June 2004 ECN-C--04-066

ECO-INDUSTRIAL PARKS IN GERMANY

Dortmund Technology Centre, Value Park, Schkopau, Avantis, Aachen

F.A.T.M. Ligthart

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1. INTRODUCTION

Ecopadev is the name of a project of the European Commission within the programme of "Energy, environment and sustainable development", key aspect 4: City of tomorrow and the cultural heritage.

The project seeks to promote a change in urban planning policy of industrial and business areas, to reach greater sustainability, improve quality of life and enhance eco-efficiency, by the development of a decision-making tool and methodology based on Eco-industrial parks development strategy.

Almost 80% of European inhabitants live in urban areas and are, therefore, affected by the quality of living conditions in cities. The continuous economic expansion has produced many problems related to unsuitable planning of cities. Important topics are: Industrial areas surrounded by residential areas, Traffic congestion, Unsuitable environmental management, Lack of data for decision making by local authorities, Energy consumption and Social problems like unemployment due to the change of economical activities, from primary industry to services etc.

Institutes of five European countries are working together to gather data of successful examples of sustainable industrial parks in order to disseminate and apply knowledge about the above mentioned items [www.ecopadev.net]. The Energy Research Centre of the Netherlands (ECN) is one of the participating institutes next to the Erasmus University of Rotterdam, ECN has, in co-operation with Ingenieurbüro Dr.-Ing. W. Trinius (Germany) contacted local authorities and industrial parks to exchange experiences about the subject. The following report will give you the results of this inventory. The definition of an eco-industrial is discussed in the report National policies concerning eco-industrial parks in Europe, ECN-C--04-061. An inventory of eco-industrial parks in the UK is given in the report ECO-INDUSTRIAL PARKS IN THE UNITED KINGDOM, ECN-C--04-065.

1.1 Industrial park data

A pre-selection of eco-industrial parks in Germany gave the following results:
Emscher Park,
Windelsbleiche,
Hamm,
Suhl,
Schkopau,
Dortmund Technology Centre and the park of
Aachen/Heerlen.
These seven parks have been evaluated on suitability for the inventory and to function as examples:
The Emscher Park is an industrial park, which is spread along a wide area (tens of kilometres). About 17 local communities worked together with the government of the land NRW and the national and European government to accomplish such a great relocation project. Along the river Emscher large areas of abandoned, polluted grounds (so called brown fields) were purified, heavy industry relocated (in some cases to east Germany, after the “Wende”) and new hi-tech and highly qualified service industries were established. Activities like purification of the river Emscher, the surrounding grounds, re-use of old industrial areas and old industrial buildings could be characterised as highly sustainable. However, because of the large scale of this project and the concern of lots of other parties in addition to the local government, it seems to be less suitable as a case for Ecopadev.

The park Windelsbleiche in the city of Bielefeld is known because of the sewing grounds of the former textile industries. Wastewater of this industry was flowed over the surrounding fields. Nowadays these wet grounds are preserved with public funds as a natural park with special vegetation. Nowadays the textile industry has a closed loop purification system. The industrial park consists of a range of companies, of which the most are owned by one family (Windel). Because of this special circumstance this park was not selected to be a case for Ecopadev.

The eco-industrial park Hamm has been set up around the Öko-Zentrum NRW Hamm. The companies, which are settled here, promote themselves as sustainable orientated and cannot be considered as a representative group of companies of an industrial park. For other companies the sustainability requirements for settlement seem to be too restrictive and therefore this park was not selected to be a case for Ecopadev.

Three local communities have established the industrial park Suhl. The reason for this co-operation was the objective to establish an industrial park near the border of the municipality, which is very often the case because of obvious reasons. This park was not selected to be a case for Ecopadev.

The park of Schkopau consists of a number of companies of one and the same branch: plastics industry. These companies have built up a lot of specific knowledge about this type of industry with respect to environmental issues, integration of material flows and processing.

The Dortmund Technology Centre has been selected because of the national and international fame of the park.

The industrial park Aachen/Heerlen has been selected because of the sustainable image and as an example of good cooperation between two countries on sustainability and will be studied in one of the following chapters.

Out of the seven industrial parks, which are described above only three appeared to be suitable for further research for the Ecopadev project.

- industrial park, Dortmund
- industrial park, Schkopau
- industrial park, Heerlen/Aachen

These 3 parks have been studied making use of the questionnaire, which is added, as an annex to this report (Appendix A).

2. INDUSTRIAL PARK, DORTMUND

The name of the industrial park is The Dortmund Technology Park (DTC). Within the borders of this park The Dortmund Technology Centre is located. The Centre has a higher degree of organisation. Therefore the inventory will be applied to the Centre. For a better understanding of the situation some paragraphs will be expended on the park.

2.1 General description

In 1982 two large companies in the region of Dortmund have reduced their numbers of employees dramatically because of an economic crises in their branch: Hösch and Krupp. As a result, the number of unemployed people in the region increased by 12000 people. In order to create jobs a great effort has been made to establish an industrial park for new technologies. The area next to the University and the Polytechnic of Dortmund was decided to be the most appropriate place.

In the year 1985 the Dortmund Technology Centre was opened. Shareholders are the City of Dortmund, the Dortmund Chamber of Commerce, the Gesellschaft für Prozeßautomation (a process automation company), the Chamber of Handicrafts, 7 local financial institutions as well as the Universität Dortmund (University of Dortmund) and the Fachhochschule Dortmund (Polytechnic of Dortmund).

The plan describes the location of the centre in relation to the city centre and the (public) transport facilities. The park is located in the square next to number 6.

