedish	
Number of employees	27 054	7 085	34 139
Number of companies	136	302	438
Average number of employees per company	199	24	78
Share of employees in companies with positive relative results	90%	74%	87%
Share of companies with positive relative results	76%	65%	69%
Share of employees in companies with fixed assets/turnover > 50%	55%	32%	50%
Share of employees in companies with fixed assets > 100 MSEK	80%	46%	73%

### 3.9 Participation in the European seventh framework programme

Of the companies included in the present study, 17 have participated in the European Seventh Framework Programme (FP7) (see Table 4). Most large companies with significant R&D in Sweden are represented in Seventh Framework Programme Projects, e.g., AstraZeneca, Perstorp Speciality chemicals, Casco Adhesives and Eka Chemicals (the latter two are both part of the Akzo Nobel group) whereas some are not, e.g., Borealis and Nynäs. AstraZeneca dominates the statistics with participation in 10 projects. At the same time, the largest project by far, in terms of funding to the Swedish participants, is in Energy involving Chemrec AB and Preem Petroleum AB. Viscogel AB is the only company which is a coordinator of a project in the ‘research for SMEs’ section of the programme. Five companies are involved in more than one project. The table shows that the business segment with the most projects by far is “Pharmaceutical products, reagents, etc.” with 17 participations (equal to 55% of the total number of participations by the Swedish chemical industry). However, seven out of these participations are within the Health programme and thus the “chemistry content” in these might be low. The second most active business segment(s) are “Chemical products” (and its sub-segments) with 10 participant projects. Out of these 10 participants, the development company SweTree Technologies and the consultant firm PP-Polymer stand for half (5).

In total, the chemical industry’s participation equals approximately 5% of the total Swedish business participation including SME. Compared to the chemical industry’s share of exports (see Section 3.6), and given that approximately a third of the participant projects are made by AstraZeneca, the Swedish chemical industry’s participation in the seventh framework programme must be regarded as low.

**Table 4 - Participation in the European Seventh Framework Programme by chemical industry companies**

FP7 Programme	Business segment	Energy	Environment	Health	ICT	Food, agriculture and fisheries, and biotechnology	Nanosciences, nanotechnologies, materials & new production technologies	People	Small and medium sized enterprises	Space	Total no. of participant projects
AstraZeneca				4	2		1	3			10
SweTree Technologies						2	1				3
Bactiguard				1					1		2
Fujirebio Diagnostics				1	1						2
PP-Polymer				1					1		2
Casco Adhesives							1				1
Linotech									1		1
Perstorp Speciality Chemicals			1								1
Eurengo Bofors										1	1
Plasmatrix Materials							1				1
GE Healthcare Bio-Sciences				1							1
Lavivo									1		1
Viscogel									1		1
Eka Chemicals							1				1
Polykemi							1				1
Preem		1									1
Chemrec		1									1

Source: VINNOVA using data from e-corda (extraction date 2012 06 19)

### 3.10 Universities, research institutes and R&D collaborations

In Sweden, there are no major industry research programmes or research foundations connected to the chemical industry in the way they are connected to other industry sectors such as the energy sector<sup>22</sup>, pulp and paper industry<sup>23</sup> or iron and steel industry<sup>24</sup>. Consequently, the chemical industry's trade association is not managing

<sup>22</sup> E.g. Elforsk ([www.elforsk.se/](http://www.elforsk.se/)) and Värmeforsk ([www.varmeforsk.se/](http://www.varmeforsk.se/)).

<sup>23</sup> E.g. the Industry research for wood and forest (in Swedish Branschforskningsprogrammet för skogs- och träindustrin): <http://www.vinnova.se/upload/EPiStorePDF/vi-10-03.pdf>

<sup>24</sup> E.g. Strategic research for the steel industry (in Swedish "Strategiskt stålforskningsprogram för Sverige": <http://www.jernkontoret.se/forskning/stalforskningsprogrammet/index.php>

research programmes nor is it coordinating common national industry research in the same way as e.g., the trade organisation for the iron and steel industry does<sup>25</sup>. Some of the more general research programmes financed by the Swedish Energy Agency could be applied also to the chemical industry<sup>26</sup>, as can parts of the research performed around the three pilot plants for production of the second generation biofuels (black liquor gasification in Piteå, gasification of biomass in Värnamo and production of ethanol in Örnköldsvik), but there are no industry specific programmes. Publicly financed industry research programmes which encourage additional funding by participating industry partners is one way R&D operators and industry can approach and learn from each other. The lack of such initiatives in Sweden can be one reason to why information regarding R&D collaboration between public and private actors was difficult to find for the chemical industry during the work for this report.

Despite the lack of industry related research programmes and research foundations, significant research is carried out in the field of chemistry and chemical engineering at many Swedish universities and research institutes, some of which are briefly described in the Appendix, together with related knowledge centres, science parks, etc.

Roughly a third of the companies which have some R&D related activities or product development clearly state that they perform these activities in collaboration with universities. The universities most often mentioned are KTH Royal Institute of Technology, Chalmers University of Technology and Lund University. A handful of companies also state that they do research or product development in cooperation with research institutes such as SP Technical Research Institute of Sweden (and subsidiaries, mainly YKI, Institute for Surface Chemistry) and Innventia. The companies which perform their research in collaboration with R&D operators range from large, e.g., Preem which has a partnership with Chalmers University of Technology and Perstorp Speciality Chemicals which collaborates with Lund University in the development of platform chemicals, to small, e.g., Pica Kemi (which develops and produces products for graffiti removal) which perform their product development in collaboration with SP Technical Research Institute of Sweden and Lund University. A number of the smaller companies are academic spin-offs such as Appeartex (which develops and produces biotechnological germicides) founded in 2003 in collaboration with Chalmers Innovation, Xylophane (which is developing a biobased barrier material for packaging) born out of a research project at Chalmers University of Technology and Plasmatrix (which is developing plasma coating for reducing friction) which develops their products in collaboration with researchers at KTH Royal Institute of Technology.

Since the chemical industry by definition is rather diverse, and since only a limited number of companies are active in R&D, it is hard to point out strategic research areas.

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<sup>25</sup> E.g. Jernkontoret is managing the common Nordic steel research and administrates two large research programmes funded by the Swedish Energy Agency and VINNOVA: "Energiforskningsprogrammet" and "Stålforskningsprogrammet".

<sup>26</sup> E.g. programmes on energy efficiency such as "Effektivisering av industrins energianvändning".

However, some areas worth mentioning are the development of biobased products and processes (e.g., chemical biorefineries), nanotechnology and its applications in the field of chemistry, process development, reduced environmental impact and areas connected to the field of Life Science (e.g., industrial biotechnology).

Roughly 65% of the companies which state that they perform research or product development in cooperation with R&D operators have less than 50 employees. The companies with external R&D collaborations are represented in all business segments. However, “Pharmaceutical products, reagents, etc.” and “Biorefinery” are the business segments with the most frequent occurrences of collaborations with external R&D operators.

The research areas are manifold and mirror the diverse chemical industry with respect to products, processes and raw materials. Most of the research is, however, quite applied and focused on improving (or adding) properties or features of the products in the company’s product portfolio.

## 4 Cluster profiles for business segments

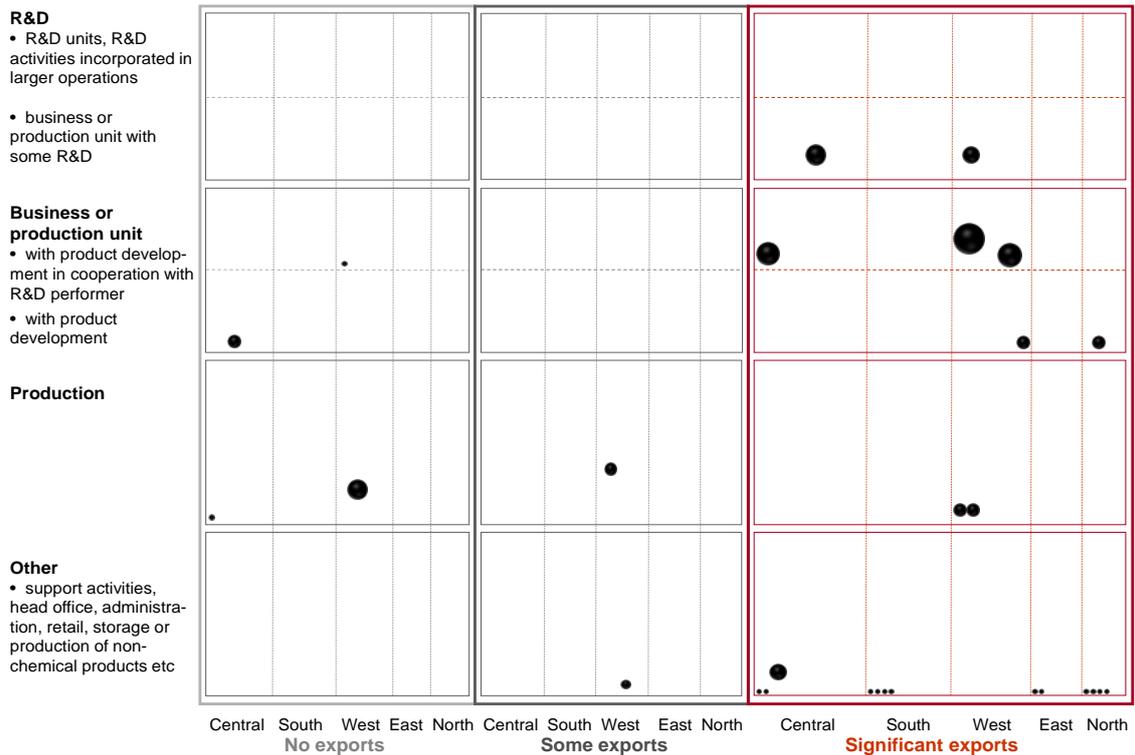
This section presents the cluster profiles (bubble diagrams) for each business segment. For each business segment, a short discussion is given regarding some of the perspectives that can be seen in the figures. The reader is encouraged to make his/her own further interpretations.

