Press Release

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DECHEMA e.V.
Theodor-Heuss-Allee 25
D-60486 Frankfurt am Main
Telefon (069) 7564-0
Telefax (069) 7564-201
E-Mail: presse@dechema.de
www.dechema.de

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Kontakt/Contact:
Dr. Christina Hirche
Tel. +49 (0) 69 / 75 64 - 2 77
Fax +49 (0) 69 / 75 64 - 2 72
E-Mail: presse@dechema.de

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Trend Report No. 2: Chemical industrial parks

Chemical industrial parks in China

- **Chemical industrial parks in China – fit for the future**
- **Eco industrial parks act as pilot projects for a sustainable economy**

Huge investments have flowed into China's chemical parks during the last few years. These investments have sparked off a high-performance chemical industry producing not only basic chemicals, but increasingly fine and special chemicals. In many cases the concepts have been inspired by European or American sites. The theme of chemical parks, featuring all aspects of park operator models, equipment, infrastructure and logistics, will be an important topic at the 7th AchemAsia from 14-18 May 2007 in Beijing. Around 500 exhibitors from 25 different countries and some 20,000 visitors will exchange their ideas and experience at this major international forum for the process industries in Asia.

The Tianjin Economic and Technological Development Area (TEDA)[a]

TEDA was founded in 1984 as one of the first national development zones. It is located 40 km from Tianjin and 120 km from Peking. 33 square km were originally reserved for the site, and most of this space is now being utilized. Permission was granted to TEDA in 2005 to develop an additional zone, TEDA West (48 square km). The principal industries in the zone are telecommunications (61 %), machinery manufacturing and car production (25 %), biopharmaceuticals (5 %) and food (6 %). The TEDA administration committee has also set up three specialized industrial parks: the Microelectronics Industrial Park (4.6 square km), the Yat-sen Scientific and Industrial Park (10 square km) and the Chemical Industrial Park (27 square km). It is also responsible for the Tianjin Export Processing Zone (2.5 square km) and Tianjin University Scientific and Technological Park.

TEDA's GDP grew by 25% between 2004 and 2006 to 64.2 billion RMB. Value-added increased in the secondary manufacturing industry by 29% to 54.1 billion RMB and by 4.1% in the service sector to 10.1 billion RMB. The population in this area was 105,000 at the end of 2005. Total investment by 4,190 foreign companies was around $30 billion as of the end of May 2006.

[a] Salonen, T., Interviews in TEDA im April 2006 & www.investteda.org

By the end of 2005, 9,185 domestic companies had invested about 42 billion RMB. The high-tech sector and the service industry are the priorities in the site development strategy.

The Tianjin Economic and Technological Development Area has excellent regional, national and international transportation links. Tianjin is one of the major rail centers in China, and it also has an international airport. TEDA has a direct link to the national superhighway network and is only 5 km from the international seaport in Tianjin.

TEDA uses the “autonomous administration committee and development company model”. TEDA Investment Holding Co. Ltd has responsibility for development. The company’s activities include real estate and infrastructure development and operation of public utilities (water, waste water, electricity, steam and gas). The TEDA administration committee has achieved ISO 14001 certification, and the TEDA eco plan for special water and solid waste recycling was approved by the State Environmental Protection Administration (SEPA) in 2003.

The Chemical Industry Park was established as a TEDA satellite zone in 1996. Of the 27 square km which have been earmarked for development, 2.5 square km have been developed as of April 2006. TEDA CIP Co, a public company, has responsibility of park development. It takes care of investment incentives, provision of the environmental infrastructure and organization of the safety management program, and it also carries out environmental and safety audits.

A favorable political framework provides support for investment incentives at three levels. TEDA CIP participates in the national “circular economy” initiative and has a program to attract recycling companies. The general tax benefits at TEDA also apply to the chemical industry park, and favorable land use rights are offered to attractive investment projects. TEDA CIP does not currently have its own infrastructure network. Instead, the park is connected to the public utilities networks (electricity, water and steam). A water treatment plan for industrial users is currently under construction, and planning is underway for a dedicated district heating station. Waste disposal companies collect waste from industrial companies on the site. Each company currently operates its own emergency services, but that is likely to change in the future.