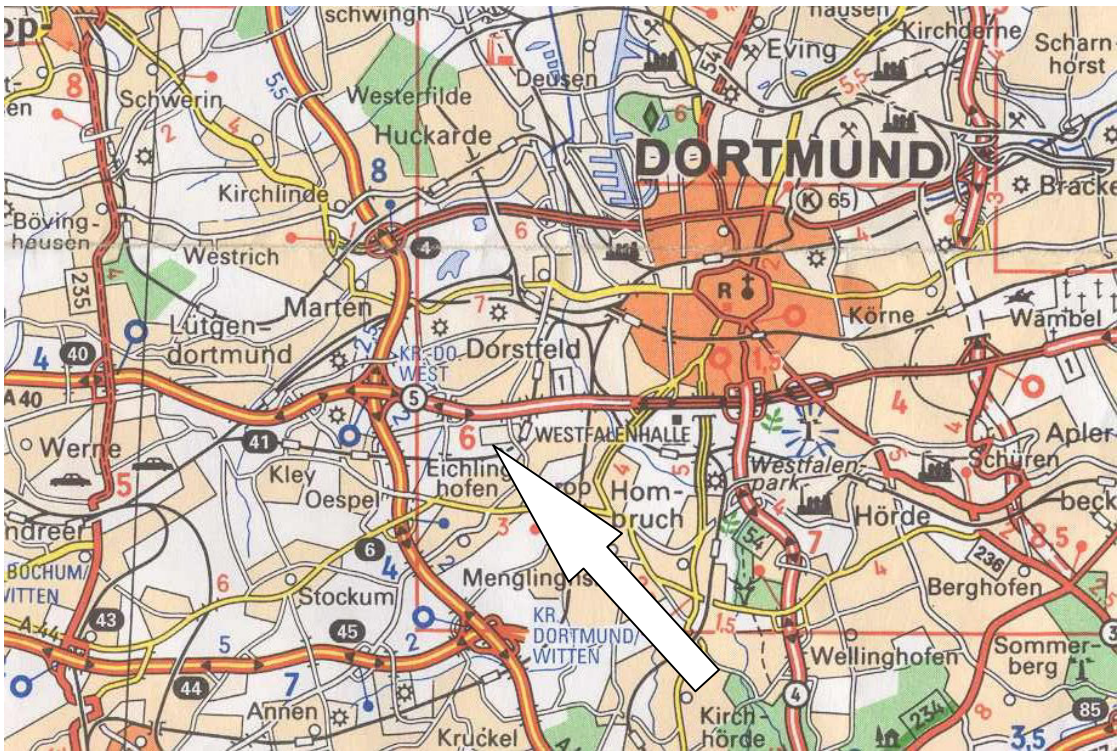

Figure 2.1 *The location of the centre in relation to the city centre*

Nowadays the city of Dortmund has a high rate of unemployment. In the nearby campus some 25.000 students are educated. The educational level of the inhabitants of the park is very high. Nearly 50% of the employees have an academic degree.

The location near research centres and an industrial city generate synergetic effects and impulses for the companies. In addition, universities, engineering colleges and natural science departments co-operate with 24 other different institutes and research facilities to create a considerable potential for research and development.

Imbedded in this area of research and development, the Dortmund Technology Centre has become a leader in innovative ideas and a source of modern technologies since its opening in 1985. The close proximity to the university, polytechnic and renowned research institutes is a major factor for its success and promotes the technology transfer between the economy and science. More than 200 companies inside the Centre and the surrounding Technology Park profit from this practical relationship between research, development, the industry and the service sector.

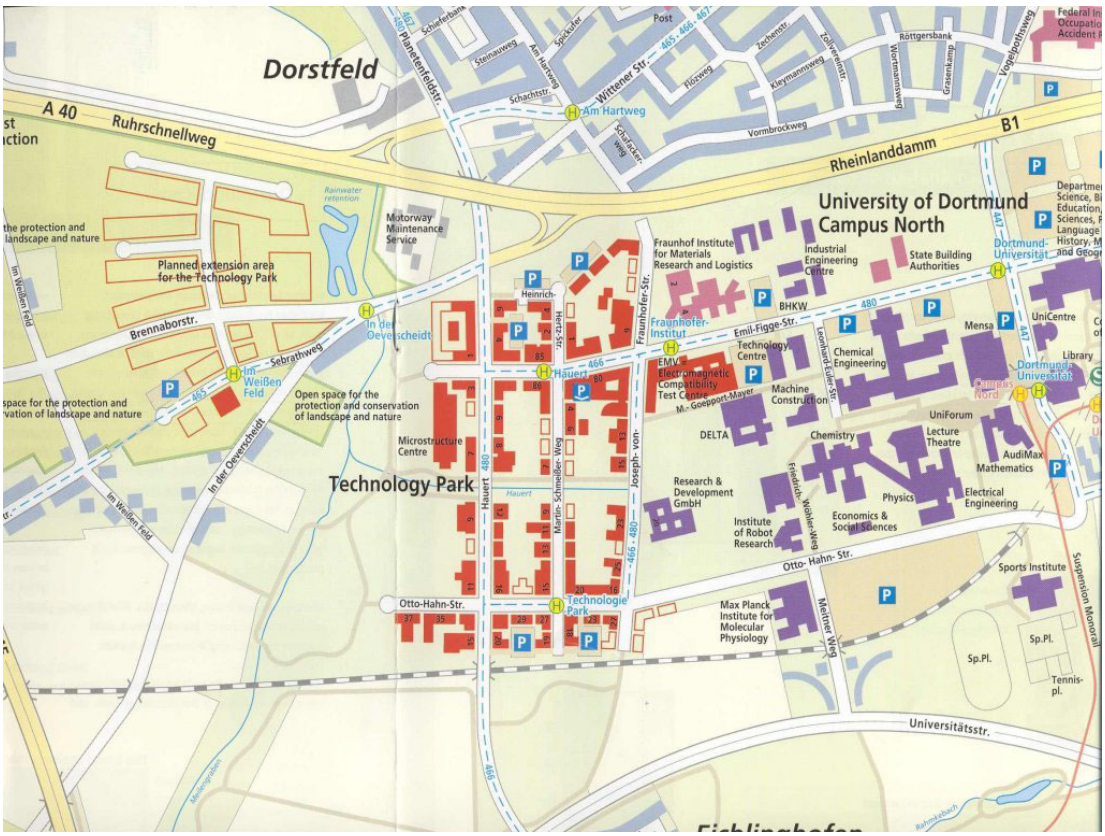

Figure 2.2 *Technology Park*

The size of the Technology Park is approximately 35 ha, 200,000 m^2 floor area, 50 buildings. The Technology Center has 4 buildings with 40,000 m^2 floor are. Another 8.6 ha is designated as extension land. However there is a conflict of interest between the need for green space and for extra employment places.

Table 2.1 *Sectors of industry*

Sectors of industry:
Electronics
Software, hardware, telecom
Multimedia
Logistics
Quality assurance, environmental technology
Microsystem technology

There are no figures about energy, water demand and material flows. In general it could be stated that because of the high rate of office buildings the material flow is low. One of the main material flows is paper. Used paper is collected separately and recycled. The energy consumption is very high in some specific areas such as:

- Laboratory building
- MCI Worldcome Internet switchhouse
- Elmos chip production

Table 2.2 *Number of companies in DTZ per type*

Number of companies in DTZ per type:	
Microsystems Technology	7
Quality Assurance	3
Logistics / Material Flow / Packaging Technology	2
Materials Application Technology	1
Electronics	2
Software Technology / Telecommunications	22
Media Technology	3
Environmental- / Bio-Technology	5
Handling Systems / Robotics	1
Technology-Oriented Services	16
Associated Tenants	8
total	70

Table 2.3 *Age of companies*

Age of companies	**%**
Established before 1980	20
Established between 1980 and 1984	10
Established between 1985 and 1989	20
Established between 1990 and 1994	30
Established between 1995 and 2000	20

A total of 11,000 employment opportunities were created in the Park, of which 3,674 are indirect additional employment opportunities. 1,300 employees work in the four building complexes of the Centre.