### 4.1 Refinery (including grease)

In 2010, the refinery industry, including the production of graphite and grease, employed 2188 people (FTE). The number of FTEs have remained fairly constant over the years 2007 to 2010. The business segment is largely made up by three larger refinery companies, Preem, Nynäs, and St1 Refinery (previously Shell Raffinaderi), one graphite producer (Superior Graphite) and a limited number of companies developing and manufacturing grease (Axel Christiernsson, etc.). The main activities are carried out solely in Västra Götaland and the areas around Stockholm, apart from Superior Graphite which has their business in Sundsvall. Most of the companies have R&D within the company (e.g., Axel Christiernsson) or are working with product development in cooperation with R&D performers (e.g., Preem). One interesting example to put forward is the joint work which has resulted in Preem's Evolution Diesel. This product is based on tall oil from the pulp and paper industry which is refined by the company Sunpine (in the business segment Biorefinery), and then blended into Preem's diesel and sold as a partly green product. Here companies have worked together along the value chain and through joint ownership of the company (Sunpine) innovation has been achieved.

The environmental aspects which are commonly discussed by the companies in this business segment are reduction of emissions and energy efficiency. Also, some companies supply excess heat for district heating purposes.

**Figure 13 - Cluster profile Refinery including greas**



## 4.2 Biorefinery

This business segment consists of two types of companies, larger exporting companies (Lantmännen Agroetanol, SEKAB, Arizona Chemicals, Domsjö Fabriker, etc.) and smaller companies in which consultants and research partners also are represented (e.g., Taurus Energy and Chemrec). The business segment additionally includes facilities currently under development such as Nordic Ethanol and Biogas (Nordisk Etanol och Biogas). In total these companies employ 789 FTEs, mainly in northern Sweden. The number of FTEs has grown by 42% between the years 2007 and 2010. Most of the companies engage in R&D and/or product development, commonly in clusters or in cooperation with other R&D actors or companies. Less than 30% of the companies showed positive results for 2010.

Currently, most companies are focused on development and manufacturing of biofuels, for example Perstorp Bioproducts, which is Sweden's largest producer of RME. Further, Domsjö Fabriker is Sweden's largest producer of biogas, although their main product is celluloses used for manufacturing of textiles (viscose). However, some of the companies develop and manufacture chemicals or materials (e.g., Arizona Chemicals and Organoclic) and some are focused on process development (e.g., Bioendev and the process for torrefaction and Värmlandsmetanol and the process for producing methanol from wood). The main environmental aspect put forward by the companies in this

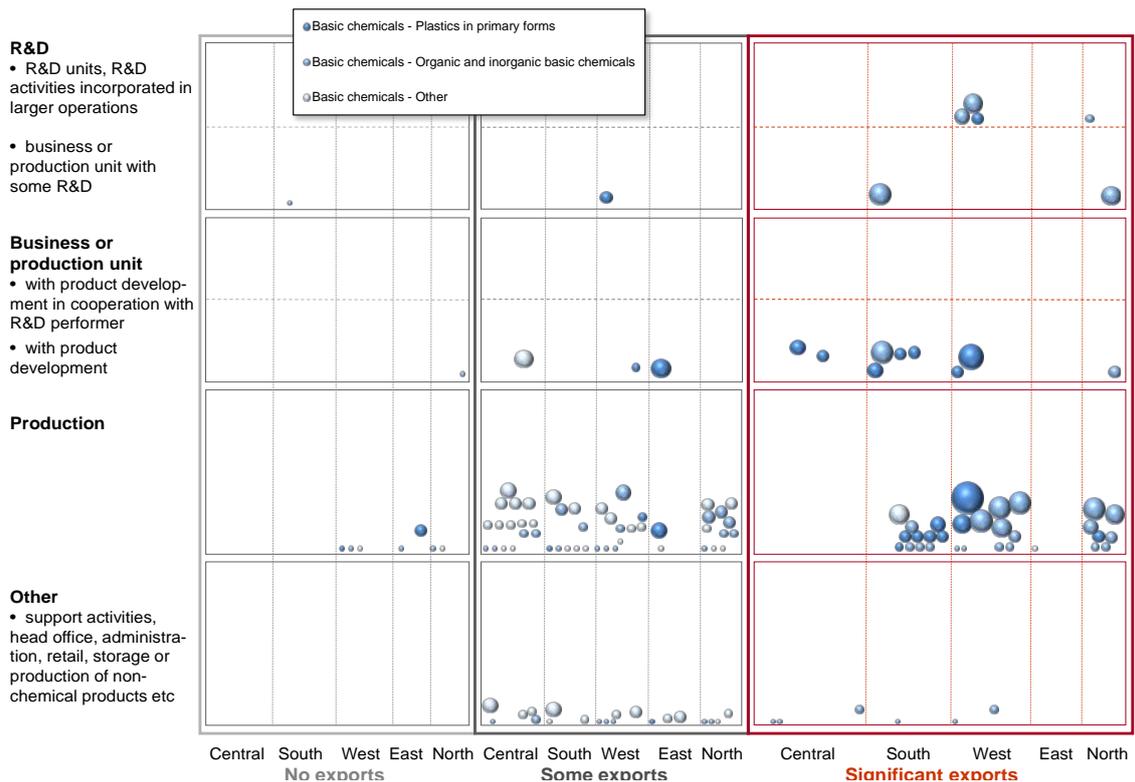


Group. Exceptions are the, rather new, companies BIM Kemi and Nexam Chemical, known for their innovation.

Environmental aspects commonly put forward by this business segment are reduced emissions and the environmental responsibility the industry takes for their business and their products. Most companies focus the communication regarding environmental issues on aspects of on-site activities, not products. However, some of the companies produce products which contribute to beneficial environmental effects, such as Kemira Kemi and Feralco Nordic, both of whom produce products for water treatment. Furthermore, some of the companies produce biodegradable plastics (promoted as environmentally sound). This is not to be confused with biobased or recycled/reused plastics. However, in some applications, biodegradable is not beneficial, for example, if the product degrades if exposed to sunlight or oxygen when it is expected to be durable (this applies to plastic used in products such as dashboards or cables).

One corporate group worth mentioning, especially concerning environmental issues, is Akzo Nobel which has been acknowledged for its sustainability work e.g., by the continuously high rankings on the Dow Jones Sustainability index.

**Figure 15 - Cluster profile Basic chemicals**

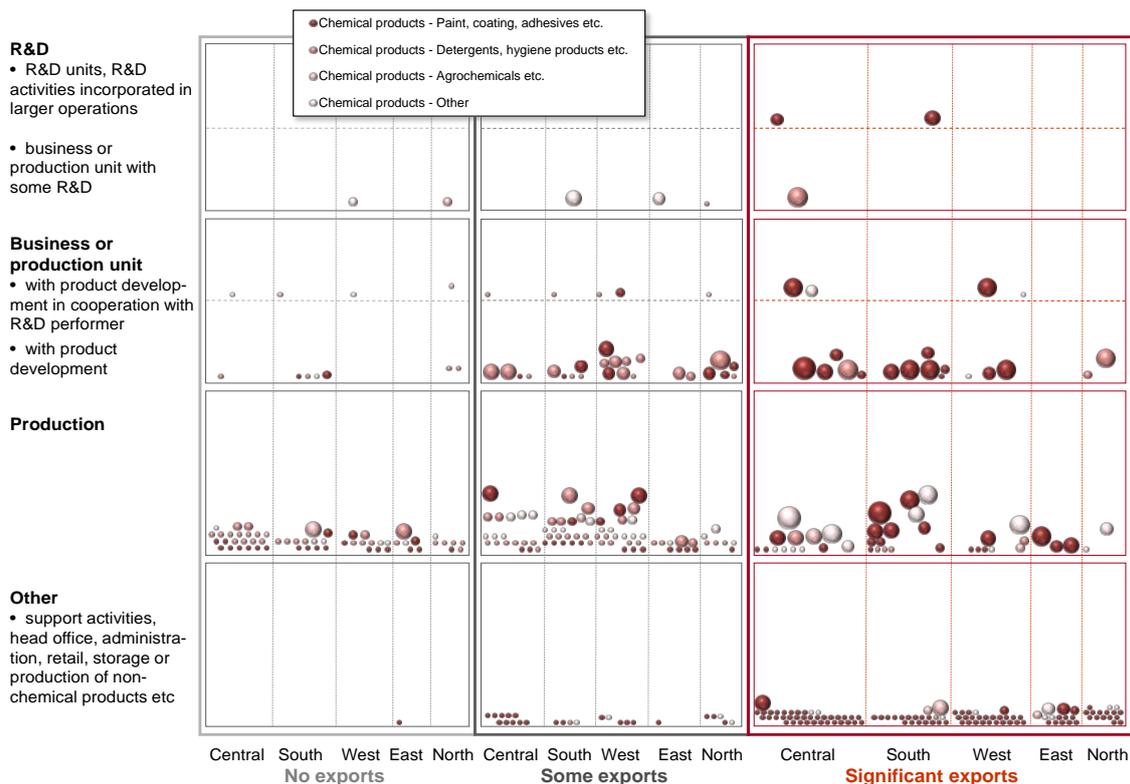


#### **4.4 Chemical products**

This is the largest business segment with regards to the number of companies. Most companies included are, however, fairly small themselves. The products produced by companies in this business segment are very diverse. The main activities are, however, similar among the companies. Most companies have their main activities in manufacturing and incremental product development. Within the sub-segment “Detergents and hygiene products, etc.” contract manufacturers are more common than within the other sub-segments. The companies are evenly spread in all five regions and employed 7 294 FTEs in the year 2010, a reduction of 5% compared to the year 2007. The R&D carried out within the companies in this business segment is partly directed towards developing new products based on biogenic feedstock. Furthermore, R&D is both carried out in larger companies with significant exports (e.g., Akzo Nobel Decorative Coating) and smaller companies lacking export (e.g., SweTree Technologies).

For the companies producing chemical products the environmental aspects put forward varies with the type of products produced. However, most companies focus on product characteristics, and/or on site environmental impacts. The companies developing and producing paint often tell if their products are water based and companies producing skin and hair care products often promote the product as “natural”. Many of the companies in this business segment also clearly state that they have an ISO 14001 certification and/or an environmental policy.

