



Chemical Cluster Development in European Regions

Benchmark Report

Summary

December 2010

www.chemclust.eu



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1 Description of chemical industry

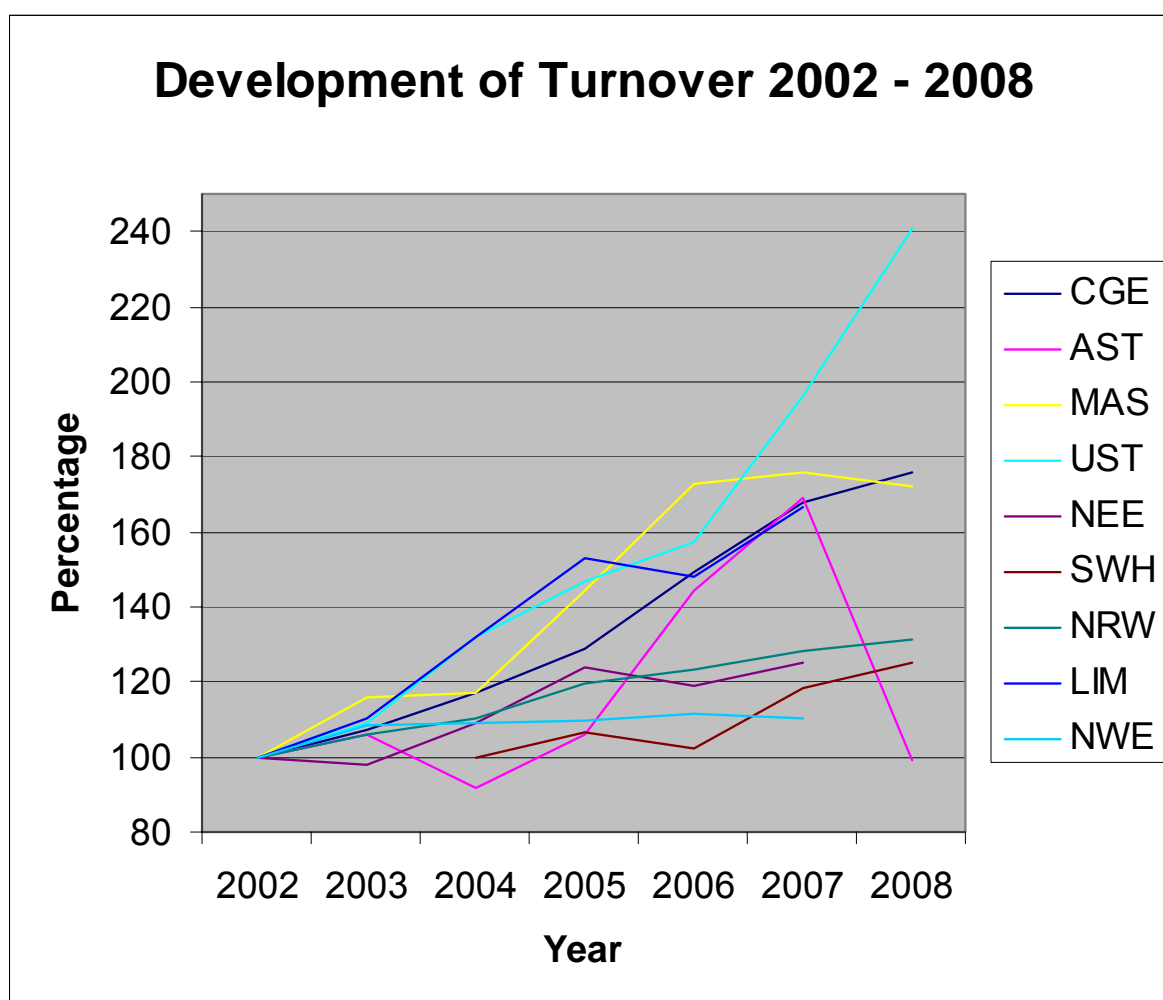
1.1 General Economic Indicators of Chemical Regions in 2007

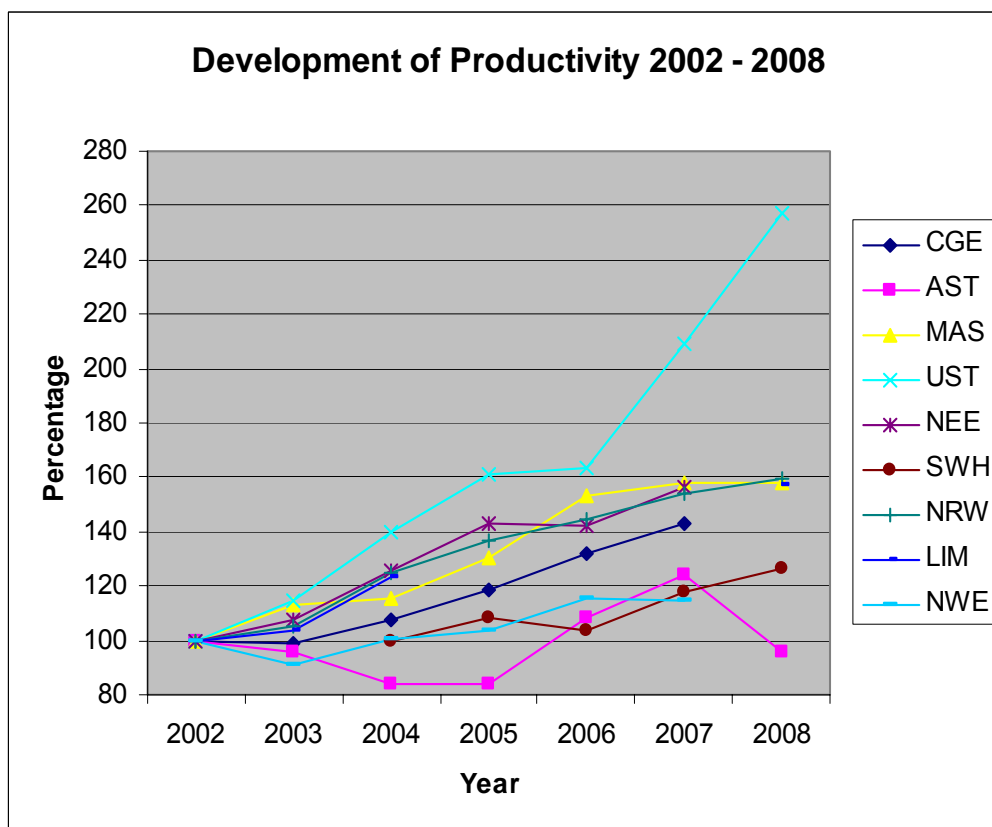
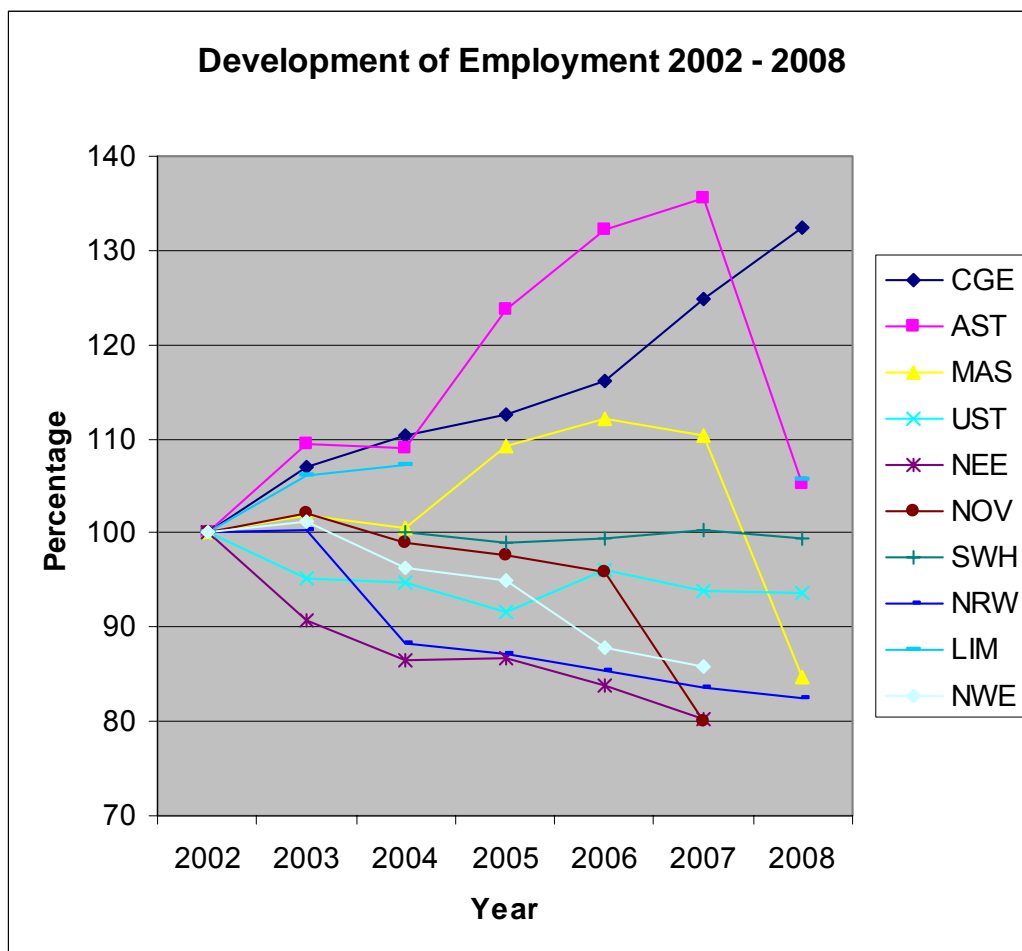
	CGE	AST	MAS	UST	NWE	NOV	LIM	NEE	SWH	NRW
GDP bln €	244	22.8	65.7	9	86.6	125	35	66	83.6	530
Surface 1 000 km2	84.0	10.6	35.6	5.3	14.2	25.4	2.2	8.6	15.8	34.1
Population Mln	11.5	1.1	5.2	0.8	6.7	4.4	1.1	2.6	2.8	17.9