Table 2.4 *% employees of the Centre per Industrial sector*

Industrial sector	**% employees of the Centre**
Electronics	35
Software, hardware, telecom	20
Multimedia	10
Logistics	10
Quality assurance, environmental technology	10
Microsystem technology	5

There are about 140 educational working places in the Park

2.2 Procedures for the Industrial Park

A company (DTC Ltd) has been founded to manage the Technology Centre. The supervision council of this body consists of members of the camber of commerce, university, economy and employment promotion department of Dortmund and others.

The department of business and employment promotion of Dortmund manages the Technology Park as a whole, but only with respect to acquisition, selection of companies, building requirements and infrastructure. The acquisition activities consist of: marketing, consulting, national and international networking and finances.

The management proposes:

- support of company settlement
- support of employment of unemployed
- selection of companies (service industry and high tech companies prevail above production facilities)
- building requirements with respect to height, architectural characteristics, minimum floor area, etc.
- better public transport (mono-rails interconnection between two campus areas north and south)
- more settlement of sports and leisure facilities inside the park

Because of the very difficult situation in Dortmund with respect to the number of unemployed in the early eighties, a great support has been given to the development of the park by all governmental levels: the local government of Dortmund, the land North Rhine-Westfalia, the federal government and the European Commission. The objective of this (financial) support was the reduction of the number of unemployed and also the so-called relocation decision (Struktur Umwandlung). The aim of the former objective was to reform the Ruhr-region from a highly polluted area with a lot of heavy production industry into a sound environment with a large share of hi-tech and highly qualified service industry.

Figure 2.3 *Aerial photo of the park*

There is a co-operation with the university and the polytechnic with respect to knowledge dissemination and technological innovation.

Before the founding of the Park, the local government of Dortmund bought the land from the farmers in the region. The Technology Centre was built and rented out by the government of Dortmund. The marketing and promoting of the Technology Park and the regulation of the settlement of appropriate industry have been carried out by the department of Business and Employment Promotion (Abteilung Wirtschafsförderung), Dortmund. The development of the

Park has been supported by funds of the community, the region, the state, the federal state and Europe.

With respect to new settlements of companies the local government, as owner of the land of the Park, decides about the type of companies to be allowed, the building requirements, the green spaces, etc. The management company of the Centre decides about the settlement of new companies in the buildings of the Centre, which are possessed by the local government. Nowadays the investments for new buildings for the Centre at the extension area of the Park can no more be carried by the local government budget. Special funds will be raised and submitted to a special administration company for this purpose.

The Technology Centre offers companies a complete service package. This includes communication devices such as telephone, fax, e-mail, the Internet and includes, for example reception and telephone services, participation at trade fairs and events, national as well as international contacts, co-operative aid and extensive consulting services provided by qualified specialists.

New companies have an infrastructure of human resources and specialists at their disposal to help them get started. The DTC offers services in different major fields, which the technology companies in the Centre can rent on a temporary basis without having to provide an infrastructure of their own that would involve considerable long-term capital investment.

A network of qualified specialists offers assistance in all company related questions.

- Dortmund Chamber of Commerce
- Dortmund Business Promotion Service
- University and Polytechnic of Dortmund
- Scientific institutes
- Financial institutions
- Dortmund Chamber of Handicrafts
- Consultant companies

2.3 Management Experience of the Industrial Park in terms of Policy Areas

Table 2.5 *The Scale of Activities per Policy Area*

	Individual Company level	**Cluster of Companies**	**Industrial Park Level**
Production process	X		
Materials	X		
Occupational Health and Safety	X		
Transport		X	
Energy	X		
Marketing			X
Human Resources			X
Quality of Life & Community Connections			X

2.3.1 Production Processes

Pollution prevention measures have been taken in the park. The quality of these measures is not above normal German level, which is very high. No special prevention measures have been taken because this could hinder the settlement of new companies.

Local government is responsible for evaluating and controlling the implementation and success of these measures.

Figure 2.4 *Main building*

41% of the companies of the Park maintain business relationships with other companies, relations that are not exclusively customer/supplier bound. Such partnering arrangements tend to split fifty-fifty across the Technology Park and the rest of the region. Examples are:

- collaboration in R&D/joint product development
- joint training programmes and seminar organisation
- sharing experience and knowledge transfer at professional association level
- co-operation with research institutes
- combined relationship management
- collaboration when advising other firms or institutes/ with other consultancy firms
- joint manufacturing in the event of overcapacity/systems co-operation

These relationships are frequently the result of contacts made students during their internship. In many cases, the close co-operation that emerges is focused on a given project.
Only on company scale eco-design is used as a means to achieve sustainable products and services.

Dortmund, as a part of the New Economy's international competition, will be expanded into one of Europe's leading sites within the scope of the Dortmund Project. Six main objectives are being focused on:

1. Setting up new leading industries: information technology, micro-systems technology and e-commerce/e-logistics
2. Strengthening resident companies
3. Expanding training, qualification, science and research
4. The expansion of Dortmund as a location into a modern business metropolis with a high quality of life and leisure time
5. Time saving methods from a one-stop-shop for those starting up a new business or settling in Dortmund
6. A clear increase in the level of employment

2.3.2 Management of Goods and Services

Services of the Technology Centre (DTC):

- use of the reception service,
- a post office box and meeting rooms is included in the rental prices,
- telephone Service:
  - ⇒ Acceptance of incoming calls
  - ⇒ Transferral of incoming calls
  - ⇒ Forwarding messages
- Pizza, bistro
- Exhibition Areas
- Conference media
- Outdoor, underground parking spaces (to rent)
- Delivery Service: Central acceptance of letters and parcels
- Security Service
- Internal magazine: DTC News Editing
- DTC MATINEE once every month on a Friday

Outline agreements exist with:

- Car rental companies
- Taxi companies
- Telephone network carriers
- Mobile phone companies
- Copying service companies
- Office material companies
- Computer hardware and software companies
- Insurance companies

Personnel Placement:

- Job applications to the various companies
- Determining personnel requirements in the DTC
- Arranging work experience placements
- Diploma dissertation placement

Company addresses in the DTC
Participation in events and seminars
Contact to other companies in the Centre and Park arranged

A number of companies inside the Dortmund Technology Park are using a communication tool called Technologypark.de. This is a internet presentation and information tool for imployees. It acts as a market place, information desk and meeting point. It is used by tens of companies and the number of users will increase when this tool will be integrated with the city information system (STI).

2.3.3 Transport

The Centre has 1300 employees, the Park 8000. 75% lives in the region of Dortmund. The most common distance of commuters from outside the region of Dormund is 50 km. 90% of all commuters travel by car. The nearby connection with the motorways is considered as a great advantage for the Park. There is a shortage of parking space however.

Figure 2.5 *Parking cars*

For 20% of the employees the lack of efficient public transport is a reason for complaint, another 30% judges the number of parking bays far too less.
There are two bus routes, which cross the area; there are two bus stops. There is one metro station, located at the nearby university campus (15 min. walking distance).

There are plans for an environmental friendly monorail system to connect the two campuses of the university with each other.

Freight transport is of a very low scale in this industrial park.