**Figure 16 - Cluster profile Chemical products**



#### 4.5 Pharmaceutical products, reagents, etc.

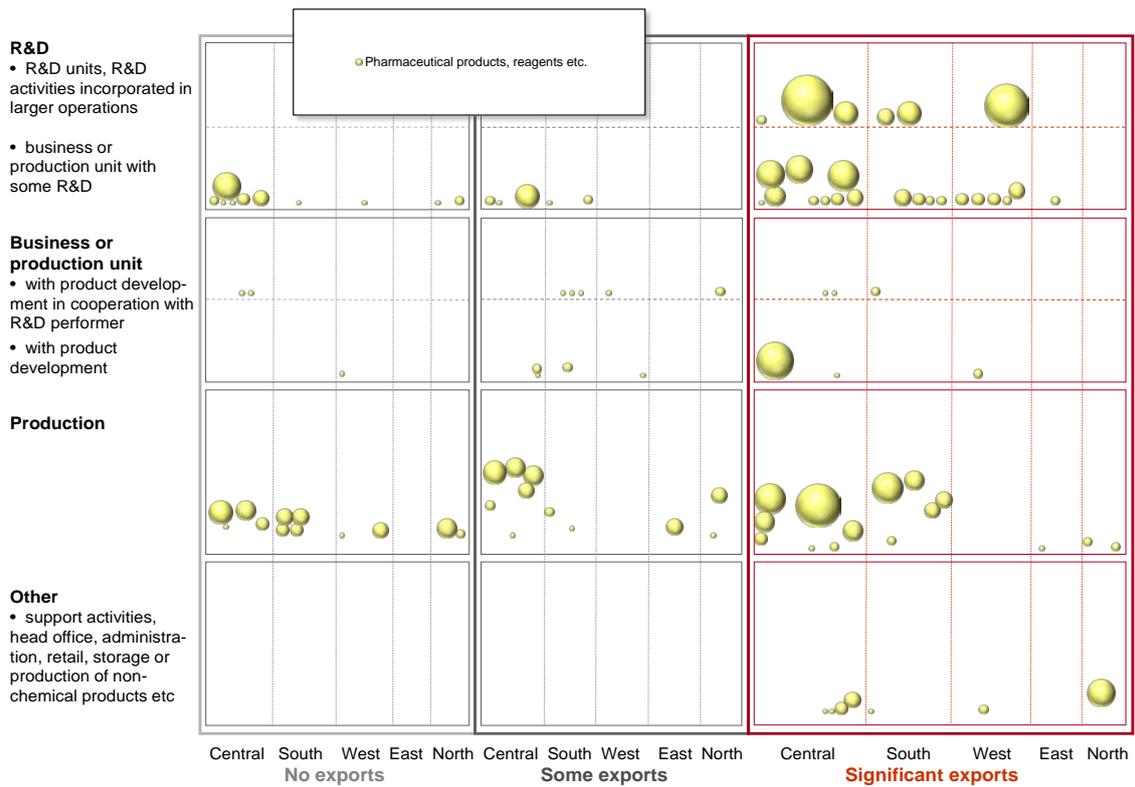
With respect to its 16 486 FTEs in the year 2010, this is the largest business segment in the chemical industry. A majority of the companies in this business segment is covered more in depth in a previous, similar, analysis of the Life Science industry<sup>27</sup>. The absolute majority of the companies are located in central Sweden around Stockholm and Uppsala.

Within the chemical industry, this is the business segment with by far the most R&D activities. It is, however, also the business segment which has reduced its employees the most between the years 2007 and 2010, both in absolute and relative terms. The cut backs made by AstraZeneca are the largest contributor to this development, since AstraZeneca is by far the largest company, both within the business segment and within the chemical industry as a whole. From this perspective it is interesting to note that the company Fresenius Kabi has moved parts of its R&D back to Sweden in the last couple of years. Apart from the R&D intensive companies, this business segment also comprises many contract manufacturers.

<sup>27</sup> Sandström A. et. al. "Life Science companies in Sweden – Including a comparison with Denmark" VINNOVA Analysis VA 2011:03 (2011)

Within this business segment, environmental aspects are seldom clearly mentioned on company websites and annual reports even though many of the companies are ISO 14001 certified and actively work with e.g., energy and process efficiency (stated if asked). In this field increasing attention is also given to what happens after the pharmaceuticals have been consumed, e.g., hormones affecting fish. Another area receiving increased attention is on site environmental issues in low cost countries given the increased outsourcing of manufacturing to such countries by the large pharmaceutical corporations.

**Figure 17 - Cluster profile Pharmaceutical products, reagents, etc.**

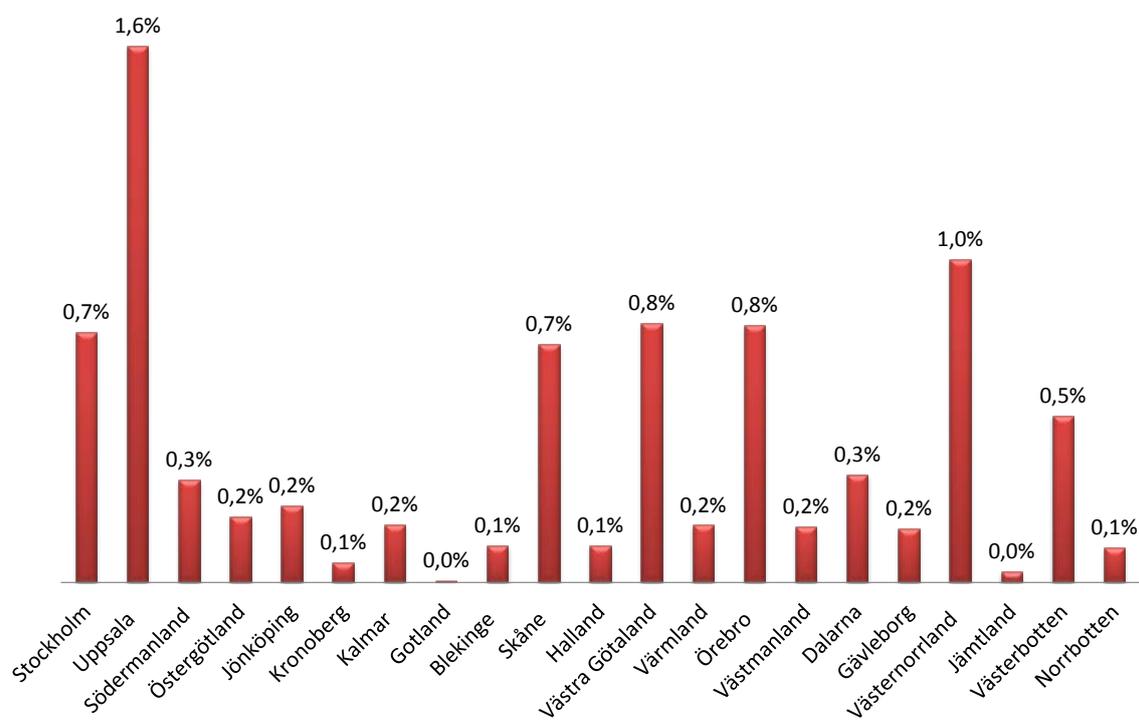


## 5 Regional cluster profiles

Figure 18 shows the share of employees in the chemical industry out of the total population in the working age for the different counties in Sweden. It should be noted that in addition to a high employment ratio in the counties close to the three regions with the highest density of companies (Stockholm, Uppsala, Skåne and Västra Götaland, see e.g., Figure 6), the chemical industry also employs a large share of the population in the counties of Västernorrland (1%) and Örebro (0.8%). The average number for the whole country is 0.8%.

Sections 7.1-7.5 presents the regional cluster profiles for the five regions analysed.

**Figure 18 - Percentage of employees in the chemical industry per county out of total population in the working age**



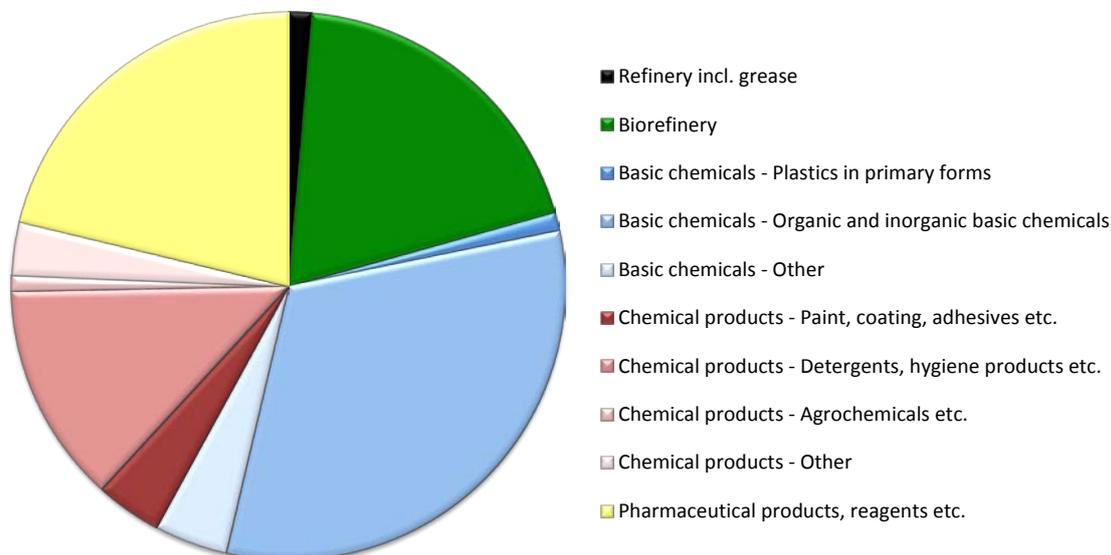
### 5.1 Region North

In Region North, a large share of the employees work in chemical industry companies which are biorefineries (e.g., Domsjö Fabriker) or use biogenic feedstock (Akzo Nobel Group). Most of the business segments are well represented in the region. The region represents 17% of the companies in the chemical industry, but only 9% of the

employees, indicating that the companies and company sites located in the region are smaller compared to the average.

**Figure 19 - Overview of the cluster profile for Region North**

**Employees in Region North divided by business segment**



Number of employees	3 238	Share of chemical industry in Sweden total	9%
Number of companies	76	Share of chemical industry in Sweden total	17%
Number of company sites	105	Share of chemical industry in Sweden total	15%
Share of business or production units in Region North with product development or R&D		38%	
Share of companies in Region North with positive results 2010 (69% in all of Sweden)		67%	
Share of employees employed in Swedish owned companies in Region North (20% in all of Sweden)		16%	
<b>Five largest sites/companies:</b> GE Healthcare Bio-sciences, Domsjö fabriker, Eka Chemicals <sup>28</sup> , Cederroth, Akzo Nobel Functional Chemicals			

Many of the companies in the region engage in product development and/or R&D. With respect to this, the cluster of companies in Örnsköldsvik (where e.g., Domsjö Fabriker is located) should be mentioned as an innovative and research oriented environment where companies share both feedstock and R&D resources. As has already been mentioned, other regional cluster initiatives and research environments include Processum and Bio4Energy.