1.2 Data for Chemical Industry and Rubber and Plastic in 2007

	CGE	AST	MAS	UST	NWE	NOV	LIM	NEE	SWH	NRW
Turnover Bln €	20.1	1.2	5.6	5.1	4.5	9.9	10.51	9.5	6.16	54.9
Aver. Yearl. Turnover Growth % 2002-07	+10.9	+11.1	+12.0	+14.4	+2.0	+3.3 (03-07)	+10.7	+4.6	+5.8 (04-08)	+5.6
Employees 1,000	65.5	3.9	45.8	7.5	67.4	41.4	14.8	23.1	20.0	107
Aver. Yearl. employees Growth % 2002-07	+4.5	+6.3	+2.0	-1.3	-3.0	-4.4	+0.9	-4.3	-0.2 (04-08)	-3.8
Investments Bln. €	1.14	0.03	n.a.	n.a.	n.a.	0.4	0.58	0.54	0.16	n.a.
Invest.rate	7%	2.4%	n.a.	n.a.	n.a.	4%	6.2%	6%	3.7%	n.a.
Wage Cost 1 000 €	34.4	60.6	11	12.2	n.a.	28.4 (2006)	n.a.	41.6	42.0	50.5

	CGE	AST	MAS	UST	NWE	NOV	LIM	NEE	SWH	NRW
Export Rate	40%	26%	63%	n.a.	n.a.	49%	70%	n.a.	43.2	51.2
Productivity 1 000 €/E	358	319	123	676	105	239	710	410	308	513
Aver. Yearl. Productivity Growth % 2002-07	+7.4	+4.4	+9.5	+15.9	+2.8	9.8 (03-07)	+8.0	+9.3	+6.0 (04-08)	+9.7





1.3 Preliminary conclusions from statistics

European Chemical industry is growing

Despite increasing global competition especially from Asia and the Far East the above described figures show that the chemical industry in the partner region is growing substantially. Several regions such as Central Germany, Asturias, Masovia, Usti or Limburg could experience yearly growth rates above 10% between 2002 and 2007. The chemical industry remains an important industrial branch with high economic impact for the regions.

Strong growth in Central and Eastern Europe – catching up to Western European productivity standards

The high growth rates in the regions in Central and Eastern Europe show the catching up process to Western European productivity levels. The transformation process of the chemical industry in the formerly state owned companies was successful in developing a competitive production base.

Stable and slow growth of employment

The majority of the regions (Central Germany, Asturias, Masovia, Usti, Limburg and Schleswig Holstein) show a stable or slow growth of employment in the chemical industry. This development is a special success taking into account the restructuring and transformation process and the global competition which the chemical industry has experienced. These figures also stress the importance of the chemical industry for the regional labour market in offering sustainable employment chances. Taking into account the high level of productivity and qualification demand together with the increasing demographic challenge the provision of qualified employees and the attraction of especially young people for working in the chemical industry is very important.

Decrease of employment in UK regions and Italy

Especially the English and Italian regions have experienced a decrease of employment of approximately 4% yearly between 2002 and 2007. These figures show the severe restructuring process which has especially hit the United Kingdom.

Increasing productivity in all chemical regions

The high growth rates of turnover and the more or less stable development of employment have led to increasing productivity levels in all chemical regions in a range

between 8-10% each year between 2002 and 2007. These figures clearly show the achievements of the chemical industry for the improvement of innovation capacity. Therefore the chemical industry remains an important driver for regional innovation development. The international orientation of exports also ensures the international competitiveness of the chemical regions and their integration in the global division of work.

Different reactions to economic crisis 2008/09

The statistics which have been integrated in this report reach until the year 2008. The chemical regions have shown different reaction on the severe economic crises which has started in autumn 2008 and continued in 2009. The regions in Eastern Europe have continued walking on their growth path, whereas especially the regions in Spain and the UK have experienced a strong decline of turnover. The real impact of the crisis will only be visible after 2010. Taking into account the time delay of collecting statistical data, the real impact of the crisis can only be assessed after 2010. It will be interesting to discuss the potential role of the chemical clusters in the crisis. This questions will be covered in the second benchmark report, which will be published at the end of the ChemClust project in 2012.

2 Analysis of Chemical Clusters

2.1 Cluster Profiles



2.1.1 Cluster Chemistry Plastics Central Germany



- **Geographic coverage:** Saxony, Saxony-Anhalt, Thuringia and Brandenburg, GER
- **Established:** 2003
- **Cluster Speaker:**
 - Dr. Christoph Mühlhaus, former MD Dow Olefineverbund GmbH
 - Andreas Hiltermann, InfraLeuna GmbH (Chemical Parks / Feedstock)
 - Dr. Reinhard Proske, Plastics Industry Association (Plastics)
 - Dr. Wolfgang Blümel, Chemical Industry Association (Chemistry)
- **Cluster Manager:** Dr. Gunthard Bratzke, isw GmbH
- **Cluster Members:**
 - 78 Chemical parks and sites, Networks / Associations, Research institutions at universities and technical colleges, Competence centres
 - About the half of the 800 chemistry and plastics businesses in Saxony, Thuringia, Saxony-Anhalt and Brandenburg are working together in the Cluster Chemistry / Plastics Central Germany
 - Land Governments: Saxony, Saxony-Anhalt, Thuringia and Brandenburg
- **Enterprises:**
 - Dow Olefinverbund GmbH, BASF Schwarzheide GmbH, SKW Stickstoffwerke Pisteritz GmbH, Domo Caproleuna GmbH, Wacker AG
- **Chemical Parks:**
 - Leuna, Dow Valuepark Schkopau, ChemiePark Bitterfeld-Wolfen, Chemie und Industriepark Zeitz, BASF Schwarzheide
- **Universities and Research:**
 - Fraunhofer Institute for Mechanics of Materials Halle IWM
 - Fraunhofer Institute for Applied Polymer Research Potsdam Golm IAP
 - University of Applied Science Merseburg

- Martin Luther University Halle-Wittenberg
- Technical University Ilmenau

- **Networks:**
 - Innovative Regional Growth Core – ReactiveWetCoating 2
 - Plastics Network Brandenburg Berlin (KuVBB), Network components suppliers plastics Saxony (AMZK), POLYKUM e. V.,
 - PolymerMat e.V.
- **Cluster management coordinated by isw GmbH**
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 Fax: +49 345 299 827 11
 E-Mail: cluster-chemie-kunststoffe@online.de
 Website: www.cluster-chemie-kunststoffe.de

2.1.2 Chemical Industry Cluster of Asturias



- **Geographic coverage:** Asturias, Spain
- **Established:** 2010 (under construction)
- **Technical Secretariat and Cluster Manager:** AIQPA Association of Chemical Industry and Processes of Asturias
- **Cluster Members:**
 - Members of AIQPA and other companies to represent business interest
 - Bordering sectors: Control and Inspection organisations and Engineering companies
 - R&D Institutions
 - Public bodies, Associations, Chambers of Commerce
- **Enterprises:**
 - Asturquimia, Bayer, Du Pont, Fertiberia, Industrias ROKO, Grupo Empresarial ENCE, Praxair, Industrial Química del Nalón, Arcelor Mittal, Rioglass. Asturiana de Zinc, Alcoa, Sia Copper, Linpac, Ibersa, Chemastur, Carus Europe.

- **Universities and Research:**
 - University of Oviedo. ITMA Foundation, PRODINTEC Foundation, Coal Institute – CSIC
- **Bordering sectors:**
 - Control and Inspection organisms: ASOCAS, Engineering companies: Duro felguera, TSK Grupo, Impulso, IMASA, Ténia Ingenieros, BEFESA, Ingenieros Asesores
- **Public Bodies Associations and Chambers:** IDEPA, Alquímicos, FADE, Chmaber of Commerce of Oviedo, Chamber of Commerce of Avilés, Chamber of Commerce of Gijón, AIQAS.
- **Cluster management:** Asociación de Industrias Químicas y de Procesos de Asturias – AIQPA Facultad de Química de Oviedo –
- **Contact Information:**

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33006 Oviedo
Tel +34 660 349 088
Email: contacto@aiqpa.com
Website: www.aiqpa.com

2.1.3 Chemicals Northwest



- **Geographic coverage:** North West England, UK
- **Established:** 2003
- **Cluster Manager:** Dr. Jenny Clucas, CEO
- **Cluster Members:**
 - industry-led, not-for-profit cluster organisation that works with the chemistry-using industries of the North West
 - CNW currently represents over 150 members who serve a wide range of markets, including pharmaceuticals, automotive, electronics and construction.
 - Participation of public authorities and research institutions
- **Enterprises:**
 - Ineos Chlorvenyl, Total Petrochemicals, Solvay Chemicals, Shell UK Oil Products, Sembcorp, Ashton Chemicals, Brunner Mond

- **Chemical Parks:**
 - Hillhouse Business Park in Thornton (800ha AGC Chemicals, Victrext, Vinnolit),
 - Runcorn (INEOS Complex), Heath Business and Technology Park
- **Universities and Research:**
 - Liverpool Science Park, University of Liverpool
 - University of Manchester
 - University of Lancashire
 - Manchester Science Park,
- **Networks:**
 - Cogent, Humber Chemical Focus, Royal Society of Chemistry, National Skills Academy Process Industry (NSAPI), ChemSkills, Chemical Industry Knowledge Transfer Network

Complete Members Directory on Website

- **Cluster management**

Dr. Jenny Clucas
Chemicals Northwest
The Heath, Runcorn,
Cheshire, WA7 4QX
Tel: +44 019 285 156 78
Email: jenny.clucas@chemicalsnorthwest.org.uk
Website: www.chemicalsnorthwest.org.uk

2.1.4 North East Process Industry Cluster



- **Geographic coverage:** North East of England, UK
- **Established:** 2003
- **Cluster Speaker/Manager:** Dr. Stan Higgins
- **Cluster Members:**
 - NEPIC is a stand-alone company, limited by guarantee, which was created and is owned by its member companies to represent the companies and supply chain of the Process Industry in the region
 - 500 Pharmaceutical, Biotechnology, Speciality, Polymer & Rubber, Petrochemical & Commodity Chemical companies based in North East England.
- **Enterprises:**
 - SABIC, Sembcorp, Lotte Chemicals, Huntsman. BP, Conoco-Phillips, BOC, Lucite International, GrowHow and Ineos Nitriles, Dow Chemicals
- **Chemical Parks:**
 - Wilton International, Redcar, Haverton Hill, Billingham Seal Sands, Billingham
- **Universities and Research:**
 - Teesside University,
 - Newcastle University
 - University of Durham
 - Sunderland University
 - Northumbria University
 - Center for Process Innovation
 - NETPARK, CELS Centre of Excellence for Life Sciences
 - NaREC National Renewable Energy Centre