On a Park level a ICT data switch house is available (MCI Worldcom). In the buildings of DTC a joint acceptance of parcels is available.

2.3.4 Energy

There are no figures about energy. In general it could be stated that because of the high rate of office buildings the energy consumption is relatively low. The energy consumption is very high in some specific areas such as (estimated energy consumption w.r.t. the whole park):

- Laboratory building (5%)
- MCI Worldcome internet switchhouse (40%)
- Elmos chip production (15%)

The federal legislation about energy performance of buildings applies. However, it is possible for the local government to make special constraints for energy consumption of buildings. Up to now no additional restraints have been applied because the expected negative effects on settlement of companies.

2.3.5 Construction and Building Technologies

The federal legislation about energy performance of buildings applies in this park. However, it is possible for the local government to make special constraints for energy consumption of buildings, agreed upon in ground contracts. Up to now no additional restraints have been applied because the expected negative effects on settlement of companies.

Further requirements are imposed with respect to minimum and maximum floor surface, number of storeys (max. 3), architectural aestatic, built surface (max. 40%), green spaces, etc.

The age of buildings in the park ranges from 4to 17 years.

2.3.6 Marketing

Apart of the profile of an high-tech park with a strong liaison with the nearby university campus the park promotes itself as “an attractive real estate against an ecologically valuable landscape”. Only companies in the field of R&D, software engineering, microsystem technology, logistics, IT and telecommunications were allowed.

The facility of the Centre for Microstructure Technology (MSC) was established in 1994 where state-of-the-art microstructures, micro systems and micro optics are developed, produced and sold all over the world. The Centre also offers the serial production of customised components and systems.

The most important product areas are currently:

- Ink-jet printing technology
- The micro spectrometer
- General channel and jet structures
- Masking technology
- Micro optics and lenses
- Excimer laser technology

Serial production of products from these areas is currently underway. Modular interface technology (MITC), located in the Microstructure Technology Centre, will become a new focal point of development in the future.

The Dortmund Modular Interface Technology Centre supports small and medium-sized companies in the areas of silicon, sensor and micro-systems technology. It helps companies find the right micro-systems technology concept and taps into markets with intelligent products, additional functionality or by improving on existent products. In order to achieve this, micro-systems technology, such as micro-optical, micro-mechanical, micro-sensorial or micro-electronic components may be integrated. The Centre also offers the possibility of developing prototypes, sample and pilot series, including the testing of the latest process technologies.

Other centres of competence are:

- EMC test centre
- Television communicate centre

New technological fields such as biotechnology, photonics, nanotechnology or molecular electronics will be added in the next years. The planned Dortmund Biomedicinal Centre (BMC) is designed to house not only the field of biomedicine but also the fields of biological computer sciences and medicinal technology. Dortmund is the nation-wide leader in tomorrow's market of microstructure technology. Additional uses for miniaturised components are being made available to users in the industry from MSC and MITC centres.

2.3.7 Human Resources

There are common programs for training the employees of similar category of industry or sector. The expected growth of the number of employees is between 250 and 350 per year. There are many links with the university and the academy. 54 companies create opportunities for students to have an educational job (approximately 140 jobs).

2.3.8 Quality of life and Community connections

There is an obvious lack of sports and leisure facilities in the park. Due to high cost, day care for children is not organised on Centre of Park scale. Some companies have some facilities. Every month on Friday there is a so-called Matinee with selected key themes at info events.

The board of supervision of the DTC acts as a connection between the DTC and the local authorities. One of the objectives of the planning of the DTC was too create jobs in the region. A share of 43% of the companies, which are settled in the centre, has started here and created, as a result thereof, new jobs. Starting companies, more than existing ones, enjoy the service facilities that are offered in the DTC. Those services enlarge the chance of survival of starting companies.

2.3.9 Information and Communication Tools

The Internet Switch house of MCI Worldcom is part of the park. The capacity of Internet is high. There is no Intranet on a park scale

2.4 Procedures for Town Planning

Procedures for town planning are urban development planning, land use planning and regional planning. The co-operation of departments of the local authority is secured by the formation of project groups, which are responsible for projects concerning urban and industrial development. These groups consist of many disciplines such as: building, environment, economy, education, public transport, etc.

Special requirements are proposed for urban development (shape, volume of buildings, number of storeys) and business settlement (type of industry with respect to environmental issues and with respect to employment of people). The green spaces in the park do have a great emphasis within the set of requirements. No more than 40% of the land has been marked as building land and within this area of building land no more than 40% of the land is allowed to build upon. These percentages of green spaces are protected by law and will not be increased. The park promotes itself as an ecologically valuable landscape. Some of these green spaces are private property of the companies, which are settled next to it. The maintenance and usage of this land is sometimes a cause of conflict. The local government tends to a more specific policy towards the owners and users of the green spaces.

Figure 2.6 *Green area*

For the extension area the building percentage is set to 60% of the plot; the number of storeys is assessed on 3 to 5.

Success factors of this (sustainable) park in the eyes of local authorities are:

- Number of starting companies (40%)
- Number of employees (10-50)

- Minimum and maximum floor surface of buildings (850-2500m^2)
- Percentage of green surface (40%)
- Physical closeness to the educational centre of the region

An important indicator for success for the city of Dortmund is:
Rate of unemployment of (female) inhabitants of Dortmund

The supervision board is a kind of link between local authorities and industry. The department of business development (Wirtschafsförderung) is a typical German tool that is used for promoting industry and employment by local government.

There are several conflicts of interest between local government and industry:
- use of green spaces (for instance as parking place)
- the employment in the DTC and the Park is on a high educational level; most unemployed do not fit in these positions because a lack of education
- public transport is not well organized in the eyes of the park inhabitants
- park inhabitants judge the communication with authorities as not satisfying
- there is criticism about the sight of the public space
- lack of sports and catering facilities

There are building requirements and permits and environmental permits like other countries have.

There is a selection of industries, public transport, marketing and human resources are part of park management; energy issues are being discussed with energy distribution companies. As to the extension area's special attention will be paid to services like sports, leisure and hotel and catering industry.

For the coming 10 years Dortmund has planned a new project with respect to business and employment promotion called "the Dortmund project" The objective of this project is to support and promote the sustainable development of Dortmund as an industrial city. To achieve this objective the city follows the strategy of investment instead of subsidies and follows herewith the rules of economical sustainability as the commission Agenda 21 formulated them:

- The economic system shall satisfy the needs of society efficiently. Therefore one has to organise the economic system in a way that the personal initiative will be promoted and the personal interest will serve the public interest in order to safeguard the common well being now and for the future generations.
- The framework for competition shall be modelled so that effective, innovative and flexible markets flourish. The economic performance and the productive, social and human capital must be preserved for the long term. The aim is an improvement of quality, not necessarily of quantity.

To fulfil these objectives the "Project Dortmund" co-operates with Dortmund's bureau Agenda 21.