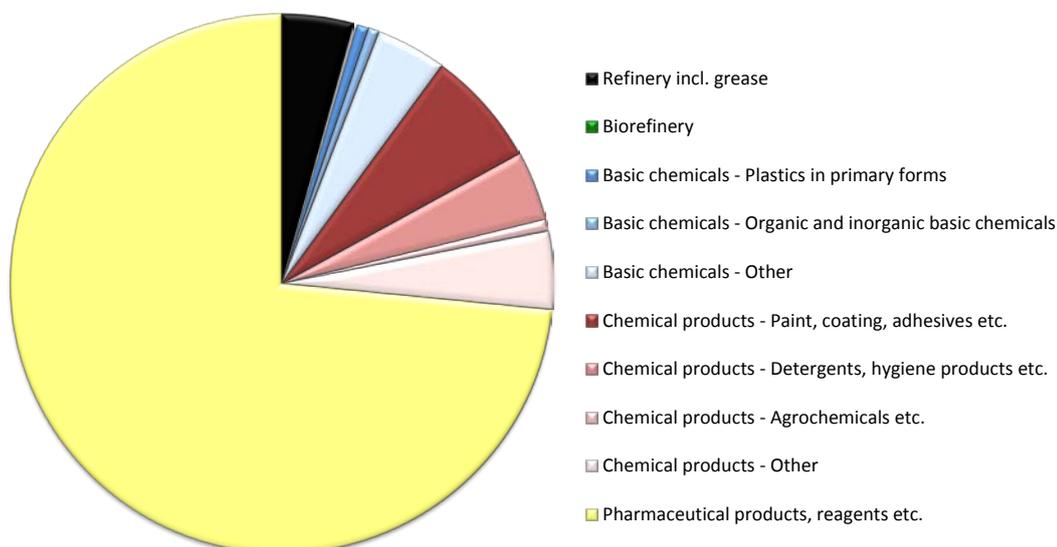
<sup>28</sup> As of 2012 also known as Akzo Nobel Pulp and Paper Chemicals.

## 5.2 Region Central

Region Central is dominated by companies which develop and manufacture pharmaceutical products and chemical products for medical purposes and many of the companies have significant R&D activities. Almost half of the employees in the chemical industry work in this region and the companies are larger than average. The second largest business segment is production of different chemical products, which in total represents 17% of the employees in the chemical industry in the region. Examples of companies in Region Central which are active in other business segments than pharmaceuticals and medical products are Nynäs with its oil refinery in Nynäshamn, Organoclick, which develops fiber based materials, Casco Adhesives, which develops adhesives and has their headquarters in Stockholm, and Orica Sweden which manufactures explosives.

**Figure 20 - Overview of the cluster profile for Region Central**

**Employees in Region Central divided by business segment**



Number of employees	15 599	Share of chemical industry in Sweden total	46%
Number of companies	144	Share of chemical industry in Sweden total	33%
Number of company sites	211	Share of chemical industry in Sweden total	31%
Share of business or production units in Region Central with product development or R&D			26%
Share of companies in Region Central with positive results 2010 (69% in all of Sweden)			68%
Share of employees employed in Swedish owned companies in Region Central (20% in all of Sweden)			19%
<b>Five largest sites/companies:</b> AstraZeneca, GE Healthcare Bio-sciences, Fresenius Kabi, Octapharma, Phadia			

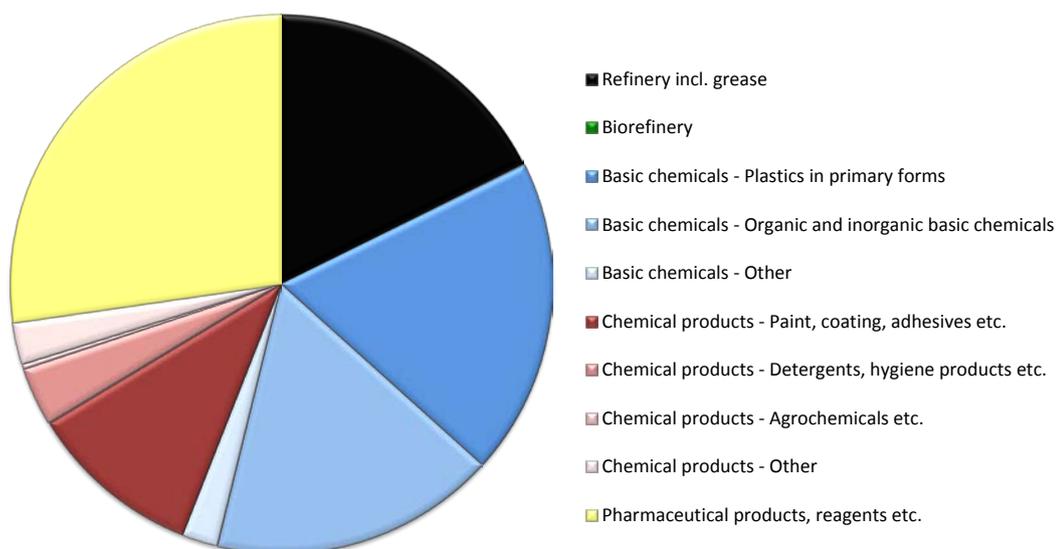
### 5.3 Region West

In the western part of Sweden, the basic chemical industry and the refinery industry are the main employers within the chemical industry. Another large employer is AstraZeneca that have a large development unit in Mölndal close to Göteborg. In relation to Swedish chemical industry as a whole, many of the companies show positive results. Also, the companies in Region West are to a greater extent than average foreign-owned.

Cluster initiatives have been formed in the region and the large chemical companies in Stenungsund (Borealis, INEOS, Akzo Nobel, Perstorp and AGA) work together with a joint vision on Sustainable Chemistry by 2030 and together with other regional actors through a regional initiative, “Kemiindustriklustret”. Furthermore, within the region, Green chemistry and biobased products have been appointed as one of five strategic areas and is identified as a regional strength.

**Figure 21 - Overview of the cluster profile for Region West**

**Employees in Region West divided by business segment**



Number of employees	8 285	Share of chemical industry in Sweden total	24%
Number of companies	119	Share of chemical industry in Sweden total	27%
Number of company sites	159	Share of chemical industry in Sweden total	23%
Share of business or production units in Region West with product development or R&D			26%
Share of companies in Region West with positive results 2010 (69% in all of Sweden)			77%
Share of employees employed in Swedish owned companies in Region West (20% in all of Sweden)			14%

**Five largest sites/companies:** AstraZeneca, Borealis, Preem, INEOS Sverige, Eka Chemicals<sup>29</sup>

<sup>29</sup> As of 2012 also known as Akzo Nobel Pulp and Paper Chemicals.

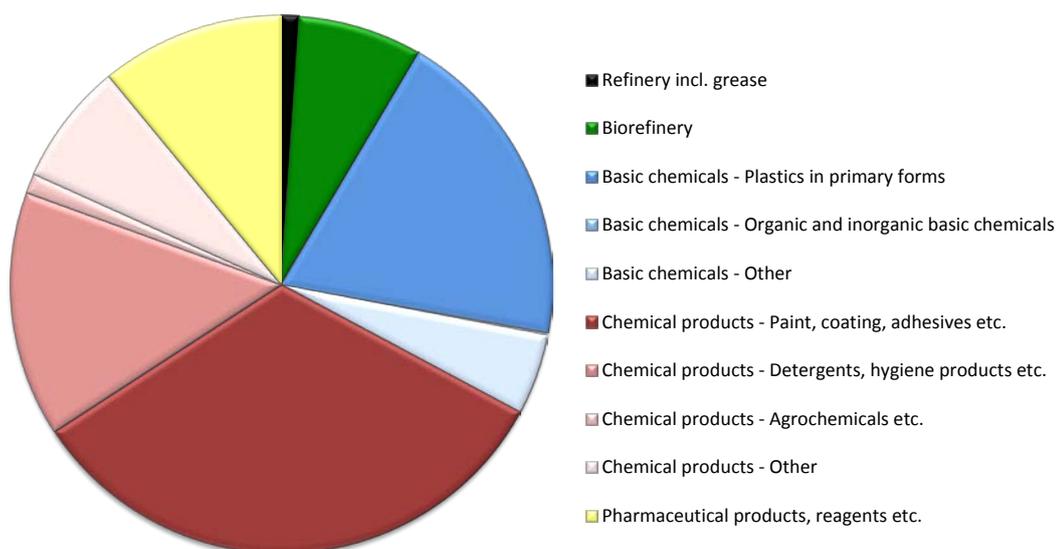
## 5.4 Region East

Out of the five regions, Region East has by far the smallest share of chemical industry. Here the chemical industry employs 1250 people in 42 companies. Most companies produce different chemical products and only a few are active in product development and R&D.

Many of the companies in the region show positive results and the companies are to a greater extent Swedish-owned compared to the other regions.