Development of the fine chemical industry is the priority at TEDA CIP. There were 20 investors at the site in April 2006. Five have already started production, and the other plants are still under construction. The list of domestic investors includes Tianjin Zhongwei Pharmaceutical Co. Ltd. (Vitamin B1), Tianjin DEK Chemical Co. Ltd. (dyes and pigments), Suanhuan Lucky New Materials Inc. (sintered magnets) and Cenway Technologies, Ltd. (herbal extracts and special chemicals).

The Japanese and Americans are the major foreign investors. They are engaged in joint ventures (JV) as well as direct investment (FDI). The list of American investors includes JV Cabot Chemical (Tianjin) Co. Ltd. which produces carbon black and has invested a total of $60 million, and the FDI PQ (Tianjin) Silicates Technology Co. Ltd., which makes silicates. The Japanese are involved in the JVs Tokai Carbon Tianjin Co. Ltd. ($50 million), Tianjin Toho Lead Recycling Co. Ltd. ($4.75 million) and Tianjin Cosmo Polyurethane Co. Ltd. (258 million RMB). Tokai Carbon has a production capacity of 40,000 t/a of carbon black. Tianjin Toho can produce 12,000 tons of secondary lead mixtures a year and und Tianjin Cosmo specializes in polyether and polyurethane resins. Tianjin Sekisui Plastics Co. ($5.6 million) which makes Piocelan (a resin composite made of polyethylene and polystyrene) is a Japanese FDI. Taiding (Tianjin) Environment Technology Co. Ltd is one of the recycling companies at the site. It can recycle 30,000 t/a of electrical and electronic waste.

Industrial production at TEDA CIP increased to 263 million RMB in 2005. As of April 2006, there was little inter-company value-added at the site. TEDA CIP will target downstream producers in the future to increase the level of on-site vertical integration.

Shanghai Chemical Industry Park (SCIP)[b]

Construction of the Shanghai Chemical Industry Park (SCIP), which focuses on petrochemicals, got underway in 2001. It is situated on Hangzhou Bay about 50 km from Shanghai. A total of 29.4 square km are available at the site. Development will take place in three phases. Because the Shanghai area is very crowded, land for the areas in phases 1 and 3 has to be reclaimed from the sea. Development has proceeded most quickly at the phase 1 site. Most of the plots are being leased by foreign investors, above all from Germany.

Phase 1 direct investments include BASF production facilities for 80,000 t/a of THF, 60,000 t/a of poly-THF and 8,000 t/a of polyisocyanate (total investment $335 million), Degussa production facilities for 9,000 t/a of polyester and 8,500 t/a of colorants (total investment $36 million), a future complex for 100,000 t/a of methylmethacrylate and special Plexiglas® products and the British LUCITE facility for 90,000 t/a of MMA at a total cost of $110 million.

Bayer is planning to invest a total of $1.8 billion at the integrated site. Bayer now has or is currently building production capacity for 10,000 t/a of polyisocyanate, 200,000 t/a of polycarbonate, 200,000 t/a of bisphenol A, 172,000 t/a of diphenyl carbonate, 230,000 t/a of methylendiisocyanate and 150,000 t/a of TDI. Construction of most of these production facilities got underway in 2003/04, and completion took place in 2005/06. Production is planned to start at the Degussa methylmethacrylate facility in 2009. Production at Bayer's MDI and TDI facilities will commence in 2008.