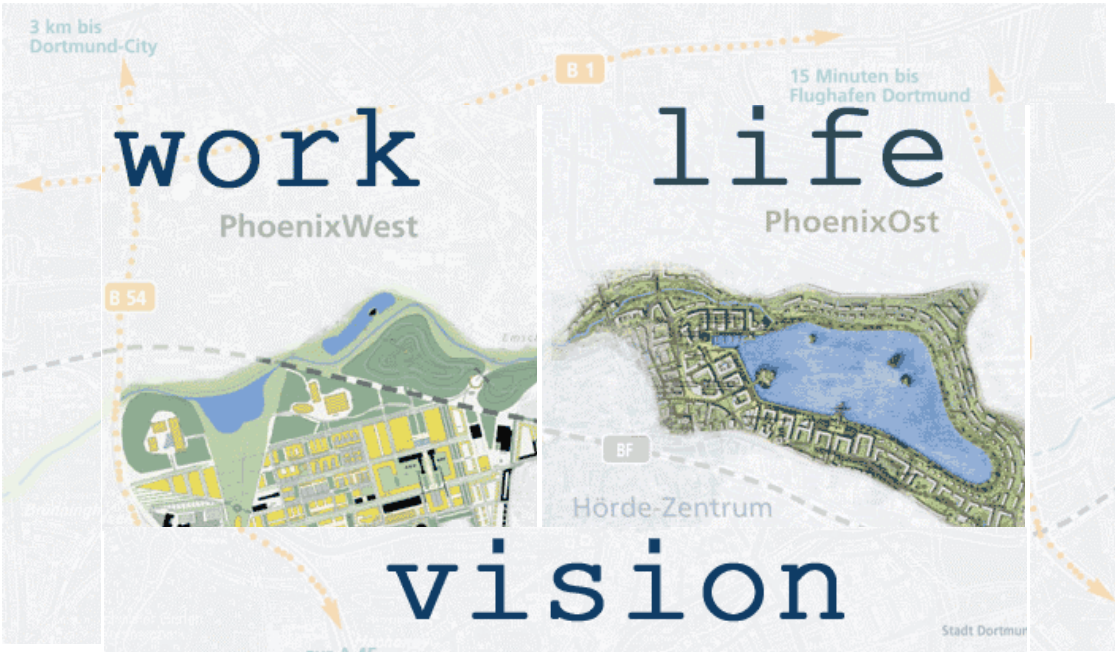

Figure 2.7 *Future regional development*

The contribution of the city of Dortmund to the project is 5 million Euros per year. The target for employment is the creation of 70,000 new jobs within 10 years, of which 10,000 are part of the existing (old) branches and 60,000 are part of the so-called new technologies. The support of existing industry is important for reduction of the high unemployment rates.
The sustainability of the project consists of three dimensions:

- economical
- ecological
- social

The sustainable economic development has the emphasis but The Dortmund Project also pays attention to the other aspects "as much as possible".

The projects Phoenix East and West are part of The Dortmund Project just as the extension of the Dortmund Technology Park. Phoenix West consists of modern technology and service industry and culture and entertainment projects. Phoenix East will host dwelling areas, leisure and also service industries.

2.5 Suggestion for measurable sustainability indicators

- emissions of CO_2, SO_x, NO_x per employee of a given branch of industry
- emissions of CO_2 per employee for transport
- the energy performance of industrial buildings
- percentage of sustainable energy, nuclear energy
- percentage of fossil fuels like coal, natural gas and oil for generation of electricity
- the rates of eco-tax on energy consumption
- the governmental support measurements of energy efficiency and renewable energy
- the use of waste incinerators for production and use of heat and power

3. INDUSTRIAL PARK SCHKOPAU

This case study describes the ValuePark in Schkopau. However, the Schkopau case can not be fully understood without knowledge about the regional industry. It is the interaction with the existing industries that makes this industrial park very valuable and sustainable. That is the reason why a great part of this study concerns the surrounding industries which all (and ValuePark also) are owned by Dow Chemical since the year 2000.

3.1 General Information

Figure 3.1 *Map of the ValuePark: location of 7 companies*

ValuePark is an industrial park concept developed by Dow and BSL[1] and supported by the Federal States of Saxony-Anhalt (Sachsen-Anhalt) and Saxony (Freistaat Sachsen). It provides industrial units to companies wishing to process products manufactured on the BSL sites, as well as to suppliers, service companies and technology firms. The aim is one of generating reciprocal benefits and contributing to the further development of the region.

[1] Buna, SOW, Leuna Olefin Combine

BSL consists of the following three main industrial sites:

- The entire complex of the former Buna works at the small village Schkopau in the Federal Land of Saxony-Anhalt
- The entire complex of the former 'Sächsische Olefinwerke' (SOW) at Böhlen in the Federal Land of the Free State of Saxony
- The high pressure polyethylene plant that forms part of the Leuna complex in the Federal Land of Saxony-Anhalt

The ValuePark is located on the site of Buna (Schkopau).

Figure 3.2 *Location of 3 BSL sites: Schkopau (ValuePark), Leuna and Böhlen*

Note:
The Federal States of Saxony and Saxony-Anhalt are two of the five so-called new States of Germany, which used to be part of the former German Democratic Republic (GDR-East Germany). In 1990 they joined the old Federal States, previously known as the Federal Republic of Germany (FRG-West Germany), when Germany was reunited. The nearest large cities are Leipzig, Halle (on Saale) and Dessau. This region is also widely known as Central Germany.

Socio-economical structure
Buna, in Schkopau was set up in 1936. It is known as the first industrial manufacturer of synthetic rubber and the name of the former Bu-Na works originates from this. 'Bu' stands for butadiene, the raw material from which synthetic rubber is made, and 'Na' is the chemical symbol for Natrium (sodium), which was originally used as a catalyst.
The main incentive for establishing a chemical industry in the Central German area was the local availability of raw materials, particularly brown coal (lignite), salts (rock salt and potash) and lime stone (from the Harz mountains). The original chemical industry in Central Germany was centred on carbon chemistry. The best known representative of this industry was carbide chemistry in Buna, which was shut down in 1993 as a result of the ecological damage it was causing, and the economical non-viability.

The steam cracker built in Böhlen, part of a large refinery that was built on the German-Polish border in the 1960s following the completion of the Soviet crude oil pipeline (known as Drushba or 'Friendship'), continued to be run as the independent SOW (Sächsische Olefin Werke) company after reunification. From the time of the steam cracker coming into operation in Böhlen up to 1993, Buna was run as a hybrid carbon-petrochemicals site (using carbides/acetylene and ethylene as its main raw materials).

After the demise of the GDR in 1989, the combines were also dissolved and transformed into independent companies. Privatisation of the former state-owned assets was carried out by Treuhand, an institution incorporated under public law. It was succeeded by the organisation BvS (Federal Institution for Special Issues Arising from German Unification), which was based in Berlin and which is dissolved in 2001.

The end of GDR state planning and the introduction of the market economy also necessitated the reorganisation of Central Germany's chemical industry. Buna, Leuna und SOW now became independent corporations that were privatised by Treuhand/BvS.