Complete Members Directory on Website

- **Cluster management**
 NEPIC Ltd,
 Room H224, Wilton Centre,
 Redcar, TS10 4RF, UK

Phone: +44 164 244 256 0

Fax: +44 164 244 256 1

Email: enquiries@nepic.co.uk

Website: www.nepic.co.uk

2.1.5 Chemical Cluster Limburg (*“Er is Chemie in Limburg”*)

- **Geographic coverage:** Limburg, NL
- **Established:** 2005
- **Cluster Speaker/Manager:** Province of Limburg/ Mr. Edwin Bakker
- **Cluster Members:**
- **Enterprises:** DSN, Sabic, chemical companies in Limburg
- **Chemical Parks:** Chemelot Campus Geleen
- **Universities and Research:** Hogeschool Zuyd, University of Maastricht
- **Politics:** Province of Limburg, NV Industriebank LIOF
- **Cluster management:** Province of Limburg informal cooperation with members
- **Contact Information**
 - Province of Limburg (Mr. Edwin Bakker)
 - Limburglaan 10, PO Box 5700, NL 6202 MA Maastricht, The Netherlands
 - Email e.bakker@prvlimburg.nl
 - Website: www.limburg.nl

2.1.6 Consortium IBIS - Innovative Bio-based and Sustainable products and processes

- **Geographic coverage:** Piedmont Region (North West Italy)
- **Established in 2009**
- **Cluster Manager:** Dott. Franco Pellacini - President
- **Cluster Members:**
 - IBIS itself is a regional network and it has been established under the Piedmont regional plan for Objective Competitiveness, in the part devoted to the “Poles of Innovation”,
 - Company which manages the Innovative Pole for Sustainable Chemistry of Piedmont and Novara. IBIS has no other mission but innovation

and it gathers research activities carried out by young chemical enterprises as well as by companies with an historical presence in the area

- The only activity of IBIS consists in researches devoted to innovative results in many chemical sectors and implemented through the collaboration among the enterprises and the research institutions taking part to the Pole
- Members: BRACCO IMAGING S.P.A., F.A.R. S.P.A. DIVISIONE POLIOLI, FN NUOVE TECNOLOGIE E SERVIZI AVANZATI S.P.A., GARBO S.R.L., ISAGRO RICERCA S.R.L., CHEMTEX ITALIA S.R.L., MEMC ELECTRONIC MATERIALS S.P.A., NOVAMONT S.P.A., PROCOAT – CONSORZIO PER LA PROMOZIONE DEI PRODOTTI VERNICIANTI, PROGE FARM S.R.L., RADICI CHIMICA S.P.A., POLIRE-SIN S.R.L., IRIS VERNICI S.R.L., POINTER S.R.L., CAGE CHEMICALS S.R.L., GEOL S.A.S., MYBATECH S.R.L., PROVINCIA DI NOVARA, CENTRO DI COMPETENZA PER L'INNOVAZIONE IN CAMPO AGROAMBIENTALE (AGROINNOVA), UNIVERSITA' DEL PIEMONTE ORIENTALE

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Website: www.ain.novara.it

2.1.7 Chemical Industry in Masovia, PL



Voivodship Masovia is currently discussing establishment of a chemical cluster with relevant stakeholders from industry and academia.

– Enterprises

- PKN Orlen
- Pa Conex sp. z o.o. Mazovia, Turnover growth in 2009:

- **355.20%**, Employees: 269, Turnover: 10 mln (Euro),
 - Lucchini Poland sp. z o.o. Mazovia, Turnover growth in 2009:
 - **184%**, Employees: 50, Turnover: 15 mln Euro
 - Torplast sp. z o.o. Mazovia, Turnover growth in 2009:
 - **154.69%**, Employees: 83, Turnover: 8.5 mln Euro
 - Cynel-Unipress sp. z o.o. Mazovia, Turnover growth in 2009:
 - **136.61%**, Employees: 35, Turnover: 7.8 mln Euro
- **Chemical Parks:**
 - Plock (PKN Orlen)
- **Universities and Research:**
 - ICHP Industrial Chemical Research Institute
- **Contact Information:**

Polish Chamber of Chemical Industry
Jerzy Majchrzak – Director / Dyrektor,
Ul. Śniadeckich 17, 00-654 Warszawa, Poland / Polska
tel. +48 228 261 665
fax. +48 226 272 154
e-mail: jerzy.majchrzak@pipc.org.pl
Website www.pipc.org.pl

2.1.8 Chemical Industry in Usti Region, CZ

Usti Region is currently discussing establishment of a chemical cluster with relevant stakeholders from industry and academia.

Czech Association of Chemical Industry

- **Enterprises:** Unipetrol, Cecka Rafinerska, Lovochemie Spolchemie
- **Chemical Parks:** Chempark Zaluzi
- **Universities and Research:**
 - Research Institute of Inorganic Chemistry
 - Jan Evangelista Purkyne University in Usti nad Labem
 - Institute of Chemical Technology Prague
- **Contact Information**

Regional Authority of Ustí Region
 Industry and Enterprise Support Department
 Velká Hradební 3118/48
 400 01 Ustí nad Labem
 Czech Republic

Contact person: Dalibor Spotak
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 Email: spotak.d.@kr-ustecky.cz
 Website: <http://www.kr-ustecky.cz>

Association of Chemical Industry of the Czech Republic
 Delnická 12 170 00 Praha 7, Czech Republic

Contact person: Ladislav Novak, Director
 Tel: +420 266 793 580
 Email: ladislav.novak@schp.cz
 Website :www.schp.cz

2.1.9 Cluster Chemie Schleswig Holstein



- **Geographic coverage:** Schleswig-Holstein, GER
- **Established:** 2010 still in set up Phase
- **Cluster Manager:** The cluster management is an organisational division of Entwicklungsgesellschaft Brunsbüttel mbH, the public Business Development Company of the rural district of Dithmarschen.
 - Cluster Manager: Jens Wrede
 - Cluster Speaker: Morten Holpert, Holcim Deutschland AG
 - Cluster Personal: Volker Ziedorn, Julia Dethlefs

- **Cluster Members:**
 - Cluster Chemie SH is widening the existing local cluster of large chemical manufacturers to integrate the whole value chain in the most northern federal state of Germany.
- **Cluster Development:**
 - It is planned to establish a more defined Chemical Cluster combining the chemical industries in Schleswig-Holstein and Hamburg. First meetings of the key players have already taken place. An expertise describing the basic structures to be developed (e.g. organizational structure, regional confines, and industries to be in- and excluded, activities...) shall be compiled till Q1.2011.
- **Enterprises:**
 - Bayer MaterialScience, DyStar, Lanxess, Sasol, Total Bitumen Deutschland GmbH, Yara
- **Chemical Parks:**
 - ChemCoast Park Brunsbüttel
- **Universities and Research:**
 - Christian Albrechts Universität Kiel, University of Applied Science Lübeck University of Applied Science Westküste Heide, Fraunhofer Institute for Silicon Technology, Innovation Centre Itzehoe
- **Networks:**
 - ChemCoast e.V. (Network of Chemical Parks in Northern Germany), Association of German Chemical Industry, Regional Section North
- **Cluster Management**

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2.1.10 Chemical cluster North Rhine-Westphalia Chemie.NRW



- **Geographic coverage:** North Rhine Westphalia, GER
- **Established:** 2009
- **Cluster Manager:** Prof. Dr. Michael Dröscher
Chair of Innovation Committee: Prof. Dr. Jens Leker
Board members: Prof. Dr. Dröscher, Prof. Dr. Leker, Mittelstaedt, Dr. von der Linden, Dr. Gersemann, Chemicals Unit of the Ministry for Economic Affairs, Energy, Building, Housing and Transport NRW
- **Cluster Members:**
 - Enterprises:** Bayer Material Science, Evonik, Degussa, Altana, Lanxess, Henkel, Jowat, etc.
 - Chemical Parks:** CHEMPARK Leverkusen, Knapsack, Industrial Park Cologne-Nord, Oberbruch, Pharma and Chemical Park Wuppertal, Marl Chemical Park, Gelsenkirchen-Scholven/Horst, Castrop-Rauxel, etc.
 - Universities and Research:** RWTH Aachen, University Cologne, Bochum, Münster, Bielefeld, Dortmund, etc.
 - Networks:** ChemCologne, ChemSite, Surface chemistry, cluster industrial biotechnology CLIB, etc.

Cluster Management: by Chemical Industry Association VCI NRW

Contact Information:

c/o VCI NRW
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Website: www.exzellenz.nrw.de / www.chemie-nrw.de

2.2 Comparison of Clusters

2.2.1 Cluster Activities

	CGE	AST	NRW	CHE	NOV	LIM	TEE	SWH
Marketing,	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Innovation promotion	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
International cooperation	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes
Inward-Investment pro- motion	Yes	No	Yes	Yes	No	Yes	Yes	Yes
Public Relation	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Human Resource Devel- opment	Yes	Yes	No	Yes	No	Yes	Yes	Yes
Political dialogue	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Facilitation of Coopera- tion (technology)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Organisation of thematic Meetings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Project Development / Consulting Services	Yes	Yes	No	Yes	No	Yes	Yes	Yes

2.2.2 Cluster Stakeholders

	CGE	AST	MAS	UST	NEE	NOV	LIM	TEE	SWH	NRW
Enterprises	800	25	60	4	650	17	210	450	83	1100
SME	720	9	50		630	15	190	300	69	640
Large comp.	80	16	10	4	30	2	20	150	14	460
Universities R&D	50	4	7	3	6	2	2	30	4	6
Industry Associa- tions	2	4	1	1	4		1	2	2	1
Networks	16	4					1		1	2
Political Entities	7	-	1	1		1	1	5	2	1
Chamber of Commerce	2	3			3			1	2	3
Other Organisa- tions	4	2					1	80		

2.3 Classification of Clusters

2.3.1 Bottom Up

- Emerged by a gathering of industrial and scientific partners to intensify mutual cooperation in order to gain competitive advantage for their daily business.
- Decentralised governance
- Cluster organisation selected by members itself
- Low political influence – setting up without considerable involvement of regional or federal policy makers
- Governmental involvement and membership possible but no leading role – ordinary members
- Cluster organisation raise majority of operating costs by memberships fees and service fees, sponsoring etc
- Fee based financing models urge cluster organisation from very beginning to provide demand oriented services and added values to cluster members!