The list of Phase 1 joint ventures includes Shanghai SECCO Petrochemical Co. cracker (joint venture between SINOPEC, SPC[c] and BP, capacity 900,000 t/a of ethylene) at a cost of $2.73 billion, the Shanghai Lianheng Isocyanates Co. Ltd. isocyanate facility (GPC[d], SHYG[e], SCACC[f], BASF and Huntsman joint venture, $1.12 billion), the Shanghai SINOPEC Mitsui Chemicals Co. (JV between SINOPEC and MGC[g]) bisphenol A facility (120,000 t/a) and the Shanghai Shenxing Chemical Industrial Co. Ltd. formaldehyde facility (80,000 t/a). Alongside the foreign investors, the domestic producers SCACC, GPC and SHYG have built their own plants for the production of PVC, acetone, ABS, SBR, PVDF and HFA.

The 13.4 square km Phase 2 sector will be mainly used by downstream customers of the Phase 1 companies (fine chemicals and derivatives). Currently the sector is virtually empty, and SCIP Development Co. is searching for potential investors to increase the level of vertical integration at the site. The reagents plant built by TCI (Shanghai) Development Co. Ltd. of Japan at a cost of $70 million has now gone into operation. The land reclamation work for Phase 3 was completed in 2004, and the plots are already reserved for specific large investors. The list of facilities which will be constructed includes a cracker, a refinery, a gas-based power station and a port.

As is the case at TEDA, the management structure of the Shanghai Chemical Industry Park (SCIP) is based on the "autonomous administration committee and development company model". The Administration Committee (SCIPAC) has responsibility for the project approval process and business coordination between the city government, SCIP and SCIP Development Co. Ltd. (SCIPDC) in matters relating to development and construction of infrastructure, utility services, waste disposal, investor acquisition and land leases. SCIPDC is a public company, and the companies at the site are the major shareholders.

SCIPDC has established joint ventures with large foreign companies to construct and operate utility and waste disposal services. The list of projects includes a waterworks (340

[b] Salonen, T., Interviews in SCIP im Juni 2005 & www.scip.com.cn
[c] SPC: SINOPEC Shanghai Petrochemical Co. Ltd.
[d] GPC: Shanghai Gaoqiao Petrochemical Corporation, subsidiary of SINOPEC
[e] SHYG: Shanghai HuaYi (Group) Co. Ltd.
[f] SCACC: Shanghai Chlor-Alkali Chemical Co. Ltd.
[g] MGC: Mitsubishi Gas Chemical Co. Ltd.

million RMB) and a waste water treatment plant (398 million RMB) with Sino-French Water Development Co. Ltd, a subsidiary of the Suez group which is based in Hong Kong, and a waste incinerator (510 million HKD) with Swire SITA Waste Services Ltd. working for the Suez Group and the New World Group of Hong Kong. A heating and power station with cogeneration was constructed as a 70:30 JV with Singapore SembCorp Utilities for 2.81 billion RMB, and the dock and tank storage facilities ($210 million) were built in collaboration with Vopak of Holland. Sinopal, a JV between Air Liquide and Praxair, supplies industrial gases to producers at SCIP ($120 million investment). All of these facilities went into operation between 2004 and 2006. An impressive infrastructure is being put in place at SCIP. Future goals include integration of environmental protection programs and further implementation of the "circular economy" strategies.

Eco industrial parks (EIPs) act as pilot projects for a sustainable economy

Sustainable development, "circular economy" and integrated production facilities play a strategic role in the Chinese economy. Numerous new laws have been introduced in order to implement what has long since been standard in western countries: conservation of resources, environmental protection, safety. The 7th AchemAsia from 14-18 May 2007 will bring together around 500 exhibitors from 25 countries and 20,000 visitors to discuss this topic.

Explosive economic growth, a higher standard of living, population growth and an unbalanced regional distribution of resources coupled with the lack of a strategy for sustained development have resulted in regional shortages of energy and water, significant pollution and damage to the environment. The government has recognized the problem, and in 2002 it adopted the "Circular Economy (CE)" as its new, far-reaching development strategy. It is hoped that this approach will provide a basis for continual economic growth by making more efficient use of natural resources and by increasing the ecological efficiency of production and consumer consumption.