**Figure 22 - Overview of the cluster profile for Region East**

**Employees in Region East divided by business segment**



Number of employees	1 254	Share of chemical industry in Sweden total	4%
Number of companies	42	Share of chemical industry in Sweden total	10%
Number of company sites	53	Share of chemical industry in Sweden total	8%
Share of business or production units in Region East with product development or R&D		11%	
Share of companies in Region East with positive results 2010 (69% in all of Sweden)		79%	
Share of employees employed in Swedish owned companies in Region East (20% in all of Sweden)		42%	

**Five largest sites/companies:** Akzo Nobel Industrial Finishes, Carpenter Sweden, Vitamex production, DuPont Powder Coatings Scandinavia, Lantmännen Agroetanol

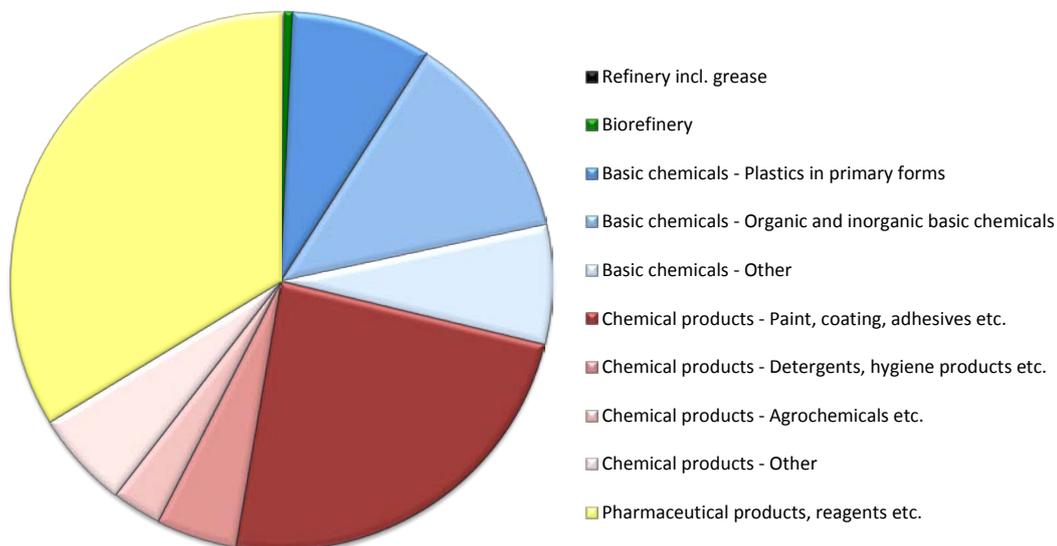
## 5.5 Region South

In Region South there is an even distribution between companies producing basic chemicals, different chemical products, and pharmaceutical products. Most of the companies are located in and around Malmö, Lund, and Perstorp. In total, the region

represents 17% of the employees and 31% of the companies within the chemical industry in Sweden.

**Figure 23 - Overview of the cluster profile for Region South**

**Employees in Region South divided by business segment**



Number of employees	5 763	Share of chemical industry in Sweden total	17%
Number of companies	135	Share of chemical industry in Sweden total	31%
Number of company sites	162	Share of chemical industry in Sweden total	23%
Share of business or production units in Region South with product development or R&D		26%	
Share of companies in Region South with positive results 2010 (69% in all of Sweden)		70%	
Share of employees employed in Swedish owned companies in Region South (20% in all of Sweden)		19%	
<b>Five largest sites/companies:</b> McNeil, Perstorp Speciality Chemicals, Kemira Kemi, AstraZeneca <sup>30</sup> , Akzo Nobel Decorative Coating			

<sup>30</sup> The AstraZeneca site in Lund was shut down during 2011, and is thus no longer one of the largest sites/companies in the region.

## 6 Consultants and service companies

The five largest technical consultants with some business directed to the chemical industry are listed in Table 5 below. As previously mentioned, only consultants with the chemical industry as their major business have been included in the population. Such companies are, however, rather small, with 1-20 employees.

**Table 5 - The five largest technical consultants with some business within the chemical industry**

	<b>Number of employees 2011</b>	<b>Number of employees 2008</b>
ÅF-INDUSTRY AB	1284	970
RAMBÖLL SVERIGE AB	856	945
SEMCON CARAN AB	1011	1628
GRONTMIJ AB	713	778
VATTENFALL POWER CONSULTANT AKTIEBOLAG	700	661

Within the chemical industry there is a broad use of technical consultants and service companies, at least amongst the larger companies. The consultants and service companies today perform different functions in the companies that were previously handled by the companies themselves, e.g., maintenance, engineering, and security. Sometimes staffing companies are also responsible for parts of the workforce employed in production or human relations and recruitment processes.

One example of such a company is BIS Production Partner that offers projects and maintenance services to various branches of industry (in Sweden to most sectors in the process industry). BIS Production Partner was founded in Sweden in 2005 and has since then expanded significantly, from 91 employees in 2008 to 536 in 2011. For the chemical industry, BIS Production Partner has signed strategic agreements to supply, for example, production-related maintenance work, preparation of maintenance and preventive maintenance for Borealis, Akzo Nobel, INEOS, Eka Chemicals, Nynäs, etc.

Other examples of consultants and service companies working (partly) with the chemical industry that have significantly expanded their business, with respect to full time employees, between the years 2007-2011 are Jacobs (51 to 69 FTE), Prevent (113 to 146), COWI (556 to 758), Randstad (532 to 784), Eurocon Engineering (6 to 142) and ÅF Industry (970 to 1294).

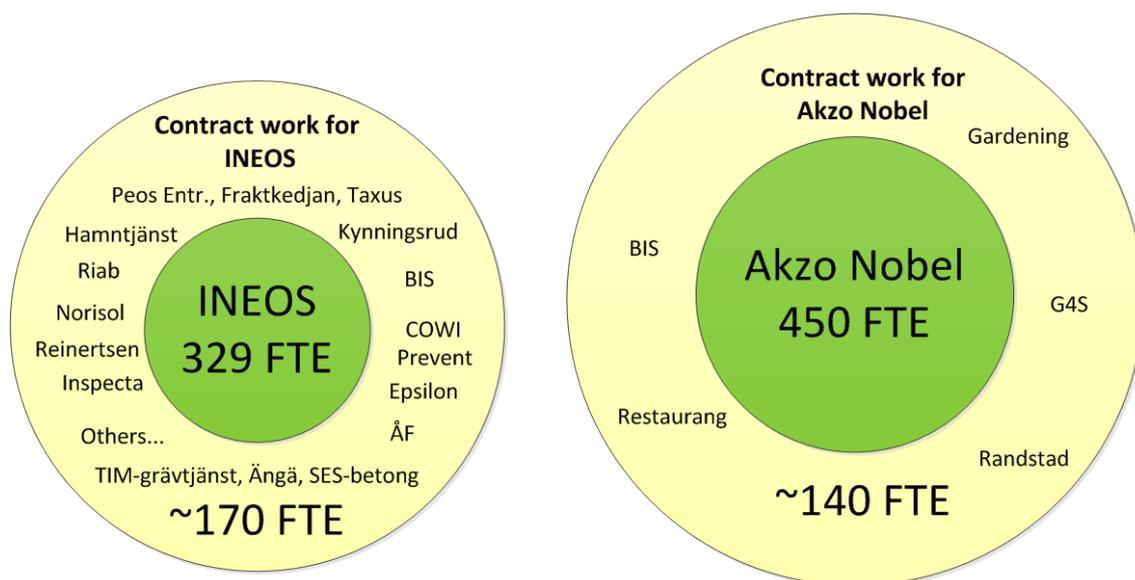
The consultants are important since the chemical industry to a large extent does not develop their own technologies, but buys them from engineering and consultant firms. Consequently, it might be the collaboration between the chemical companies and specialised consultants that generates innovation in new technology and biorefineries.

Examples of consultant firms working with biorefineries in different ways (with regard to the chemical industry, but mainly about other industry sectors, such as the pulp and paper industry) are e.g., MoRe Research, Eurocon and the research institute Innventia.

## 6.1 The example of direct and indirect employment for two companies in the chemical industry

In Figure 24 an example is given regarding the direct and indirect employment in the chemical industry. The cores represent INEOS, a PVC manufacturer, and Akzo Nobel, which develops and produces surfactants in Stenungsund. The circles around the cores represent all the people which work for INEOS and Akzo Nobel at the Stenungsund site, but are employed in other companies. As can be seen, these people add an additional 30-50% to the total number of FTEs. For the process industry the indirect employment for the process industry can be estimated by a factor two, which means for each direct employee in the industry another person is employed in another industry or sector<sup>31</sup>.

**Figure 24 - Direct employment and on-site indirect employment for INEOS and Akzo Nobel in Stenungsund**



*Data for on-site indirect employment given by Lars Josefsson of INEOS and Sara Mårlind of Akzo Nobel Surface Chemistry*

<sup>31</sup> See e.g. IVA-M-353 "Ökad konkurrenskraft för svensk processindustri" (only available in Swedish).

# Appendix

## **Biogenic feedstock and the business segment biorefineries**

By definition all companies in the business segment Biorefinery have biogenic feedstock. There are, however, many more companies which to different extents utilise biogenic feedstock. Companies may also produce products based on different types of feedstock at different production sites, and in this report they have been categorised into business segments based on their main product. One example that should be mentioned is the Akzo Nobel sites in Sundsvall where the feedstock is fully biogenic. Depending on the choice of definition, these sites may be classified as biorefineries or “green chemistry”. In this study, however, they have been categorised into the business segment “Organic and inorganic base chemicals” since the companies’ main activities are in this field and also since the use of biogenic feedstock is not a novelty for manufacturing of the produced products. Other companies with mainly biogenic feedstock (but not classified as biorefineries) are manufacturers of limewash, linseed oil, skincare products and pharmaceutical companies. Thus, the chemical industry is “greener” than it looks in the map visualisation (see Figure 7).

It should be noted that it is difficult to fully and correctly identify all companies which fully or partly utilise biogenic feedstock. It is also a complicated task to define what “enough” is in order to be called a biorefinery, and what can be included in the term “green chemistry”. Many companies also have renewable (sometimes biogenic) sources for the energy they use in their support processes, e.g., Nynäs that source some of their process heat from a biomass based heat and power plant. Thus, the aim in this work has been a first attempt to identify a business segment which may, or may not grow, and thereby has begun a foundation to study the dynamics of changes in the coming years.

## **Universities, research institutes, knowledge centres, etc. related to the chemical industry**

At KTH, located in Stockholm, the School of Chemical Science and Engineering is one of the larger schools at the university. The school is comprised of both fundamental and applied sciences and is divided into three departments, Chemical Engineering (with a focus on energy research and production of fuels), Chemistry (with the focus areas of Bioactive Molecules, Functional Materials & Surfaces, and Energy & Environment) and Fibre and Polymer Technology (mainly related to the pulp and paper industry and its systems and processes). At KTH one can find the following centres related to the chemical industry: the Industrial NMR Centre, the Centre of Molecular Devices, the Biofibre Materials Centre and the Swedish Centre for Biomimetic Fiber Engineering.

Further, the following large research institutes are also located at the KTH campus: the Institute for Surface Chemistry<sup>32</sup>, Innventia, and Swerea KIMAB.