2.3.2 Top-Down externally initiated clusters

- installation of cluster supported by clear mandate and publicly funded by authorities on regional or national level (also both)
- Cluster initiatives have facilitated or stimulated emergence
- Sometimes spontaneously initiated within triple helix to overcome obstacles of cooperation and wallow trust building between partners
- In beginning public funding at least during embryonic phase (approx. 3-5 years) funding rates can differ
- When mature cluster raise majority of operating costs by themselves membership and service fees, sponsoring etc. (lower fee compared to bottom up clusters only co-finance cluster activities other costs publicly funded)
- Quite high political influence, policy makers consider clusters as appropriate tool to increase innovation capability and competitiveness of certain region

2.3.3 Top-Down, Internally initiated cluster

- driving force specific organisation, most likely research institution or university possibly also a company

- leading organisation inherits governance and management of whole cluster and provides resources for cluster organisation
 - initiator often follows objectives that are supposed to be pursued by means of cluster activities
 - initiator likely to dominate the activities and themes of whole cluster
 - initiator often uses cluster approach to increase reputation and to gather members to acquire funds for joint R&D activities
- (Meyer zu Köcker, 2009, p.12ff)

2.3.4 Summary of Classification of Clusters

	CCK	AST	MAS	UST	CHE	NOV	LIM	TEE	SWH	NRW
Bottom up	x				X		X	X		
Top Down Externally		x	(?)	(?)		x	x		(?)	X
Top Down Internally	x									

2.3.5 Emergence of Cluster

Cluster	Explanations
CGE	RIS – Network development polymer network, Network of chemical parks 2003: Cluster Conference Central Germany – Large companies have take initiative to develop cluster – direct private financing from industry 2007 – Begin of Cluster Management project partly financed by GA (regional fund) Extension 2010-2013 expected
AST	AIQPA has been funded as network of important chemical companies in Asturias and is the core of the networking and cluster development (concrete projects were also supported by IDEPA) Chemical Cluster Asturias is under development and will start in 2011 with financial support from IDEPA – AIQPA will take over the cluster management (Technical Secretariat)
MAS	Voivodship Masovia and Polish Chamber of Chemical Industry

	are currently discussing development of cluster
UST	No chemical Cluster in Usti Region despite Usti is the largest chemical location in Czech Republic, Usti Region has interest to support Network/Cluster development, Chemical Companies have sceptical attitude – major question overcoming competition, building trust and added value of cluster
NWE	The Cluster development has been initiated by chemical companies in creating own organisation Chemicals Northwest, which was supported by Regional Development Agency
NOV	IBIS has been developed as network to promote research established under the Piedmont regional plan for Objective Competitiveness, in the part devoted to the “Poles of Innovation”
LIM	The cluster has emerged out of joint cooperation activities of DSM and the province of Limburg for the development of the research campus on the chemical site in Geleen as basis for the development of chemical innovation and entrepreneurship. The province of Limburg has developed the acceleration agenda, which focuses regional funding for the promotion of 4 clusters, where 1 is chemistry. The Development Bank took over important function in communication and provision of innovative financing solutions such as the Innovation voucher. Currently the province of Limburg is updating Cluster policy to develop new quality of development.
TEE	<p>Teesside Chemical Initiative set up to support companies following break-up of ICI</p> <p>2003 – Pharmaceutical & Speciality Chemicals Cluster set up to represent remainder of process sector (industry led with some RDA funding)</p> <p>2005 – Merger of TCI and P&S Cluster to provide uniform support across all process sector and supply chain (industry led with some RDA funding)</p> <p>2008 – Extension of funding from RDA to support ongoing cluster development.</p> <p>2008 – NEPIC incorporates North East Biofuels with RDA sup-</p>

	port RDA funding will cease March 2011.
SWH	The Chemical Cluster is in the start up phase, the core industrial basis is the chemical park Brunsbüttel and the network of chemical parks ChemCoast, The Ministry for Economy of Schleswig Holstein supports establishment of Cluster
NRW	The basis for Cluster Development was the decision of the government in 2005 to develop state clusters, co-financed by NRW and industry in the so called “Excellence Initiative”.

2.3.6 Driving Force

Cluster	Explanations
CGE	Large Companies (e.g. Dow), chemical parks (CeChemNet) Cluster moderator (isw), plastic company networks and R&D entities in Central Germany
AST	Chemical companies (AIQPA) have initiated the cluster and IDEPA has supported development
MAS	Voivodship Masovia is interested in developing cluster and promoting regional chemical industry
UST	Usti Region wants to facilitate discussion about cluster development with help of ChemClust Project, Chemical Industry Association supports this objective
NWE	Industry identified need for cooperation. Strong industry lead throughout development of cluster
NOV	Piedmont Region has been the main driver in providing financial resources for research. In dialogue with regional stakeholders and the province of Novara it has been decided to dedicate funds also to chemistry
LIM	Strong involvement of companies DSM and public support by Province of Limburg and Development Bank LIOF
TEE	Industry identified need for mechanisms to provide support that was previously part of ICI. Strong industry lead throughout development of cluster.
SWH	Driving force are chemical companies and chemical parks coor-

	dinated by egeb (Development Company Brunsbüttel) and supported by regional ministry for economy
NRW	Driving force of cluster development has been chemical industry, industry association VCI NRW, Ministry for Economy has given financial support for these activities.

2.3.7 Composition of Cluster Management

Cluster	
CCK	Cluster speakers from industry, professional cluster management as member of cluster, 4 employees.
AST	Cluster secretariat will be taken over by AIQPA one person will be employed / cluster manager
MAS	No existing Cluster management, Polish Chamber of Chemical Industry provides information and services to companies
UST	There is no cluster management, Chemical Industry Association has a committee for SusChem Technology Platform which deals with innovation matters of the chemical industry, there is close cooperation between SCHP and Usti region
NWE	Speaker from industry, professional cluster management taken over by own organisation, Staff 9
NOV	Speaker from industry The coordination of the network is managed by Industry Association of Novara, currently they are coordinating the consortium from their own resources, staff: 2
LIM	Informal Cluster Management taken over by Province, LIOF and Chemelot, staff: 6
TEE	Professional cluster management with senior figures from industry as senior managers. 17 employees in total plus consultants used for specific project delivery. Leadership team and “Thrust teams” made up of industrialists.
SWH	Cluster Speaker from industry Professional Cluster Management 3 employees
NRW	Cluster Speaker from industry, professional cluster management by industry association, Staff: 3

2.3.8 Legal status and membership

Cluster	Explanations
CCK	No legal status, no direct membership, several companies provide letter of intent for cluster management project – informal network and cooperation for cluster activities, meta network co-operation with associations and company networks
AST	Cluster will have a status of association, companies and universities are members
MAS	To be decided
UST	Loose network no legal status or direct membership
NWE	Chemicals North West has a legal status and 150 member companies
NOV	IBIS Consortium is a legal body with direct membership of the companies
LIM	No legal status and no direct membership, cluster activities are implemented in open cooperation with companies and stakeholders, Open Innovation approach is used
TEE	Nepic is a stand-alone company, limited by guarantee, which was created and is owned by its member companies to represent the companies and supply chain of the Process Industry in the region. 350 member companies and 120 associated members
SWH	No legal status, no direct member informal involvement of cluster stakeholders
NRW	No legal status, no direct membership funding is provided via the Excellence Initiative

2.3.9 Funding Sources

Cluster	
CCK	2003-2006 yearly 20.000 Euro for Cluster coordination from private sources Public Funding from national programme GA 2007-2010, no membership fees, no service fee (3 years 750,000, 75% public funding, 25 own resources) 2010-2013 – decrease public funding to 2011-2013: 67%, 65%, 63%
AST	Funding is provided by IDEPA in the framework of the programme Innovation, Enterprise and Occupation, 10.800 Euro Spent for Developing to strategic plan finalised in August, Validation by AIQPA for establish the cluster, plan: 5 years 61 000 first year, 2 nd 166 000, 3 rd 281 000, 4 th 296 000, 5 th 312 000. own resources have to be decided
MAS	To be decided
UST	Czech Invest has financed cluster development from 2004-2006 (200 000 – 1 000 000 Mio CK (8 000-40 000 Euro) for 3 Years (1 st year 75%, 2 nd 50%, 3 rd 25%), minimum 15 companies (60% SME), 1 university and 1 public authority) Main Finance from ERDF – 15 Clusters have been supported (Plastics Cluster in South Moravia) currently no cluster support available
CHE	CNW is funded by membership fees and public funding from Development Agency NWDA, Membership fee (individual membership 130 pounds, corporate membership 470 pounds)
NOV	Regional funding programme pole of innovation; Total IBIS annual plan budget for research is € 8 566 200=. Total ERDF contribution € 4 320 180, membership fee 500 € per year
LIM	Public Regional Funding 8 Mio., private Investments 60 Mio, next 10 years 120 Mio Euro Investments, commitment of own resources for staff involvement of Province, LIOF and companies
TEE	Nepic is funded by membership fees and public funding from

	<p>OneNortheast Development Agency (Membership fees: MICRO (<10 employees) 150 pounds, SMALL: (<50) 300 p, MEDIUM (<250) 450 p, LARGE (>250) 600 p)</p> <p>Initially ~80% public funding, reducing through development of cluster to ~40%. Moving to zero by 2011 due to heavy public budget cuts following the financial crisis</p>
SWH	<p>Preparation and set up phase finance with Regional Management funding programme</p> <p>Cluster Management will be mainly financed by national programme GA 75% public funding for 3 years 25% own resources industry</p>
NRW	<p>Regional funding from NRW Excellence Initiative (50% public / 50% private)</p>

2.3.10 Political Influence

Cluster	Explanations
CCK	Medium: Ministry of Economy from Saxony-Anhalt, Saxony, Thuringia and Brandenburg participate in Cluster Board Meetings and support cluster activities, main funding from regional level (Ministry for Economy and Labour Saxony-Anhalt) – monitoring of successful implementation and results promised
AST	Low Medium – Companies decide, IDEPA as public development agency has supported initiated cluster and provides financing
MAS	High: Masovia is interested in Cluster development, participation of chemical companies has to be developed
UST	High: Usti Region is leading the discussion on cluster development together with chemical industry association
CHE	Medium: Company driven network, Public Authorities support activities and development agency partly finances cluster
NOV	Low : Industry are main driver of research activity, Province of Novara is member of the consortium and gives political support
LIM	High. Strong cooperation between companies, research campus and province administration and development bank – open inno-

	vation approach used for public funding allocation
TEE	Low – Company driven network, independent of local and national governments Public Authorities support activities and development agency partly finances cluster
SWH	Medium, company driven network, regional ministry supports and finances activities
NRW	Medium, industry driven network, regional ministry supports and finances activities, Ministry is member of the Steering Committee