In order for operations to continue, the supply of raw materials had to be secured through the ethylene cracker in Böhlen (SOW) for both the derivatives plants in Schkopau and Leuna. This led to the start of the BSL-Olefinverbund (olefin combine) project in 1994. This collaborative project was achieved through privatisation by the US Corporation, The Dow Chemical Company, in a five-year program that started in 1995 was successfully concluded in May 2000.

For the material flows see Figure 3.7.

In legal terms, the Buna Sow Leuna Olefinverbund GmbH privatisation project, sanctioned by the EU Commission in Brussels, was initially set up in 1995 as an 80/20 joint venture between Dow and BvS. The project reached its conclusion on June 1, 2000 with the take-over by Dow of the remaining 20% BvS shares. BSL is therefore now a wholly owned subsidiary of the Dow group also called Dow Central Germany.

Employment and educational level
Before the Berlin Wall came down and East Germany was integrated with West Germany, BSL employed 25,000 people. Today BSL employs closer to 2,500 people. But this number is misleading. The 25,000 included the employment of peoplewho's activities were not directly related to the company, such as schoolteachers, shopkeepers, nursery workers, and the like.

The educational level of the employees in the region is high. The region has a large number of educational establishments specialising in chemistry and plastics that are able to offer a high level of expertise. Education and training is available at all levels (including vocational training, specialist colleges, technical colleges and universities in Leipzig and Halle). Further educational and training opportunities are available in the capital Berlin, which is only two hours away by car.

The connection of the industrial park
There are several tram and bus connections between the ValuePark and the nearby cities (Merseburg, Halle, Leipzig).

The railway infrastructure is very good. Almost all cities and villages in the region are connected.

Highways running north south (A9, Berlin-Munich) and east west (A14, Dresden-Magdeburg) are also within easy access. The new A 38 (Göttingen-Leipzig) highway is also scheduled to be completed in a few years, giving BSL its own highway intersection to the west gate. Also worth mentioning, for the development of business relations, is the expansion of Leipzig airport to accommodate large-capacity aircraft, an excellent hotel infrastructure in Leipzig and Halle, and also the increasing number of Inter-city train connections to and from the region.

There is no connection of the site to water transport canals (the Saale is not suitable for large vessels).

The ValuePark
The ValuePark has a ground surface of 100 ha, about 50,000 m^2 floor space and 15 buildings.

Figure 3.3 *ValuePark; the buildings of Manuli Stretch Deutschland GmbH*

The following investors are settled at the ValuePark:

- EVC (Deutschland) GmbH

The German subsidiary of the European Vinyls Corporation, quoted on the Amsterdam stock exchange, is the largest manufacturer of PVC in Europe. EVC took over the BSL PVC production facility at the Schkopau site on June 1st, 1998 and immediately started to modernise it and set up a new S-PVC plant.

The sum invested was DEM110 million, of which 24 million was for equipment and 19 million for planning and project management. 125 workers are currently employed in Schkopau, producing a total of 50 kilotons of PVC-E and 280 kilotons of PVC-S a year.

- Hoyer GmbH

Based in Hamburg, Hoyer GmbH is one of the leading logistics companies operating throughout the world. Its core business consists of the transport, storage and transhipment of liquids, bulk goods and gases.

Its ever-increasing involvement with large chemical plants led to its decision to set up its own base at the Dow/BSL ValuePark in Schkopau. Here Hoyer operates a cleaning facility for tankers, containers and rail trucks, a warehouse and also a storage silo for plastics. This ValuePark site is the company's headquarters in Central Eastern Germany and is the base from which services are provided to the whole Central German chemical region.

- Kurotec GmbH

Kurotec manufactures glass fibre-reinforced tubes, moulded parts and other equipment with nominal bores (in accordance with German norms) of 25 to 5000 mm diameter using a hand winding process, glass fibre-reinforced pressure and process vessels and washers, as well as special prefabricated parts for use in industry and plant construction. This involves the use of all types of UP and PHA (VE) resins commonly found in the trade and appropriate protective chemical coatings or PE, PP, PVC and PVDF liners.

With a manufacturing area of 2,100 m^2 and nine winding machines, Kurotec is able to complete large jobs and has a 60-strong team of fitters.

- Manuli Stretch Deutschland GmbH

Manuli Stretch Deutschland GmbH is part of the Manuli Packaging Group, which has been involved in the manufacture of 100% recyclable industrial-quality LLDPE stretch film, BOPP films and self-adhesive film since 1970. Manuli, now based in BSL's ValuePark, started production in September 1999 and has a production capacity of 50,000 tons of LLDPE. The firm employs 50 members of staff.

- PASEC Industrieverpackung GmbH.

PASEC Industrieverpackung GmbH is the German branch of PASEC N.V., based in Malle (in Belgium), and the largest and most up-to-date wooden packaging firm in the Benelux countries. The company's Schkopau plant which manufactures wooden pallets was started up in 1999 and has a capacity of 500,000 units per annum.

- RP-Compounds GmbH

RP-Compounds GmbH is a 100% owned subsidiary of the Belgian company RAVAGO, which was founded by Raf van Gorp in Arendonk in 1961. It has a large number of branches in Europe, Asia, America and Africa.

Its main area of business lies in the production of, and trade in, plastics. RP-Compounds GmbH has been manufacturing at ValuePark in Schkopau since 1999 and produces a variety of

different compounds and master batches. Around 50 workers are employed in the Ravago group's most up-to-date plant. Its expandable production facility represents an investment significantly in excess of DEM 50 million.

Since 1998 the following investors are settled at the ValuePark location:

Table 3.1 *Investors at the ValuePark location*

Company	sector	material flow/a	employees
EVC (Deutschland) GmbH	PVC production	330 ktons PVC	125
Hoyer GmbH	transport of chemicals		
Kurotec GmbH	polyester pipes		60
Manuli Stretch Deutschland GmbH	stretch film	50 ktons LDPE	50
PASEC Industrieverpackung GmbH	wooden pallets	500,000 pcs	
RP-Compounds GmbH	plastic compounds		50

The Dow/ BSL company employs 2300 workers in the region and the ValuePark (started in 1998) 400.

Because of the existing physical, technical and social infrastructure the investment per new employee is as an average 0,5 million Euro. The investment in other regions in the east without this optimal proposition is average 2 to 5 million Euro per worker in the chemical industry.

Dow Chemical can be considered as the owner of the buildings in the industrial park

3.2 Procedures for Industrial Parks

The reorganisation of BSL, which was supported by the German government and co-financed by Dow from its own resources, has involved the closure of 11 facilities, the sale of 2 facilities, the streamlining of 8 existing facilities and the construction of 15 new facilities between 1995 and 2000. During the reconstruction period, total investment for new plants and renovation of existing facilities in the sites reached USD 2.5 billion.