At Chalmers University of Technology, located in Göteborg, the research most closely related to the chemical industry is performed by the Department of Chemical and Biological Engineering. The research ranges from natural science and bioscience, applied chemistry and biotechnology to chemical engineering, and is performed through its five divisions: Chemistry and Biochemistry, Life Sciences, Applied Chemistry, Energy and Materials and Chemical Engineering. At this department one can find the following national centres: Centre for Chemical Process Engineering (CPE), Competence Centre for Recycling (CCR), Competence Centre for High Temperature Corrosion (HTC), Competence Centre for Catalysis (KCK), Plastic for a Sustainable Society (PLUS), SUMO Biomaterials and SUPRA centre. The rector of Chalmers has a background in chemical engineering and Chalmers is playing an active part in “Kemiindustriklustret”<sup>33</sup>, which aims at promoting and supporting the chemical industry in western Sweden.

In Gothenburg also the faculty of science at University of Gothenburg performs research in the area of chemistry, mostly through the department of Chemistry and Molecular Biology. The research at the department is divided into more than 15 different areas (e.g. Analytical chemistry, Biochemistry, Electrochemistry, Environmental nanochemistry, Inorganic chemistry, Marine chemistry, Medicinal chemistry, Organic chemistry, Surface biophysics). Also, the VINN Excellence Centre BIOMATCELL (which combines the expertise of materials science and medical devices, with state-of-the-art knowledge of biological components) is hosted by the University of Gothenburg.

In Lund the chemistry research is organised under the umbrella of “Kemicentrum” which is comprised of three departments from both the Faculty of Engineering (LTH) and The Faculty of Science (LU). This makes Kemicentrum one of the largest research centres within the chemistry area in Northern Europe. The three departments are: the Department of Chemistry, the Department of Food Technology, Engineering and Nutrition and the Department of Chemical Engineering. In addition to Kemicentrum, many other research centres and institutes are also located at the Lund University campuses, e.g., Biomedical Centre, Centre for Biomechanics, Centre for Research on Pharmaceuticals and Medical Devices and Lund Functional Food Science Centre. Lund University also is the host for LU Biofuels, which is a multi-disciplinary research platform that brings together researchers working on biofuels from faculties, departments and centres across the entire university.

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<sup>32</sup> Previously a subsidiary of SP Technical Research Institute of Sweden but as of December 2012 merged with SP Chemistry and Materials and a part of SP parent company.

<sup>33</sup> Lead by Business Region Göteborg. See:

<http://www.businessregion.se/huvudmeny/affarsomraden/affarsdrivenmiljoutveckling/gronkemi/kemiindustriklustret.4.47345d50135f346f271708.html>

At Umeå University, in northern Sweden, the Department of Chemistry is one of the largest departments. The research at the department is divided into three main research areas: Biological Chemistry (focusing on biologically important molecules, macromolecules like proteins, nucleic acids, carbohydrates and lipids, as well as small organic molecules), Environmental and Biogeochemistry (focusing on chemical compounds in the environment) and Technical Chemistry (focusing on accelerating the development of integrated biorefining and energy technologies). The department cooperates with more than 30 companies, and a number of small spin-off companies are located in close proximity to Umeå University and the University Science Park, Uminova Science Park. Apart from its location in Umeå, Umeå University has campuses also in Örnsköldsvik and Skellefteå.

Bio4Energy which is a strategic research environment which consists of Luleå University of Technology, Umeå University, and the Swedish University of Agricultural Sciences (Umeå campus). Bio4Energy has a handful of associated industrial partners, e.g., SEKAB. Bio4Energy works with seven research platforms, each of which corresponds to a link in the biorefinery value chain: Feedstock, Pretreatment and Fractionation, Thermochemical, Biochemical, Catalysis and Separation, Process Integration and Environmental.

Processum started in 2003 as a technology park, but has since developed into a biorefinery cluster initiative. Processum is now a member owned company located in Örnsköldsvik (at the same premises as e.g., Domsjö Fabriker, SEKAB and MoRe Research). The major part of the activities within Processum lies within R&D in the areas of biotechnology, energy technology, inorganic and organic chemistry as well as sustainable raw materials.

SP Technical Research Institute of Sweden is Sweden's largest industry research institute and the parent company in a group consisting of six wholly-owned subsidiary companies. The Swedish state, through RISE Holding (Research Institutes of Sweden, government owned), is the sole shareholder of the company. SP operates at about 30 sites in Sweden, but has its headquarters and main facilities outside Borås. The subsidiary YKI, Institute for Surface Chemistry, and the technical area Chemistry and Materials (which will be merged at the beginning of the year 2013) are the units with most strong links to the chemical industry. However, other technical areas and subsidiaries also have relevant activities, such as Energy Technology, Wood Technology, JTI - Swedish Institute of Agricultural and Environmental Engineering and SIK - Swedish Institute for Food and Biotechnology.

Swerea SICOMP, a part of the RISE Holding owned Swerea group, is a research institute in the field of polymer fibre composites. Their business includes applied composite research, development, as well as training, within eight working areas: Large-Scale Experimental Equipment, Materials Science, Modelling and Simulation, Process Development, Product Development, Production Technology, Structural

Engineering, Testing and Analysis. Swerea SICOMP is located in Göteborg, Piteå and Linköping.

Innventia is a research institute which is owned partly by six forest industry companies and partly by RISE Holding (Research Institutes of Sweden, government owned). Innventia has three business areas: Biorefining, Material Processes and Packaging Solutions. Out of these three business areas it is the business area of Biorefining which is the one mostly related to the chemical industry. However, all activities at Innventia are primarily based on or related to the pulp and paper industry. The headquarters are located on the campus of KTH in Stockholm, but Innventia also has operations in Trondheim (the subsidiary PFI), London and at Bäckhammars Bruk where they are operating a demonstration plant for lignin extraction.

The Swedish Knowledge Centre for Renewable Fuels (f3) is a nationwide centre, which through cooperation and a systems approach aims to enhance the development of “fossil free fuels” (otherwise known as renewable fuels) for transportation. The centre does not perform or support fundamental research, but performs syntheses of current research about the production of renewable fuels as well as supplemental research, such as comparative systems analyses of fuels, processes, raw materials and plant design. From the chemical industry, Sekab, Perstorp and Preem are partners in f3. The research activities in the centre are, however, almost exclusively performed by the research operators, not the partnering companies.

Other innovation environments and science parks where the chemical industry is (partly) represented are: Shift2Bio, Uppsala Science Park and SLU Holding, Solander Science Park, Åkroken, Paper Province, the Biofuel region and others.

## **A summary record of environmental aspects and supplemental information**

For the environmental aspects, the following main sources of information have been used: company annual reports, annual environmental reports (if available), information on company websites, environmental parts/aspects of research/development projects in which the company is active, company environmental policy (if available) and online publicly available information about the company (press releases, popular science articles, membership in environmental networks, efficiency programs, etc.).

The quantity and quality of information available varies significantly between the different companies. For many of the very small companies (1-4 employees) no information could be found. On the contrary, for many of the larger companies, significant amounts of information could be found in e.g., environmental reports where both already implemented and future environmental measures were accounted for and described.

Almost all companies which provide any information regarding environmental aspects (usually through an environmental policy) state that they work with “continuous

improvements” and “energy efficiency” and/or “waste minimisation”. Many companies also state that they comply with REACH and that they strive towards reducing their environmental impact (on-site, implicitly stated).

The quality and content of environmental policies given by the companies vary. Some give only a single sentence statement, and some are rather explicit including both vision and goals. The focus is mostly on on-site activity and the non-toxicity of the products produced.

A minority of the companies state environmental aspects as part of their overall company vision and/or business, some rather clearly (e.g., Kemira Kemi) and some more implicitly.

Only very few companies work with the full definition of sustainability (economic, social and environmental), Akzo Nobel being the best example naturally, as it is renowned for its top ranking on Dow Jones Sustainability Index.

## Process for identifying the companies

In the table below the primary sources for identifying companies are listed. The companies were examined one by one and some were found not to be within the definition, see Section 3, and thus excluded. The companies included can be found in the list in the subsequent section.

NACE-codes	Exerps for NACE 19, 20, 21
Trade organisations and similar	The Swedish Plastics and Chemicals Federation, The Swedish Industrial and Chemical Employers Association, The Swedish Bioenergy Association (Svebio)
Cluster and cluster initiatives	Processum, Hållbar Kemi 2030, The biofuel region
Knowledge centres, platforms and science parks	f3, Shift2Bio, Solander sciencepark, Åkroken, Paper Province
Project/EU-project	BioDME, SUPRABIO, Projects connected to LUBiofuels
Other	NyTekniks 33-Listan, the magazine <i>Bioenergy's</i> list of existing and planned plants for biofuel production in Sweden

## List of companies

### Refinery (including grease)

*>250 employees*

Preem AB

Nynäs AB

*51-250 employees*

St1 Refinery AB

Axel Christersson AB

Petrolia AB

*11-50 employees*

Lantmännen Aspen Petroleum AB

Exxon Mobile Sverige AB

Göteborgs smörjmedelsfabrik  
(Scanlube) AB

Superior Graphite Europé Ltd, USA,  
Sweden filial

*1-10 employees*

Svensk oljeåtervinning AB

Ecopar AB

### Biorefinery

*>250 employees*

Domsjö Fabriker Aktiebolag

*51-250 employees*

Arizona Chemical Aktiebolag

Sekab Biofuels and Chemicals AB

Lantmännen Agroetanol AB

*11-50 employees*

Binol AB

Sunpine AB

Sveprol Bio Production AB

Chemrec Aktiebolag

*1-10 employees*

Swedish Biofuels AB

Ecoil AB (PUBL)

NBE Sweden AB

Meva Innovation AB

Ecobränsle i Karlshamn Aktiebolag

Lignoboost Demo AB

Organoclick AB

Värmlandsmetanol Aktiebolag (PUBL)

Taurus Energy AB (PUBL)

Perstorp Bioproducts AB

Norups Gård Bioraff AB

Energigårdarna i Eslöv AB

Nordisk Etanol & Biogas AB

Bioendev AB (Bio Energy

Development North AB)

Eco-oil Miljöbränslen i Sverige AB

Sveprol Bio Production AB

Chemrec Aktiebolag

### Basic chemicals

*>250 employees*

Borealis Aktiebolag

Eka Chemicals AB

AGA Gas Aktiebolag

Akzo Nobel Functional Chemicals AB

Akzo Nobel Surface Chemistry

Aktiebolag

INEOS Sverige AB

Perstorp Speciality Chemicals AB

Perstorp Oxo AB (incl. Perstorp Oxo  
Belgium)