2.3.11 Degree of Internationalisation

Cluster	Explanations
CCK	6-7 Active development and leadership of several EU Projects, MentorChem, ChemSME, ECRN, ChemLog, ChemClust, Leonardo, Saxony-Anhalt holds Presidency of ECRN Association and fulfils leadership function
AST	5-6: Participation in MentorChem, ECRN Interreg Project, contacts to other chemical clusters, IDEPA Member of ECRN Association
MAS	4 participation in ECRN Project, ChemLog, international activities of PKN Orlen
UST	5-6. Usti Region is active in international projects to support development of chemical industry e.g. ChemLog, ChemClust, Usti is also member in European Chemical Regions Network
CHE	5 participation in ECRN Interreg project, Cheshire is member of ECRN Association
NOV	5-6 IBIS Cluster members with only limited international activities, Province Novara with high level of activity, participation in ChemLog, ChemClust, Losamedchem, Member of ECRN Association
LIM	6-7 participation in many EU Projects, ChemSME, ECRN Interreg, cross boarder cooperation with Belgium and Germany
TEE	6-7 Project partner in ChemSME ECRN Interreg, Tees Valley is member in ECRN Association, Partnership to other European

	Clusters, Memoranda of Understanding in place with Axcelera (Fr), Suape (Brasil) and India. Increasing involvement in European projects
SWH	4 - member of ECRN Association
NRW	7 – ECRN Interreg partner and association member, High international visibility and activity, location of headquarters of global players, important chemical sites

1. No international activities visible and intended
2. No international activities visible but basically intended
3. First participation in and/or organization of international events by the clusters management are visible
4. Punctual cooperation with international partners
5. Active regular and intense participation of the clusters and its members in European Projects and other events
6. Intense cross linking/partnership with one or more foreign clusters (Noticeably internationally acting clusters)
7. Noticeably international acting cluster
(Meyer zu Köcker, 2009, p. 32)

2.4 Innovation Focus of Cluster

2.4.1 Activities of the cluster to promote innovation

Cluster	Explanations
CCK	Road Map Process for the identification of future innovation potentials for research and product development Prof Nelles Innovation Price – award for innovation in chemical and plastics industry
AST	Development of RTD collaborative projects Establishing links/cooperation with the public administrations Creating multidisciplinary groups for project development Supporting the proposal preparation phase and partners search both at national and European level Seeking and obtaining public financing: competitive clusters, National Research bodies, EUREKA, EUROSTARS, 7th EU Commission Framework Programme, etc.
MAS	PIPC informs all its members about possibilities of participation in the 7 Frame Program and other programs realized within the frames of EU structural funds as well as other innovation programs. PIPC is also coordinator of the Polish Technological Platform of Sustainable Chemistry. Promotion and information is one of the tasks of this Platform.
UST	SCHP coordinates activities of the Czech SusChem Technology Platform which is an important basis for innovation promotion in Usti

NWE	<ul style="list-style-type: none"> – Events/workshops. Information dissemination about funding calls- bespoke , mail-shots, news letters, e-bulletins . – Connecting companies to Knowledge Transfer Networks , Universities, Research institutions, other companies networks. – Cross sector collaboration to promote opportunities. E,g plus Automotive cluster, and environmental technologies Innovation (fitness tools) survey. – Awards for innovation – Innovation Road show (2009)
NOV	<p>IBIS has no other mission but innovation and it gathers research activities carried out by young chemical enterprises as well as by companies with an historical presence in the area. The only activity of IBIS consists in researches devoted to innovative results in many chemical sectors and implemented through the collaboration among the enterprises and the research institutions taking part to the Pole.</p>
LIM	<p>Open innovation : Promotion and realisation of innovation co-operation, facilitating communication and entrepreneurship</p> <p>ChemCafé : Informal exchange of knowledge and business contacts</p> <p>Colloquia (DSM) : Exchanges of technical and scientific knowledge</p>
TEE	<p>Centre for Process Innovation</p> <p>Innovation programme with the Tees Valley Industrial Programme (TVIP)</p> <p>Wilton Innovation Connector</p> <p>NETPARK</p> <p>NEPIC Innovation Strategic Thrust Team, Science for Success published annually and collaboration and promotion of KTN</p>

SWH	<ul style="list-style-type: none"> – Intense exchange between universities, R&D facilities and companies <p>As Northern Germany is mainly used for production activities, the focus of innovation is more on the technical (process innovation) than on the material side. There is a lack of understanding between the academic and the practical part. The cluster builds a platform to find a common understanding.</p> <ul style="list-style-type: none"> – Funding of research capacities <p>Schleswig-Holstein has relatively less institutes compared to other regions. The cluster starts a political impact to increase the innovation capacity.</p>
NRW	<p>Aims: Create a favorable environment for innovation. Strengthen the growth potential of NRW's industry. Stimulate economical growth and employment. Improve the network between industry and the scientific community.</p> <p>How: Build a strong network of all potential cooperation partners, academia, research institutes, SMEs and industry. Build cross innovation activities with the sister clusters on Plastics, Nanotechnology, Biotechnology and Energy.</p> <p>Tasks: Analyze core competences of universities, applied universities and research institutes and correlate to the structure and core competences of the industry.</p> <p>Identify future business opportunities for the NRW chemical industry based on the competences of the NRW scientific community. Identify possible bottlenecks in the education of engineers and scientists. Identify new cluster activities to build more value chain networks. Strengthen the site marketing for ChemSite (northern Ruhr area) and ChemCologne (Rhine area)</p> <p>Activities: Supervise Surface Chemistry Network</p> <p>Build new innovation networks for the topics:</p> <ul style="list-style-type: none"> – Secure resources and extend synthesis competence in NRW – Innovative Electronics, Electro Mobility

2.4.2 Best-practice solutions for innovation development in the cluster

Cluster	Explanations
CCK	The Fraunhofer Pilot Plant Center for Polymer synthesis and processing (PAZ)
AST	<ul style="list-style-type: none"> – Implementation of Safety Good Practices from previously development studies. – Compendium of Good Environmental Practices based on the Technical sector experience – Training courses between Industry and University
MAS	<ul style="list-style-type: none"> – PIPC doesn't implement any innovation program, however, makes efforts to organize seminars devoted to research programs. – PIPC plays a role of mediator between scientific-research units, Chamber's members and other companies. – PIPC has organized Branch Contact Point on the 7 Frame Program – Activity of the Polish Technological Platform of Sustainable Chemistry could be also treated as innovation development activity – PIPC watches very carefully and actively effectiveness of functioning of the Innovation Program realized by the biggest chemical companies as Ciech S.A., Nitrogen Plant "Puławy" S.A. and PCC Rokita S.A. – President of the Chamber is a member of the Council for Science at the Ministry of Science and Higher Education, influencing R&D policy implementation in Poland
UST	<p>A few projects solved by VUAnCh:</p> <ul style="list-style-type: none"> – Research of advanced processes of waste reprocessing to alternative energy sources. – Synthesis of titanosilicates and their applications. – Hybride nanocomposite materials – Advanced types of Zeolites and their applications – Investigation the influence of motor fuels with biocompo-

	<p>nents of the performance and emissions of compression-ignition and spark-ignition engines in the vehicle fleet of the Czech Republic.</p> <ul style="list-style-type: none"> – Single site catalysts for olefin polymerization
NWE	<ol style="list-style-type: none"> 1. Innovation tools & individual companies- assess companies ability to innovate , willingness , knowledge, connectivity = individual strategy and connections to individual help. 2. CIKTN- Chemical Industry Knowledge Transfer Network- bringing collaboration partners together to bid for Technology Strategy Board (Uk wide) and EU funds 3. Knowledge Centre for Materials Chemistry *(KCMC) KCMC - Home bringing expertise from several universities/institutions together into one virtual centre
NOV	<p>IBIS Annual Activity Plan identifies promising research projects between industry and academia and provides funding sources and cooperation framework</p>
LIM	<p>In Limburg the Chemelot Campus is for the Chemical Cluster Limburg the centre. In Chemelot Campus there is a close cooperation between DSM, University of Maastricht, Province of Limburg (Letter of Intent) and DSM and the Hogeschool Zuyd (University of Applied Research & Education using the Open Innovation approach.</p> <p>Successful solutions for financial support of innovation development</p> <p>In Limburg the national innovation grants are available for Innovation development within the Chemical Cluster. The most important Grant Scheme is the regional program Peaks in the Delta (Ministry of Economic Affairs, Province of Limburg and the Province of Noord Brabant € 10 mln p/y for industrial and experimental research (Technologies: High tech systems, materials, Life Sciences and Food).</p> <p>There are also regional grants, which are supported by EU-</p>

	<p>funding. Chemistry and Materials are special subject of stimulation. Limburg is situated in several Interreg IVA regions and there are a number of projects available for the Cluster (be. functional Surfaces, Nanotechnology/surface treatment).</p> <p>The Province of Limburg has also founded the Innovation fund (seed money). This is a fund specially aimed at SME companies to support projects with a very innovative nature.</p> <p>In Limburg are several venture funds active for general stimulation of companies with innovation projects. Special for CHem-elot/materials: Nedermaas Ventures and Limburg Ventures.</p>
TEE	<p>Centre for Process Innovation (CPI) ;</p> <p>SUSPROC (Sustainable Processing Centre) and</p> <p>PETEC (Printable Electronics Centre).</p>
SWH	<p>Oncampus FHLübeck: oncampus offers access to online r&d exchange and continuing education at German and international universities via the internet.</p> <p>www.oncampus.de</p> <p>KuK Kunststoffkompetenzzentrum Lübeck</p> <p>High Qualified Specialists in plastics and fibre composite supporting process and material solutions for companies using plastic materials</p>
NRW	<p>In preparation:</p> <p>Synthesis Competence in NRW “SusChemSys”</p> <p>Innovative Electronics</p>