The State Council gave an additional indication that the "Circular Economy"[h] will play an important role in the country's future economic development when it transferred responsibility for driving the Circular Economy forward from the State Environmental Protection Administration (SEPA) to the National Development und Reform Commission (NDRC) .

Since 2002, China has been phasing in the circular economy at three levels: at the micro and company level as cleaner production (Cleaner Production Promotion Law 2003), at the meso or industrial park level in the form of Eco Industrial Parks (EIPs) and at the macro level as eco cities and provinces.

At the industrial park level, an environmental research institute with support from the site management team develops an eco plan for the park, which takes regional constraints and opportunities into account. These plans are not limited to issues related to industrial production. They focus mainly on inner- and intra-company engineering issues, for example energy cascading, shared use of infrastructure, exchange of by-products and waste recycling, as well as on economic incentives such as subsidies for environmental protection investment and resource pricing strategies.

Once the eco plan has been approved by SEPA, the park is given "EIP" status. There were 16 Eco Industrial Parks in China in May 2006 (see table 1). SEPA published the Standards for EIPs in China, and it is expected to start assessing implementation of the eco plans in the near future.

[h] Yuan, Z., Bi, J., Moriguichi, Y. 2006. The Circular Economy – A New Development Strategy in China. Journal of Industrial Ecology, Vol. 10, No. 1-2. S. 4-8.

Despite the success of some pilot projects (e.g. TEDA and Dalian development zone), progress has been slow because insufficient attention has been given to the economic aspects. In order to achieve more efficient implementation, a slow paradigm change is currently under way. Instead of being viewed as an incentive to recycle, “circular economy” will become a strategy for sustainable development evolving the industrial structure, developing new technology and reforming industrial policy[h]. The draft Circular Economy Promotion Law is expected to go into effect in 2007 or 2008.

Table 3 Eco industrial parks including corporate groups and development zones in China[i]

No.	Location	Industrial Focus	Approved
1	Guigang, Guangxi (Guitang Group)	sugar, alcohol, fertilizer and paper factory	2001
2	Nanhai Eco-Industrial Park, Guangdong	environmental S&T consulting, production of environmental protection technology, production of ecological products, recycling industry	2001
3	Baotou Aluminium (Group) Co. Ltd., Inner Mongolia	aluminum industry	2003
4	Changsha Huangxing Industrial Park, Hunan		2003
5	Lubei, Shandong (Lubei Group)	chemicals, construction materials and light industry	2003
6	TEDA, Tianjin	electronics, machinery, pharmaceuticals and foodstuffs, ISO 14001	2004
7	Fushun Mining Group, Liaoning	coal mining and methane recovery	2004
8	Dalian ETDZ, Liaoning	petrochemicals, electronics, telecommunications, etc. ISO 14001	2004
9	Suzhou High-Tech Development Zone, Jiangsu	telecommunications, fine chemicals, precision mechanics and new materials, ISO 14001	2004
10	Suzhou Industrial Park, Jiangsu	IT, automotive industry, logistics, ISO 14001	2004
11	Yantai ETDZ, Shandong	electronics, textile fiber, plastics food and biomedical, ISO 14001	2004
12	Guiyang Kaiyang Phosphorus Chemical Engineering Group, Guangxi	mining coal with high phosphor content	2004
13	Weifang Ocean Chemical High-tech Development Zone, Shandong	chemical and high-tech industry	2005
14	Zhengzhou Shangjie Industrial Park, Henan		2005
15	Baotou Iron and Steel (Group) Co. Ltd., Inner Mongolia	iron, steel and rare earth metal industry	2005
16	Shanxi Antai (Group) Co. Ltd., Shanxi	coal washing, coking plant, pig iron, construction materials and the electric power industry, ISO 14001	2006

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(The trend reports are compiled by specialized international journalists. DECHEMA is not liable for incomplete or inaccurate information.)

[i] Salonen, T., Representation of the Chinese data from www.sepa.org.cn, 31.08.2006