Sustainable indicators:

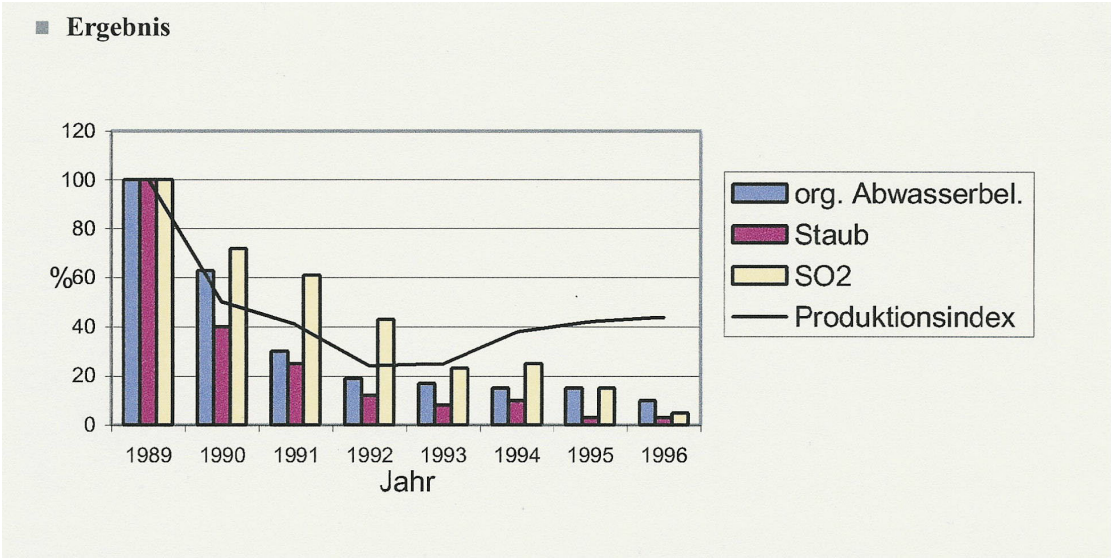

Figure 3.4 *Environmental progress of BSL sites during the nineties.*

explanation of terms:
Ergebnis: result
Abwasserbel.: organic wastewater pollution
Staub: dust

An integral part of the privatisation concept was the decontamination of the production areas and buildings, as well as the landscaping of the surface area, which was not being used.

The BSL sites do not include a nature preserve, but the Schkopau site does include a park integrated with the facility's water treatment plant. Dow invites schoolchildren and community residents to see the facility operation and visit the park. The wastewater facility is only the most visible illustration of the remediation efforts at the site.

About 90% of contaminated soil has been cleaned up using thermal and biological methods and landfill to dispose of hard-to-treat soil. Plants operating at BSL sites have either been built or revamped with primary and secondary containment systems to protect against any spill going any farther than the plant itself. What Dow has done is to "recycle the area" for industrial use. It is an effort comparable to efforts in the U.S. to return brownfields - or abandoned industrial sites - to productive use. Reuse is "more sensible than greenfield development," because it preserves pristine environments.

There is a management body board, which is a part of the Dow Company. This board is responsible for the management of the park and reports to the general Dow Chemical Germany management board.

ValuePark, the Dow/BSL technology park concept, is orientated primarily towards the creation of synergies between potential investors and the Dow site. The park concept focuses also on the exploitation of existing and yet to be created economic benefits that current and future ValuePark partners are able to offer one another.

These relationships can take the form of:
- Mutually beneficial services
- The provision of raw materials and products
- The purchase and/or processing of finished goods and other types of direct or indirect relationship

Note:
The yearly production of plastics of BSL as a whole is about 1 million tons. 20%-30% of this material is further processed by industries on the site of BSL.

All companies of the Park meet every three months for discussion about the important topics.

Furthermore, Dow/BSL is taking a leading regional role in supporting and promoting an innovative Local Network of plastics research activity. The Central German Plastics Technology Network (Das Netzwerk Mitteldeutsche Kunststofftechnik) has recently launched its initial site on the Internet.

On a wider scale there is the www.kompetenznetze.de, which is the great German network for technological centres of excellence.

3.3 Management Experience of the Industrial Park in terms of Policy Areas

Table 3.2 *The Scale of Activities per Policy Area*

	Individual Company level	Cluster of Companies*	Industrial Park Level*
Production process	x	x	
Materials		x	
Occupational Health and Safety		x	
Transport	x	x	
Energy		x	
Marketing	x	x	
Human Resources		x	
Quality of Life & Community Connections		x	

* Dow Chemical owned companies and Park

3.3.1 Production Process

The regular German laws apply (Immission Act).

The measurement and control of environmental issues like the emission of gases, dust and noise are in the first place the responsibility of the companies themselves. The national institutes like the TüV and the environmental office are checking the values without annunciation. The wastewater values are continuously checked.

The preferred investors in ValuePark are:

- Companies that process plastics as produced in BSL (Schkopau)
- Manufacturers of specialist chemicals (Schkopau or Böhlen)
- Companies that process cracked chemical products (Böhlen)
- Special suppliers of raw materials, auxiliary materials or production resources

The conditions for settlement in the ValuePark are very specific because the site is to valuable to give away to just some company, which does not profit the advantages of the existing infrastructure and the presence of raw materials to be processed.

The BSL Schkopau site is developing increasingly into a centre for research and development. As part of the Dow's global strategic orientation, a centre for research, development and applied technology, which focuses primarily on plastics, is being created there. This therefore ties in with the local tradition and locally available expertise, and means that an emphasis is being placed on the new plastics, in particular, the ones that Dow took into its portfolio as additional products at the time of BSL's privatisation. Thus its global research activities in the areas of PET and synthetic rubber, for example, are based at Schkopau.

This concentrated pool of knowledge and experience is also to be made available to those ValuePark investors involved in the manufacture and processing of plastics. The potential thus exists for an extended network embracing manufacturers, scientists, research institutions and processing firms.

In order to promote economic development in Germany's "new" Federal States, the Federal Government, the Governments of the Federal States and European Union, are providing a number of development grants.

The aim of these grants is to achieve targeted growth in the manufacturing industries, reduce the higher than average levels of unemployment in Eastern Germany, alleviate the burden of modernisation resulting from reunification, and finally provide the impetus for independent economic upturn.

The grants are at varying degrees available to both German and foreign investors for the setting up, and running of, industry production centres within the development area.

Development grants are available in the form of the following subsidies:

- Investment allowances
- Subsidies awarded within the framework of so called "GA funding"
- Special grant programs
- Other subsidies such as ERP credits, share capital assistance programs, environmental grants, research grants, labour market incentives, federal state and other guarantees.

The most important of these are investment allowances and GA (federal project) funding. These incentives are available at different levels for large, small and medium-sized companies.

3.3.2 Management of Goods and Services

Along with the opportunity to take out long-term contracts for the supply of products, the ValuePark team of experts also offers advice and expertise in all areas of project realisation.

Leases for fully developed, cleaned-up sites can be agreed for periods of up to 99 years. In terms of size and position, plots can be made available to suit almost any requirements investors may have.