2.4.3 Policy approaches and cluster strategies with focus on innovation development

Cluster	Explanations
CCK	CeChemNet-Network of Innovation Sites National funding for Cluster management The Strategy Dialog chemistry
AST	<p>Asturias Regional Cluster policy: IDEPA, the Economic Development Agency of the Principality of Asturias started in 2007 a Cluster Policy with an overall budget of 1 million € in order to support activities focused on: leadership, networking and financial support. As regards the financial support two calls have been launched: 1st call in 2008 with a budget of 500 000 € and 12 projects approved and the 2nd call in 2009 with a budget of 750 000€.</p> <p>The Innovative Business Grouping (AEIs) is part of the Plan for Business Development, approved by the Government of Spain as a means of driving forward and extending the practice of innovation more quickly within eligible business groups which have aspirations for embarking on advanced, cooperative projects.</p>
MAS	Currently under discussion, funds are available under Operational Programme,
UST	<p>There is no interest in the long term to attending in clusters from side of companies in the region. So neither the Region department doesn't see an output from this situation in this time.</p> <p>In the past there was a cluster in the Usti Region.</p> <ul style="list-style-type: none"> – BIOplast: the cluster was vertically focused to biologically decomposable plastics – beginning with raw material, through producers to waste composting. The activity of this cluster finished with the stopping of financial support.
NWE	<p>Knowledge to innovate (C-Tech) Lancaster University</p> <p>Centres of Excellence-</p> <p>NW Chemical Sector Strategy- NWDA website Welcome to the</p>

	<p>Northwest Regional Development Agency Chemical Sector Strategy</p> <p>National Strategy</p> <ul style="list-style-type: none"> – NINJ (new Industries new Jobs) – Low Carbon – Innovation and Growth teams <p>North West Science Council 2007-2010- Strategy for Science (included Chemistry)</p> <ul style="list-style-type: none"> – Senior industrials – Senior academics. – NWDA 07 to 21010 series of pillars one of which chemicals led to KCMC – major success. STEM minor success
NOV	<p>The first success factor of IBIS was the achievement of a specific financial line dedicated to chemistry in the regional ERDF planning.</p>
LIM	<p>The Chemical Cluster in Limburg is supported by the provincial policy. In the Acceleration agenda, Chematerials is defined as one of the growth engines for the region.. One of the major developments, which is a result of the Acceleration Agenda, is the development of the Chemelot Campus. The Province of Limburg tries to the develop the Chemelot Campus, together with the partners DSM and University of Maastricht, into the innovation community in the Euregion. A top state of the art location with accompanying facilities. The first milestone in this development is set in march 2010 with signing the Letter of Intent between DSM, University Maastricht / MUMC+ and Province of Limburg. After signing of the Letter of Intent the partners have started with the preparation of the Masterplan. This process is still in progress and will be finished in the first quarter of 2011. <i>Peaks in the Delta</i> has supported the project “ChemMaterials”, in which DSM and the Hogeschool Zuyd are cooperating.</p>
TEE	<p>Development of a regional Innovation Strategy to identify key areas for focus and regular networking and promotion of best</p>

	<p>practice.</p> <p>A key outcome of the presence of the Centre for Process Innovation (CPI) in the region is to encourage the creation of clusters surrounding the National Industrial Biotechnology Facility (NIBF) AND THE Printable Electronics Technology Centre (Petec)</p>
SWH	<p>Assistance in technology transfer (academic program)</p> <p>Forcing existing transfer institutions at Schleswig-Holstein universities to widen their programs onto chemical technologies.</p>
NRW	<p>Creation of the Innovation Committee of CHEMIE.NRW</p> <p>Creating a data base on chemical faculty in NRW</p> <p>Bundle surface chemistry activities</p> <p>Combine forces of ChemSite and ChemCologne in the framework of the Cluster Chemistry of the Excellence Initiative</p>

2.5 Integration in Innovation Networks

2.5.1 Regional Innovation Landscape

Cluster	Explanations
CCK	<p>Innovative Network 'Research and Development Plastics Technology</p> <p>Central Germany (FEKM):</p> <p>Central German Plastics Network (MKN): The Central German Plastics Network (MKN) is a platform for collaboration of plastics processor networks in Saxony, Saxony-Anhalt and Thuringia:</p> <p>Automotive Component Suppliers Plastics Engineering Saxony AMZK (Saxony), PolymerMat (Thuringia) and Polykum (Saxony-Anhalt).</p>
AST	<p>The Cluster will be integrated in the Cluster Association of Asturias (8 clusters) and the Chemical Industries Association of Asturias will be at the core of the Chemical Cluster.</p>
MAS	<p>Chemical industry cooperates with a variety of Research Institutions such as ICHP or University Warsaw</p>
UST	<p>The Research Institute for Inorganic Chemistry (VUAnCh) is</p>

	solving a lot of specific projects for the most of chemical manufacturers in the region. Furthermore VUAnCh offers a wide range of accredited and other chemical and physical analyses including professional consultations.
NWE	<ul style="list-style-type: none"> – NW Universities Association – Knowledge Centre Materials Chemistry – University of Manchester Chemistry Department. (Chemicals Northwest is on Advisory Committee for University of Manchester Chemical Dept) – North West Development Agency- Innovation – North West Science Council- Chemicals Pillar – CoEBio3 – North west England Science Parks – Chemical Sector Group – University of Liverpool Chemistry Department. – University of Lancaster Chemistry Department.
NOV	IBIS itself is a regional network and it has been established under the Piedmont regional plan for Objective Competitivity, in the part devoted to the “Poles of Innovation”, which financed IBIS as the managing structure of the Pole of Innovation for Sustainable Chemistry.
LIM	The Chemelot Campus is the centre for the Chemical Cluster Limburg. In Chemelot Campus there is a close cooperation between DSM, University of Maastricht and Province of Limburg (LOI) and DSM and the Hogeschool Zuyd
TEE	<p>Active networking takes place between regional and national groups i.e. CPI, CIKTN & KTNs, Universities and there are links with other industrial sectors</p> <p>The National Skills Academy for the Process Industries (NSAPI) is based in the Tees Valley (www.process.nsacademy.co.uk) with a remit to up-skill the UK Process Industry Sector to global standards.</p>
SWH	In set up phase

NRW	CHEMIE.NRW is one of 16 clusters in NRW and works closely together with kunststoffland.NRW, NMW.NRW, BIO.NRW, ENERGIE.NRW and some others and also with Cluster Industrielle Biotechnologie 2021
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2.5.2 National Innovation Networks

Cluster	Explanations
CCK	National Cooperation with German Chemical Clusters The German Sector Group of Chemical Parks and Sites within the German Chemical Industry Association (VCI)
AST	The Chemical Cluster will be integrated in FEIQUE, the Spanish Federation of Chemical Industries, with more than 3 500 companies.
MAS	Cooperation takes place in National Suschem Technology Platform
UST	In the most of chemical companies exist agreements with the Institute of Chemical technology in Prague concerned the enlightenment of specialists for their needs. In some cases is this Institute solving technological projects for demand of this companies.
CHE	<ul style="list-style-type: none"> – Chemical Industry Knowledge Transfer Network (CITKN). – BIS (Business Innovation Service)-Chemical Unit – RSC (Royal Society of Chemistry – IChE (Institute of Chemical Engineering) – Other chemical clusters – DICIDA- – Intelligent Formulation Yorkshire – (CPI) Centre for Process Industries (Wilton) – National Non Food Crop Centre (NNFC) – Other Knowledge Transfer Networks (KTN's) – UKTI-export and inward investment UK Government – COGENT/NSAPI (Skills)

	<ul style="list-style-type: none"> – Petec- Printed electronics, NE England – Chemical Industry Education Centre (York)- Links to primary school programmes. – Business Education Matters- links to secondary school programme
NOV	<p>At national level IBIS has been inserted in the organisations supporting actions for the development of chemistry which belong to the territories of the local authorities taking part to the National Observatory for Chemistry, which is a structure created by the Italian Ministry for Economy aimed at elaborating indications for the improvement of public nation laws related to chemistry.</p> <p>Furthermore, IBIS has opened a confrontation and a collaboration, with the scope of increasing the quality and the quantity of the Italian participation to European programs supporting research in chemistry, with IT SusChem, which is an association, led by the University Alma Mater of Bologna and formed by other Universities, national research centres, entrepreneurial associations and local authorities, aiming at being the Italian version of the European Platform for Chemistry.</p>
LIM	<p>Vereniging van de Nederlandse Chemische Industrie (Association of Dutch Chemical Industry) (VNCI)</p> <p>Dutch Polymer Institute (www.polymers.nl)</p>
TEE	<p>DICIDA, Links to other regional chemical initiatives, CI(KTN)</p> <p>Trade Associations, professional science and engineering institutions.</p> <p>National links with the National Skills Academy and Cogent Sector Skills Council</p>
SWH	<p>The cluster is active in the federal states of Schleswig-Holstein and Hamburg. While Schleswig-Holstein houses the chemical companies of the region, Hamburg based service companies are a main part of the value chain. Chemical related service means e.g. logistics, trade, financing, process software, maintenance etc</p>

	<p>Because of this integration the cluster integrates following partners:</p> <ul style="list-style-type: none"> – ChemCoast e.V. (Northern Germany Chemical Sites Association) – Verband der Chemischen Industrie e.V. (VCI) (National Association of the Chemical Industry) – Industrieverband Hamburg (Industry Association Hamburg) – Industrie- und Handelskammer (Chamber of Industry and Commerce)
NRW	Via Chemical Association organization close exchange of activities with other chemical regions in Germany take place