Kemira Kemi Aktiebolag

*51-250 employees*

Air Liquide Gas Aktiebolag

Polykemi Aktiebolag

Element Six Aktiebolag

Carpenter Sweden AB

Akzo Nobel Base Chemicals

Aktiebolag

Ashland Industries Sweden AB

(previously Hercules AB)

Imerys Mineral AB

Celanese Emulotions Norden AB

BASF AB

Habia Teknoflour Aktiebolag

Chemiplastica AB

Sealed Air Svenska Aktiebolag

Böhler Welding Group Nordic AB

PA Resins AB  
INEOS Compounds Sweden AB  
Elasto Sweden AB  
Rohm and Haas Nordiska Aktiebolag  
Evonik Norcarb AB

*11-50 employees*

Riflex Film Aktiebolag  
BIM Kemi SWEDEN Aktiebolag  
Wibax Aktiebolag  
INEOS Nova Sweden AB  
Aluflour Aktiebolag  
Carbide Sweden AB  
Polyone Sweden AB  
Delta Plast AB  
Nolato Silikonteknik AB  
Styron Sverige AB  
Skogens Kol Aktiebolag  
BASF Polyurethanes Nordic AB  
Ask Chemicals Scandinavia Aktiebolag  
Syrgis Performance Initiators AB  
Kemikalia AB  
Tetra Chemicals Europe AB  
Nils Malmgren Aktiebolag  
Thevinyl Aktiebolag  
Feralco Nordic AB  
Marenordic AB  
PQ Sweden AB

*1-10 employees*

Unicolor AB  
Wibax Tech Aktiebolag  
Nexam Chemical AB  
Strandplast Perstorp AB  
Lab.service i Sundsvall Aktiebolag  
Archemi Aktiebolag  
Sellukem AB  
TA Chemistry Aktiebolag  
Recyclean Biosystems AB  
Vindelkol AB  
Lundin Polymertek AB  
BSI Byggsystem Industri Aktiebolag  
Extroil AB  
J.M. Huber Sweden AB

Cryotech AB  
Peroxide Propulsion Gunnilse  
Aktiebolag  
Elastomix AB  
Isblästring Sverige AB  
CP Kelco AB  
Getica AB

**Chemical products**

*>250 employees*

Flügger AB  
Orica Sweden AB (previously Dyno  
Nobel Sweden AB)  
Cederroth AB  
Akzo Nobel Decorative Coatings AB  
Casco Adhesives AB  
Alcro-Beckers Aktiebolag

*51-250 employees*

Becker Industrial Coatings AB  
Eurenco Bofors Aktiebolag  
Akzo Nobel Industrial Coatings  
Aktiebolag  
Yara AB  
Gelita Sweden Aktiebolag  
Swedish Match Industries Aktiebolag  
Flint Group Sweden AB  
Bona Aktiebolag  
International Färg Aktiebolag  
CCS Healthcare AB  
Akzo Nobel Industrial Finishes AB  
Oriflame Products Sweden AB  
Bostik Aktiebolag  
Caparol Sverige AB  
Aerosol Scandinavia Aktiebolag  
DuPont Powder Coatings Scandinavia  
AB  
Kemetyl Aktiebolag  
Lahega Kemi Aktiebolag  
Hardford Production AB  
Clariant Masterbatches Norden  
Aktiebolag  
Henkel Adhesive Technologies Norden  
Aktiebolag

Southcoat AB  
DuPont Sverige AB  
Teknos Aktiebolag  
Sika Sverige Aktiebolag  
Rekal Svenska Aktiebolag  
Yara Helsingborg AB  
Formox AB  
Carlfors Bruk AB  
Depend Cosmetic Aktiebolag  
Aromatic Aktiebolag  
A Clean Partner International AB  
*11-50 employees*  
Hagmans Kemi Aktiebolag  
Auson Aktiebolag  
Colorex Sweden Aktiebolag  
Herdins Färgverk Aktiebolag  
Sterisol AB  
Wedevåg Färg Aktiebolag  
Flowcrete Sweden AB  
Norstel Aktiebolag  
Liwell Kemi Aktiebolag  
Regosam Manufacturing AB  
Victoria Scandinavian Soap AB  
LaPerle Haircare Aktiebolag  
EPC Sverige AB  
Umicore Autocat Sweden AB  
Flint Group Lund AB  
Aktiv Kemi i Småland AB  
Aksab Kemi Aktiebolag  
Stockholms Analytiska Laboratorium  
Aktiebolag  
SweTree Technologies AB  
Petefa AB  
Silvandersson Sweden Aktiebolag  
Grace Catalyst AB  
Kimit Aktiebolag  
Landora Färgindustri Aktiebolag  
Cleans Production AB  
PLS Produkter Aktiebolag  
Aurena Laboratories AB  
Vasco Aktiebolag  
Syntema i Vaggeryd Aktiebolag  
Lyckeby Construction AB

AB Röa  
Stora Kopparbergs Bergslags  
Aktiebolag  
Aktiebolaget Lennart Månsson  
International  
Liwa Färg AB  
Plasticolor Sweden Aktiebolag  
Gjöco AB  
Lyckeby Industrial AB  
Arboritec Aktiebolag  
Dermanord-Svensk Hudvård AB  
Scandinavian Hair Company AB  
Macserien Produktion AB  
K. Ungh Aktiebolag  
Tinter Färgblandarna Aktiebolag  
Ecofix AB  
Lotrec Aktiebolag  
Nordic Biocosmetic Production AB  
Norab Aktiebolag  
Svenska Latex AB  
Kempartner Aktiebolag  
FFAB Legopack Aktiebolag  
Xylophane AB  
*1-10 employees*  
Syntema i Eskilstuna Aktiebolag  
Engwall O. Claesson Aktiebolag  
Westlén Industrier AB  
Vio Ljusfabrik Aktiebolag  
Syntema i Göteborg AB  
Lars-Erik Johansson Bilprodukter  
Aktiebolag  
EKC Production AB  
Almén Cosmetic Group AB  
Svensk Freonåtervinning Aktiebolag  
Bycosin AB  
Fuji Hunt Nordic Aktiebolag  
Wibo Färg Aktiebolag  
Simplus AB  
Yngve Niklasson Aktiebolag  
Invekta Green Aktiebolag  
H L C Produkter AB  
MICO AB  
Föllinge Hälsoprodukter Aktiebolag

Aktiebolaget Konsumentkemi  
 Klockargårdens i Norberg AB  
 Björnax Aktiebolag  
 Protega AB  
 Kefa Drytech Aktiebolag  
 Målarkalk Aktiebolag  
 Kemisan Sverige AB  
 Swede Global SG AB  
 Blue & Green AB  
 Gyllebo Gødning Aktiebolag  
 Kemiverken i Skänninge Aktiebolag  
 GFFAB, Pyromedia & Pyroteknik,  
 Fyrverkerispecialisterna AB  
 C. Majbäck AB  
 Ljungby Komposit AB  
 Rosinco AB  
 Becker Acroma Group Aktiebola  
 Bacca Byggkemi AB  
 Sunchem Aktiebolag  
 PP-Polymer Aktiebolag  
 Svenska Diskbolaget Aktiebolag  
 T.H. Meyer AB  
 Sanego AB  
 Natural Fragrance of Sweden AB  
 Schmidts Polérmedel Aktiebolag  
 Gytterp Cartridge Company AB  
 Joel Svenssons Vaxfabrik Aktiebolag  
 Industriqulören i Eskilstuna Aktiebolag  
 Vadstena Färg AB  
 Screentech i Haparanda Aktiebolag  
 Aktiebolaget Prols-Fabrik  
 Kombi Kemi Aktiebolag  
 Pica Kemi AB  
 Kombidelta AB  
 Plantamed Aktiebolag  
 Alron Chemical Co Aktiebolag  
 Blekinge Bioprodukter AB  
 Syntema i Linköping Aktiebolag  
 Codec Förg Aktiebolag  
 Ingenjörfirma Gustaf Båke Aktiebolag  
 Vensotec Systemkemi Aktiebolag  
 Thord Ohlssons Kemiska Produkter  
 Aktiebolag  
 Chemex Aktiebolag  
 ICR Kemi AB  
 Emin Svenska Aktiebolag  
 Temax AB  
 Relaco i Klippan Aktiebolag  
 Biobact Aktiebolag  
 Swetech i Karlskoga Aktiebolag G  
 Vesta SI Europe AB  
 Falu Vapen Färg AB  
 Protega Production AB  
 Syntema i Malmö Aktiebolag  
 Colorpoint Osby Kemi AB  
 Vining Färg AB  
 Q-Bond Aktiebolag  
 Klippotekets Fabrik Aktiebolag  
 Zefin Chemical AB  
 NMK Svenska Försäljning AB  
 Unique Cosmetics Sweden AB  
 GDP Gého de Prince-Myrthil Lab AB  
 Rapsodine T.H. Meyers AB  
 Chempos Aktiebolag  
 Textilfilter Scandinavia AB  
 Waltreco Aktiebolag  
 Specialkemi Väst AB  
 Emutec AB  
 Bigner & Co Kem AB  
 Borkmanns Antik & Byggnadsvård AB  
 N.P.G Nordic Paint Aktiebolag  
 Handels & Partifirman Svedo A  
 Hermansson AB  
 Qloss AB (previously Cmart AB)  
 Ovolin AB  
 RLH i Högsta Aktiebolag  
 Gysinge Färg AB  
 Weba Kemi Aktiebolag  
 Kemek Aktiebolag  
 Uniol-Produkter Aktiebolag  
 ANA- Produkter Aktiebolag  
 GRP Produkter Aktiebolag  
 Dr G. Strindbergs Produkter I  
 SVERIGE Aktiebolag  
 Recykling i Gävle Aktiebolag

Condico Miljöprodukter i Lessebo  
Aktiebolag  
Wise Naturkosmetik AB  
Ekholm Vision AB  
Valbo Kem AB  
Luxit Organic Care AB  
Kemeco Aktiebolag  
Skillingarydssalvan Aktiebolag  
B.K. Industri Kell Olsson Aktiebolag  
Duoex Chemical AB  
Visolve Chemicals AB  
Pyro - Smålands Krutbruk Aktiebolag  
KTM-Krim.Teknisk Materiel  
Aktiebolag  
Solaster Production AB  
Lack och Färg Harald Jansson  
Aktiebolag  
Aktiebolaget Svenska Handelsimporten  
Kopparbergs Pigment AB  
Ferroman Nordcoat AB  
Enetorpets Färg Aktiebolag  
Limtek & Mikab AB  
Linotech Aktiebolag  
Glor-isol Färg Aktiebolag  
Trikem AB  
FFC Kemi Aktiebolag  
HCL & Pet Care Laboratory Aktiebolag  
Skargard AB  
A Cook AB  
Capinord AB  
Tonics of Sweden AB  
Protomega Chemicals Sweden AB  
Nya Bionema Aktiebolag  
Binab Bio-Innovation AB  
Reniderm Scandinavia Aktiebolag  
Svenska Saneringsaktiebolaget  
Alldecopy Aktiebolag  
Envitech Aktiebolag  
Pyro Event Magnus Cieslak AB  
Svenska Brandia Aktiebolag  
Masens Kemiska Tekniska Aktiebolag  
Pyroproffs Fireworks Aktiebolag  
Pyroswede Aktiebolag

Chemirol AB  
Plasmatrix Materials AB  
Hexion Speciality Chemicals Sweden  
AB  
Glitsa Produktion AB  
Kullafärg AB  
Cosmedica of Sweden AB  
Amfolyten Aktiebolag  
Bil- & Båtvårds Aktiebolaget Err-Bee  
Sempérvirens Handel AB  
Ecovation Production Aktiebolag  
Microplan AB  
Biocontrol Systems AB  
Aviosol AB (PUBL)

**Pharmaceutical products, reagents,  
etc.**

*>250 employees*  
AstraZeneca AB  
GE Healthcare Bio-Sciences AB  
Fresenius Kabi AB  
McNeil AB  
Octapharma AB  
Apotek Produktion & Laboratorier AB  
Swedish Orphan Biovitrum AB (PUBL)  
Phadia AB  
Pfizer AB  
Q-Med Aktiebolag  
Cambrex Karlskoga Aktiebolag  
Recipharm Stockholm AB  
Pfizer Health AB

*51-250 employees*  
Recipharm Karlskoga AB  
Kemwell AB  
Polypeptide Laboratories (Sweden) AB  
AMO Uppsala AB  
Vitamex Production AB  
Qpahrma AB  
Crucell Sweden AB  
Vitrolife Sweden Aktiebolag  
Orexo AB  
Euro-Diagnostica AB  
Rechon Life Sciences AB

Unimedic Aktiebolag  
Recipharm Strängnäs AB  
Allergon Aktiebolag  
Cepheid AB  
Oasmia Pharmaceutical AB  
Recipharm Höganäs AB  
Bioglan AB

*11-50 employees*  
Scandinavian Gene Synthesis  
Aktiebolag  
Recipharm Biologics AB  
Fujirebio Diagnostics AB  
Abigo Medical Aktiebolag  
Bohus Biotech Aktiebolag  
Svanova Biotech AB  
Aktiebolaget Cernelle  
Natumin Pharma AB  
Biora AB  
Bactiguard AB  
Olerup SSP Aktiebolag  
Unitech Biopharma AB  
Magle Aktiebolag  
Chemotechnique MB Diagnostics  
Aktiebolag  
AB Biomérieux (fusionerat med  
Aktiebolaget Biodisk)  
Syntagon AB  
Swedish Orphan Biovitrum  
Manufacturing AB  
Bioreal (Sweden) AB  
Nidacón International AB  
Agrisera Aktiebolag  
Miwana Aktiebolag  
Rolf Kullgren AB  
Biokraft Pharma Aktiebolag

IDL Biotech AB

*1-10 employees*  
Scandinavian Regulatory Services  
Aktiebolag  
JE-Medic i Gävle AB  
Protista International AB  
Biothema Aktiebolag  
Bactus AB  
Medirox Aktiebolag  
DSM Anti-Infectives Sweden AB  
Carls-Bergh Pharma Aktiebolag  
Dental Therapeutics Aktiebolag  
Viscogel AB  
Devyser AB  
Appeartex AB  
Novozymes Biopharma Sweden AB  
Octean AB  
Materia Compacta i Höganäs AB  
Reagensia Aktiebolag  
Wasa Medicals AB  
Pharmadone AB  
Stratosphere Pharma AB  
Novasaid AB  
Probac AB  
Encecor Aktiebolag  
Percell Biolytica Aktiebolag  
Imco Corporation LTD Aktiebolag  
BR. Bioreagens AB  
Metina AB  
Prolight Diagnostics AB (PUBL)  
Medipharm Aktiebolag  
Ellem Läkemedel Aktiebolag  
Nexyte AB  
Recip Läkemedel AB  
Lavivo AB



# VINNOVA's publications

February 2013

See [www.VINNOVA.se](http://www.VINNOVA.se) for more information

## VINNOVA Analysis

### VA 2013:

- 01 Chemical Industry Companies in Sweden

### VA 2012:

- 01 Impact of innovation policy - Lessons from VINNOVA's impact studies. *For Swedish version see VA 2011:10*
- 02 Lösningar på lager - Energilagringstekniken och framtidens hållbara energiförsörjning
- 03 Friska system - eHälsa som lösning på hälso- och sjukvårdens utmaningar
- 04 Utan nät - Batterimarknadens utvecklingsmöjligheter och framtida tillväxt
- 05 Sveriges deltagande i sjunde ramprogrammet för forskning och teknisk utveckling (FP7) - Lägesrapport 2007 - 2011. *Only available as PDF*
- 06 Företag inom fordonsindustrin - Nationella, regionala och sektoriella klusterprofiler som underlag för analys- och strategiarbete
- 07 Svensk Life Science industri efter AstraZenecas nedskärningar. *Only available as PDF*
- 08 EUREKA Impact Evaluation - Effects of Swedish participation in EUREKA projects
- 09 Uppföljning avseende svenskt deltagande i Eurostars. *For English version see VA 2012:10. Only available as PDF*
- 10 Follow-Up of Swedish Participation in Eurostars. *For Swedish version see VA 2012:09. Only available as PDF*

### VA 2011:

- 01 Smart ledning - Drivkrafter och förutsättningar för utveckling av avancerade elnät
- 02 Framtid med växtverk - Kan hållbara städer möta klimatutmaningarna?
- 03 Life science companies in Sweden - Including a comparison with Denmark
- 04 Sveriges deltagande i sjunde ramprogrammet för forskning och teknisk utveckling (FP7) - Lägesrapport 2007-2010, fokus SMF. *Only available as PDF. For brief version see VA 2011:05*

- 05 Sammanfattning Sveriges deltagande i FP7 - Lägesrapport 2007-2010 - Fokus SMF. *Brief version of VA 2011:04*

- 06 Effektanalys av forskningsprogram inom material från förnyelsebara råvaror

- 07 Effektanalys av starka forsknings- & innovationssystem. *Only available as PDF. For brief version see VA 2011:08*

- 08 Sammanfattning - Effektanalys av starka forsknings- & innovationssystem. *Brief version of VA 2011:07*

- 09 Samarbete mellan Sverige och Kina avseende vetenskaplig sampublicering - aktörer, inriktning och nätverk. *Only available as PDF*

- 10 När staten spelat roll - lärdomar av VINNOVAs effektstudier. *For English version see VA 2012:01*

## VINNOVA Information

### VI 2013:

- 01 Branschforskningsprogrammet för skogs- & träindustrin - Projektkatalog 2013

### VI 2012:

- 02 Så blir Sverige attraktivare genom forskning och innovation - VINNOVAs förslag för ökad konkurrenskraft och hållbar tillväxt till regeringens forsknings- och innovationsproposition
- 03 Idékatalog - Sociala innovationer för äldre
- 04 Innovation i offentlig upphandling - Ett verktyg för problemlösning
- 05 Årsredovisning 2011
- 06 *Replaced by VI 2012:15*
- 07 Din kontakt till EU:s forsknings- och innovationsprogram
- 08 Uppdrag att stärka det svensk-kinesiska forsknings- och innovationssamarbetet. *Only available as PDF*
- 09 Projektkatalog eTjänster. Slutkonferens - summering och reflektioner
- 10 Hållbara produktionsstrategier samt Tillverkning i ständig förändring - Projektkatalog 2012
- 11 VINNVÄXT
- 12 Effekter av innovationspolitik - Tillbakablickar och framtidsperspektiv
- 13 Banbrytande IKT - Projektkatalog
- 14 Smartare, snabbare, konvergerande lösningar - Projektkatalog inom området IT och Data/ Telekommunikation i programmet Framtidens kommunikation
- 15 Fordonsstrategisk forskning och innovation för framtidens fordon och transporter.
- 16 Utmaningsdriven innovation - Samhällsutmaningar som drivkraft för stärkt tillväxt
- 17Handledning för insatser riktade mot tjänsteverksamheter och tjänsteinnovation. *Only available as PDF*
- ### VI 2011:
- 01 Framtidens personresor - Projektkatalog
- 02 Miljöinnovationer - Projektkatalog
- 03 Innovation & Gender

- 04 Årsredovisning 2010
- 05 VINN Excellence Center - Investing in competitive research & innovation milieus
- 06 VINNOVA Sweden´s Innovation Agency
- 07 Challenge-driven Innovation - VINNOVA´s new strategy for strengthening Swedish innovation capacity. *For Swedish version see VI 2011:08*
- 08 *Replaced by VI 2012:16. For English version see VI 2011:07*
- 09 *Replaced by VI 2012:02*
- 10 Projektkatalog - Innovationer för framtidens hälsa.
- 11 *Replaced by VI 2012:06 .*
- 12 *Replaced by VI 2012:14*
- 13 *Replaced by VI 2012:04*

## VINNOVA Policy VP 2011:

- 01 Tjänstebaserad innovation - Utformning av insatser som möter behov hos företag och organisationer. *Only available as PDF*
- 02 Regeringsuppdrag Kina - "Föreslå områden för förstärkt långsiktigt forsknings-, innovations- och utbildningssamarbete med Kina" U2010/7180/F. *Only available as PDF*
- 03 Behov av kunskap och kompetens för tjänsteinnovationer
- 04 Utveckling av Sveriges kunskapsintensiva innovationssystem - Huvudrapport - Underlag till forsknings- & innovationsproposition
- 05 Utveckling av Sveriges kunskapsintensiva innovationssystem - Bilagor - Underlag till forsknings- & innovationsproposition

## VINNOVA Report VR 2012:

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