2.5.3 European Innovation Cooperation

Cluster	Explanations
CCK	<p>European Chemical Regions Network</p> <p>High Level Group for the competitiveness of chemical industry in Europe</p> <p>ChemLog, ChemSME, MEntorChem</p> <p>European Chemical Site Promotion Platform – ECSPP</p>
AST	<p>AT Clusters: a European Territorial Co-operation Project funded under the Atlantic Area Operational Programme to explore real possibilities of transnational cooperation among clusters in the Atlantic Area (existing or under creation ones), and in connecting them together in order to facilitate their development.</p> <p>European Cluster Alliance</p> <p>European Chemical Regions Network (ECRN)</p> <p>MentorChem</p>
MAS	Participation in SusChem Technology Platform, Masovia is also associated partner in the ChemLog Project.
UST	<p>In cooperation with other members of ECRN in thin connection with the project ChemLog, we can assume the successful development of the international integration of regions within the clusters.</p> <p>Because the project ChemLog, focused on transportation of</p>

	chemical goods, we have established relationships with potential partners in Central Europe and we are closer to a solution the issue of cluster policy.
CHE	Chemicals Northwest links through <ul style="list-style-type: none"> – DICIDA – To ECRN – Via Chemical Industry Association and Chair of Chemicals Northwest Board to CEFIC (European Chemical Trade Body NWDA overseas offices and investment points – UKTI
NOV	Through the Province of Novara and beyond the insertion in CHEMCLUST project as its only Italian cluster, IBIS has the chance to take part to the debates, the elaboration of position papers and the carrying out of projects at European level, which are the usual activities of ECRN network. Moreover, with the support of Piedmont Region, IBIS has created a relationship with the partners of the project INTERREG IV B MED “IC – MED Innovation clusters in the Mediterranean”, dedicated to build research collaborations in common fields of activities among many different industrial clusters settled in the Mediterranean area.
LIM	ECRN, Limburg works closely in the Interreg A Region with Aachen and Belgium
TEE	ECRN, Memoranda of Understanding between NEPIC and Axcelera (France), India Chemical Council, Vapi and Gujarat and with Suape (Brazil). Universities and NETPARK have international experience and RDA have some overseas offices ChemSME
SWH	ECRN
NRW	ECRN, Loose contacts and exchange of ideas and planning of future activities with other areas, especially in NL and BE

3 Need for Actions and future potentials

3.1 Priority topics for future cluster activities

Cluster	Explanations
CCK	Feedstock: Cooperation between different industrial branches. Innovation: Chemical Logistics: Human Resource Development: New financing resources for chemical industry:
AST	The following action lines will be carried out by 4 Working Groups: <ul style="list-style-type: none"> – Business development: set up of a discussion forum, promote the image and the relationship between the Chemical and Processes Industry and improve the logistic problems that affect the sector companies. – Training: Information database with state of the art technology, improve the environmental performance of the companies, promote sustainable development, increase the safety levels and minimise the risks in the production centres. – RTD: Promote collaborative projects, access to financing. – Regulation and environment: energy efficiency, waste management, ecological products.
MAS	One of the priority is to build a joint information platform which would enable an exchange of information, experience, technical and technological solutions. Expand cooperation with self – government of Mazovia as well as strengthen the role of clusters in Regional Innovation System
CHE	<ul style="list-style-type: none"> – More networks designed to share best practice – The networks to have sub-sectors focussed on innovation, and to have an ability to support active collaborative projects across the industry. One example is the Personal Care Network project operating in Yorkshire.

NOV	Promote research cooperation between industry and academia in the area of new chemical products to support eco-efficiency
LIM	With the development of the Chemelot Campus, a new development organisation will be established. In this organisation there will be a focus on marketing, business development and acquisition of companies. The activities will focus on the creation of roadmaps, clustering, acquisition of new companies, involvement of knowledge institutions, creating networks, initiate feasibility studies for new ideas, etc. The activities which are done at this moment within the Chemcluster, with the development of the Chemelot Campus, will be more intensified, expanded en with focus and mass.
TEE	<p>Closer integration to other chemical using industries to promote open innovation.</p> <p>Increase of spin-out business creation and increase entrepreneurial culture.</p> <p>Low Carbon and sustainable feedstocks</p> <p>Reduced Emissions</p> <p>Increasing knowledge of non-conventional uses for existing products</p> <p>Industrial Biotechnology, Advanced Materials, Nanotechnology, Printable Electronics, Enabling Technologies</p> <p>Next generation speciality chemicals</p> <p>Continuing process improvements</p> <p>Skills development for the emerging technologies through NSAPI and Cogent SSC.</p>
SWH	<ul style="list-style-type: none"> – Better cooperation with the politics. – Identification of unused synergies within the sector. – Strengthening the support for innovation and training. – More focus on SME's along the value chain. (SME have no good access to networks because of little information or small personnel capacity)
NRW	Get the planned activities "SusChemSys" and Innovative Electronics running by securing public funding in the CHeK.NRW

	<p>and Spitzencluster funding schemes on state and national level.</p> <p>Strengthen communication among stakeholders, especially in industry and academia.</p> <p>Strengthen communication with the public to enhance understanding and support of chemistry as the problem solving science and industry.</p> <p>Reach out to SMEs and engage SMEs in research projects with universities and applied universities.</p> <p>Innovation areas are: Industrial biotechnology, Chemical Synthesis, Innovative Electronics, Mobility. Energy and Surfaces</p>
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3.2 Needs for action to strengthen innovation capacity

Cluster	Explanations
CCK	<p>Further Development of Technology Road Maps</p> <p>Implementation of practical Research Voucher Systems</p>
AST	<ul style="list-style-type: none"> – Industry support to basic research for knowledge creation – Industry participation in technology development involving some exploratory work – Academic intervention in solving specific industry problems – Laboratory utilization by industry <p>Continuing education programme</p>
CHE	<ul style="list-style-type: none"> – There must be more contact between the two informing better knowledge of each others needs, constraints and opportunities. – Universities can work with smaller projects, which will give benefits in easy to deal with contracts, IP issues and understanding the need for speedy results. – Industry must do more to recognise the benefits of joint R&D programmes.
NOV	<p>In IBIS Consortium this common agenda is compulsory if both Universities and companies want to receive ERDF contribution.</p> <p>But the cluster needs to overcome its current horizon and look at further possibilities like elaborating and presenting research pro-</p>

	<p>jects under the 7 FP's calls. To do this a closer collaboration and a transnational dimension are necessary and this is the future perspective of the development of the common agenda between academia and industry in the cluster.</p>
LIM	<p>Important in the Chemelot Campus is the development of Knowledge to Knowledge and the Knowledge to business. Especially the last one focuses on the cooperation between academia and business. To create this cooperation, research programs will be designed and focused on the main technologies on the Campus.</p> <ul style="list-style-type: none"> – (Performance) Materials: automotive en electronic polymer-based systems; – Biobased materials: functional coatings, specialty packaging, biobased materials and products; – Biomedical Materials: medical coatings, polymer implants, drug delivery systems, tissue engineering, regenerative medicine; – Biotechnology/biosynthesis: White biotech, bio synthesis & process intensification; – Analytical support: R&D Enabling technologies. <p>These research programs are the result of a strategy developed for the Campus. The Marketing & Business Development (M&BD) organisation / new to appoint research director must make a connection between these programs' and companies.</p>
TEE	<p>Increase support for the Science to Business Hub (S2B). Development of better and more regular feedback loops in communication to overcome differences in ethos and culture between industry and academia, whilst continuing and increasing liaison activities.</p> <p>Promotion and development of Knowledge Transfer Partnerships (KTPs) involving member companies</p> <p>Provision of more open innovation events and activities</p>

SWH	<p>It is intended to create the new Chemical Cluster with a strong involvement of the regional universities. Thus the link between industry and academia shall be an integral part of the cluster. Furthermore the cooperation shall not only be furthered through organisational integration but also through the networking part of the cluster.</p> <ul style="list-style-type: none"> – Reduced costs for IP protection – particularly for SMEs – Dedicated innovation fund across Europe – Influence EU and National policy to improve framework and provide more feedback on current framework – Further tax incentives <p>Further support of student placements</p>
NRW	<p>In chemistry, academia and industry are traditionally working together on a high level of cooperation, also in precompetitive as in competitive research and development. It is important to focus activities and concentrate public funds in the most promising fields of activity to stabilize and strengthen NRW as the strongest chemical region of Europe.</p> <p>As most of the industrial stakeholders are global companies, the local academia competes with research institutions on a global scale for the cooperation projects of these companies. Here, by focusing the available public funds on the given strengths of research helps to build local cooperations.</p>

3.2.1 Potential for cross cluster cooperation and innovation development

Cluster	Explanations
CCK	<p>Solar-Industry – New Materials for PV</p> <p>Automotive and Aviation Industry – lighter materials with specific characteristics for automotive construction</p> <p>Agriculture– fertilizers</p> <p>Food Industry - biodegradable packaging and foil</p> <p>Energy Suppliers – CCS</p> <p>Environment technology companies – new materials and proc-</p>

	<p>ess to protect environment and save resources</p> <p>Logistic Service Providers – Innovative logistic concepts – integration of LSP in chemical site</p>
AST	<ul style="list-style-type: none"> – Low carbon – Fertilizers – Recycling – Performance materials – Industrial Biotechnology – Process safety – Carbon fibers – Resource efficiency
MAS	<ul style="list-style-type: none"> – PIPC participates in the work of Electrical Energy and Gas Consumers Forum and of CO2 Forum of Branch Organization in the scope of legal regulations on climate and environment, energy effectiveness and decrease of energy and raw materials consumption – PIPC coordinates CARE+ - Project aimed at improvement of energy effectiveness in medium and small chemical companies – PIPC watches the latest innovation trends in other branches and suggests their implementation in chemical branch.
UST	<p>Association of Chemical Industry of the Czech Republic (SCHP) delegated its innovation problems to CTP SusChem - Basic information on Technology Platforms.</p> <p>SusChem will develop a Strategic Research Agenda in three sections: Industrial Biotechnology, Materials Technology, Reaction and Process Design. The Platform will also identify and address barriers to and opportunities for chemistry innovation that will be deal with in the Horizontal Issues Group.</p>
NWE	<ul style="list-style-type: none"> – Low Carbon – Climate change implications – Energy generation - in renewable, nuclear and carbon cap-

	<p>ture</p> <ul style="list-style-type: none"> – Recycling – Performance materials – Modelling/simulation – Industrial Biotechnology <p>Grand challenges</p> <p>Health, ageing population, water, food and energy.</p> <ul style="list-style-type: none"> – Low carbon, and the automotive sector in particular – Printed electronics – Materials chemistry (formulation) – Sustainable product design – IB – Nanotechnology
NOV	<p>The following research sectors have high priority :</p> <ol style="list-style-type: none"> 1. innovative coatings, aimed at elevating the environmental performances of varnishes; 2. bio-based products from renewable rough materials; 3. more eco-sustainable processes and products, including different kinds of interventions to reduce the environmental impact of chemistry
LIM	<p>The Chematerials cluster is strongly linked with life science (biomedical materials, biotechnology for example).</p> <p>Also a link can be made to food.</p> <p>The Chemelot Campus is focused on:</p> <ul style="list-style-type: none"> – Performance materials; – Biobased materials; – Biomedical materials; – Biotechnoly; <p>R&D enabling technologies.</p>
TEE	<p>Within travelling distance of the Tees Valley there is the Nissan car factory, we have food producers, engineering companies manufacturing companies producing goods for industry and</p>

	<p>consumers.</p> <p>All elements of entrepreneurial skills required to innovate</p> <p>Low Carbon, Resource efficiency, Process and Scale Optimisation, Green Chemistry</p>
SWH	<p>All elements of entrepreneurial skills required for innovation,</p> <ul style="list-style-type: none"> – Low Carbon – Resource efficiency – Process and Scale Optimisation – Green Chemistry <p>Interexchange in the fields of</p> <ul style="list-style-type: none"> – resource efficiency – carbon-fibres – sustainability – nano-technology – pharmaceuticals – carbon / emission reduction; carbon trade – wind energy to hydrogen – process development – downstream technologies – composite materials
NRW	<p>Innovative Electronics</p> <p>Electro Mobility</p> <p>Sustainable Energy</p> <p>Resource efficiency</p>

Summary: Taking into account the answers from the ChemClust partners, the following topics have a high potential for cross cluster development and innovation development:

- Solar-Industry - New Materials for PV
- Automotive and Aviation Industry – lighter materials with specific, electro mobility - characteristics for automotive construction
- Agriculture– fertilizers
- Food Industry - biodegradable packaging and foil
- Energy Suppliers – CCS, sustainable energy
- Environment technology companies – new materials and process to protect environment and save resources, low carbon technologies, eco efficiency, re-cycling
- Performance materials
- Innovative electronics, printed electronics
- Sustainable product design
- Industrial biotechnology
- Nanotechnology
- Logistic Service Providers – Innovative logistic concepts – integration of LSP in chemical site

3.3 Need for action for cooperation of clusters at European level

Cluster	Explanations
CCK	<p>Innovations promotion</p> <p>Describe innovation developments in European Clusters to increase transparency and improve communication</p> <p>Establishment of Voucher Systems also for international research cooperation – cross-boarder recognition of Voucher</p> <p>Open Innovation – look for partners for joint innovation activities – facilitate innovation and R&D cooperation among clusters</p> <p>Finding solutions for joint financing of innovation activities between different countries</p> <p>Chemical park development</p> <p>Describe added value and benefits of chemical parks in global competition</p> <p>Strengthening innovation capacity by settling research infrastructure on chemical parks and improving integration in regional innovation landscape</p> <p>Know how transfer about successful models for park development – overcoming challenges of competition and cooperation</p> <p>Better connection of chemical parks via improved logistics</p> <p>Human Resource Development</p> <p>International Staff Exchange</p> <p>Joint definition of new professions</p> <p>Cooperation between chemical industry and universities</p> <p>Information about cluster activities and promotion of working in chemical industry towards young people</p>
AST	<p>Innovations promotion</p> <p>Human Resource Development</p>
MAS	<p>Active monitoring of implementation of the European legislation on benchmarking and BAT in Poland is the most important prob-</p>

	<p>lem.</p> <p>Decrease of the level green house gases emissions and generates sewages and wastes is also very important.</p> <p>Better energy effectiveness and maximal increase of the share of renewable raw materials are other two important topics for us.</p>
UST	<p>Centre connecting research, education and industrial application to be constructed in Chempark Záluží. Project of VUAnCh will be supported by European Union with CZK 776 million.</p> <p>The Centre in Záluží will continue the long and successful cooperation between VUAnCh and IChT Prague and the academic divisions of the Academy of Sciences of the Czech Republic, who participated and are currently participating in several joint research projects. It will also continue the cooperation with production plants, especially small and mid-sized companies, mostly from North Bohemia. Research will be contracted by the Unipetrol Group companies but also other firms from the industry. In the region these include Spolchemie Ústí nad Labem, Hexion Sokolov, Spolana Neratovice or Synthos Kralupy.</p>
CHE	<p>Innovations promotion</p> <ul style="list-style-type: none"> – Connecting industry and academia more – SMEs linked to innovation funds – Opening up 'open innovation networks' – Closer inter-university co-operation – Sharing best practice on starting up and running Centres of Excellence (Franhofer, Germany) <p>Chemical park development</p> <p>Human Resource Development</p> <ul style="list-style-type: none"> – How to further develop and support of STEM activities – Best practice on skills development at all levels – Apprenticeships- increasing value and status and encourage companies to take them on – Retaining science graduates – Up-Skilling graduates and vocational workers for cross-sector opportunities whilst maintaining skills and knowledge

NOV	<p>Innovations promotion</p> <ul style="list-style-type: none"> – joint research activities (new material, bio-degradable plastics etc.) – faster application of innovation results to production and market – better integration between research activities and productive needs <p>Chemical park development</p> <ul style="list-style-type: none"> – improvement of transport connections and logistic – exchange of common activity management models – improvement of the financial support system for enterprises <p>Human Resource Development</p> <ul style="list-style-type: none"> – better system of development skill forecast – flexible and effective methods to plan and implement training activities – effective systems of professional orientation – better methods of follow-up survey.
LIM	<p>Innovations promotion</p> <ul style="list-style-type: none"> – Share best practices: how is innovation stimulated, which facilities are offered, which financial instruments are available, etc <p>Chemical park development</p> <ul style="list-style-type: none"> – The facilities necessary for an open innovation environment: <ul style="list-style-type: none"> ○ Miniplants; ○ Joint conference rooms / restaurant; ○ Presence of laboratories; ○ Presence of knowledge institutions <p>Human Resource Development</p> <ul style="list-style-type: none"> – Which different skills / competence are necessary to have in an organisation who wants to perform in an open innovation

	<p>environment;</p> <ul style="list-style-type: none"> – Which skills are necessary for employees who work in an open innovation community; <p>Which educational programs should be available</p>
TEE	<p>Innovations promotion</p> <p>Policy development. Access to facilities and sharing of resources.</p> <p>Encouraging joint FP7 & FP8 projects</p> <p>Increased communication and collaboration</p> <p>Chemical park development</p> <p>Logistical provision for alternative feedstock</p> <p>Improving access without compromising H&S and security</p> <p>Human Resource Development</p> <p>through linkage with NSAPI and Cogent SSC.</p> <p>Encouraging youngsters to study STEM subjects</p> <p>Passing on experience of older staff</p> <p>Encouraging LLL for adaptable and flexible skills that go across traditional boundaries and help meet needs of emerging technologies</p>
SWH	<p>Innovations promotion</p> <ul style="list-style-type: none"> – Joint research capacities – Interregional open innovation exchange – Joint communication <p>Chemical park development</p> <p>European database for feedstock exchange</p> <p>Human Resource Development</p> <p>The ESF-program gives good support for new qualification concepts. These concepts should be linked on an European platform to have a wide offer of qualification programs for the chemical industry</p>

NRW	<p>Innovation promotion</p> <p>Open access to FP7 respective FP8 funding opportunities</p> <p>Chemical park development</p> <p>Improve regulations (cut red tape) for chemical sites on all levels.</p> <p>Human Resource Development</p> <p>Simplification of EU public funding procedures</p>
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Summary: Taking into account the answers from the ChemClust partners, the following topics have a high relevance for ***cooperation of chemical clusters at European level:***

Innovations promotion

- Describe innovation developments in European Clusters to increase transparency and improve communication
- Establishment of Voucher Systems also for international research cooperation – cross-border recognition of Voucher
- Linking SMEs to innovation Funds
- Open Innovation – look for partners for joint innovation activities – facilitate innovation and R&D cooperation among clusters and its members
- Finding solutions for joint financing of innovation activities between different countries
- Sharing best practice on Centres of Excellence (e.g. Fraunhofer, CPI etc)
- Joint Access to research facilities and sharing R&D resources

Chemical park development

- Describe added value and benefits of chemical parks in global competition
- Strengthening innovation capacity by settling research infrastructure on chemical parks and improving integration in regional innovation landscape – synergy to Open Innovation Approach
- Know how transfer about successful models for park development – overcoming challenges of competition and cooperation
- Better connection of chemical parks via improved logistics

Human Resource Development

- International Staff Exchange (Employees and Trainees)
- Joint definition of new professions (Joint Foresight Studies for future qualification demands of innovative technologies)
- Cooperation between chemical industry and universities
- Information about cluster activities and promotion of working in chemical industry towards young people (kindergarten, school, university)
- Encourage youngsters to study STEM subjects
- Using experiences of older staff
- Encouraging lifelong learning for adaptable and flexible skills across traditional boundaries to meet needs of emerging technologies

3.4 Needs for Joint Position to European Policies

Cluster	Explanations
CCK	<p>EU legislation on emission trading and CCS is an important topic for the chemical industry as it constitutes a major cost factor. CCS is important for the innovation topic coal to chemicals. There is a European Coal Round Table within the European Parliament, which discusses EU policies towards coal. Cooperation with ECRN and the round table could be interesting to promote this topic</p> <p>The topic of future energy policy is important for the chemical industry also referring as important cost of production.</p>
AST	<ul style="list-style-type: none"> – Dissemination campaigns – International conferences – Think-Tanks <p>Political Manifesto of the Chemical Regions</p>
CHE	<ul style="list-style-type: none"> – Introducing venture capital for start-ups/spin-outs – Best practice sharing between chemical clusters – Supply chain opportunities between regions – Plus more strategies as per HR development as earlier. <p>Best Practice in a number of areas- STEM activities</p>

	<p>Skills development</p> <p>Encouraging companies to recruit apprentices.</p>
NOV	<p>The initiative to be undertaken towards external stakeholders at European level are various. During the CHEMCLUST project and afterwards, European, national and regional authorities, must be involved to implement the regulation changes (about ERDF management etc) that the project will suggest. A lobby action must be undertaken towards them with the scope to increase the possibilities of success of the projects that will be presented to provide financial support for the new network. Finally a general confrontation with these authorities must be established about the strategic themes affecting the development of chemical cluster in Europe (raw materials, energy, logistic, skills, etc).</p>
LIM	<p>Lobby activities especially on open innovation in Chemical sites:</p> <p>Venture capital</p> <p>Research infrastructure (miniplants etc)</p>
TEE	<p>Improving communication and cooperation with European Commission DG EAC, DG COMP, DG TREN, DG ENTR DG RTD, Committee of the Regions and European Investment Bank</p>
NRW	<p>Shaping priorities on 8th Framework Research Programme</p> <p>Lobby for better regulations to make investment easier.</p> <p>Improve reputation of chemical sector as problem solver for sustainable development for future challenges (environment, climate, resource efficiency, etc.)</p>