Leases and also long-term flexible contracts, for the provision of the following resources, utilities and services, are available at competitive rates:

Resources & Utilities

- Electrical power
- Natural gas
- Water for fire fighting
- Nitrogen
- Compressed air
- Potable water
- River water
- Cooling water
- Process water
- Reprocessing of effluents
- Thermal treatment of production residues
- Others upon request

Services

- Security**
- Emergency service **
- Environmental service
- Analysis and testing service
- Rail transport
- Safety at work
- Catering
- Medical care
- Industrial hygiene

Personnel

- Complete personnel package
- Provision of appropriate qualified personnel
- Basic and ongoing training
- Advice on personnel matters

The services denoted by ** are compulsory, all other services are optional and can be made available according to the needs of the investor.

Dow offers to new companies' assistance to the acquisition of permits. These permits concerning environmental issues like emissions of gases, dust, noise, etc. must be requested at the national government of the lands Saxony (Böhlen: Leipzig) and Saxony-Anhalt (Schkopau, Leuna: Halle). The national office for environment is responsible for the inspection of installation next to the federal institutes like for instance the TüV.

The building office of Merseburg is responsible for the to buildings to comply with building requirements such as noise production, height, green surface, building factor, etc. The Dow Company also assists with respect to these permits.

All contracts for the provision of services and resources will be taken out with Buna Sow Leuna Olefinverbund GmbH. This gives investors a single point of contact for all their different needs. This full service concept is one of ValuePark's fundamental strengths and makes practical, everyday co-ordination and co-operation considerably easier.

The policy of Dow/BSL with respect to new investors in the ValuePark is to offer all services for settlement and networking by one party: the management of the Park. The services are given against the costing price without profit. The management aims at a good investment environment with the best possible profits out of the core business (not out of services).

3.3.3 Occupational Health and Safety

There is a common fire brigade and security service for the whole industrial area of BSL Schkopau.

3.3.4 Transport

The whole park counts 400 employees.

There are several tram and bus connections between the ValuePark and the nearby cities (Merseburg, Halle, Leipzig). The frequency of the stops is more than three times per hour at the beginning and end of shifts and once per 40 minutes outside these periods. The railway infrastructure is very good. Almost all cities and villages in the region are connected. The low frequency tracks are mostly privatised and are doing well. Deutsche Bahn (DB) controls the main system. The policy of the government for the future is to invest more in rail infrastructure. Because of concentration of chemical industry in the region (radius of 20 km), the business related transportation of people is mostly limited to this small region. The railway transport has a share of 5-10% of the total output material transport. The transport by road (trucks) covers the main share of transportation of output goods. The transportation of raw materials takes place by pipelines.

Founded as an integrated entity, BSL can operate successfully over a sustained period of time only supported by the right sort of infrastructure. In addition to the Rostock-Böhlen naphtha pipeline, the BSL works are all connected to one another with pipelines supplying other raw materials and interim products such as ethylene, propylene, butadiene, styrene, hydrogen, and brine. Located at Rostock are the terminals for the unloading and storage of raw materials, from

all over the world, employed in the cracking process, and for their onward transmission, via pipeline, to Böhlen. Because of the need for a modern and economical infrastructure, two further plants, Teutschenthal (located between Schkopau and Halle) and Rostock on the Baltic coast, were added to the three main BSL works (Buna-Schkopau, SOW-Böhlen and Leuna). Since Dow acquired BSL, Teutschenthal has been used for brine extraction and the existing and resulting salt mine caverns used for the storage, in gaseous form, of materials such as ethylene and propylene. In addition to this, BSL is also closely integrated with the rail network and has its own loading and unloading facilities. The infrastructure of pipelines between the three industrial areas of BSL (Schkopau, Leuna and Böhlen) and the pipelines from Rostock (Baltic Sea) and Russia for nafta and crude oil are very profitable for this group of industries. The avoided transport by truck because of the presence of these pipelines amounts about 10 trucks a day.

There is a freight railway station (see Figure 3-1) and there are several tram and bus connections between the ValuePark and the nearby cities (Merseburg, Halle, Leipzig). The frequency of the stops is more than three times per hour at the beginning and end of shifts and once per 40 minutes outside these periods. The railway infrastructure is very good. Almost all cities and villages in the region are connected. The low frequency tracks are mostly privatised and are doing good. Deutsche Bahn (DB) controls the main system. The policy of the government for the future is to invest more in rail infrastructure.

Highways running north-south (A9, Berlin-Munich) and east-west (A14, Dresden-Magdeburg) are also within easy access. The new A 38 (Göttingen-Leipzig) highway is also scheduled to be completed in a few years, giving BSL its own highway intersection to the west gate. Also worth mentioning, for the development of business relations, is the expansion of Leipzig airport to accommodate large-capacity aircraft, an excellent hotel infrastructure in Leipzig and Halle, and also the increasing number of Inter-city train connections to and from the region. There is no connection of the site to water transport canals (the Saale is no suitable for large vessels).

3.3.5 Energy

Next to the site of Schkopau a large energy power plant is located. This power plant (1995) is brown coal fired and produces besides electricity also steam for the whole industrial site of Schkopau. This steam delivery is consumed on a year round basis. On top of this facility the Schkopau site has its own steam generation, which acts as a peek production installation. The power plant must be considered as a cogeneration set (combined heat and power production), which is a great advantage with respect to the CO_2 emission.

The site is equipped with a waste incinerator, which burns the waste materials of the factories. The chlorine that is a part of the waste is recovered and also the heat of the burning process is regained and used for heating of building and processes.

Figure 3.5 *Power plant Schkopau*

3.3.6 Construction and Building Technologies

The building office of Merseburg is responsible for the buildings to comply with building requirements such as noise production, height, green surface, building factor, etc. The Dow Company also assists with respect to these permits.

The age of the buildings in the park is 6 years or younger.

3.3.7 Marketing

There was a marketing and advertising campaign during the establishment phase of the park.

ValuePark, the Dow/BSL technology park concept, is orientated primarily towards the creation of synergies between potential investors and the Dow site. The park concept also focuses on the exploitation of existing and yet to be created economic benefits that current and future ValuePark partners are able to offer one another.

These relationships can take the form of:

- Mutually beneficial services
- The provision of raw materials and products
- The purchase and/or processing of finished goods and other types of direct or indirect relationship

The preferred investors in ValuePark are therefore:

- Companies that process plastics as produced in BSL (Schkopau)
- Manufacturers of specialist chemicals (Schkopau or Böhlen)
- Companies that process cracked chemical products (Böhlen)
- Special suppliers of raw materials, auxiliary materials or production resources
- Selected service providers for the site

The aim of targeting preferred groups is to exploit the maximum number of currently available

synergies and also to create new ones. In addition, these particular branches of industry thus fitting well into the existing site, also offer a guarantee of achieving the right relationship between investment volume and the number of new workplaces created. This will also benefit to the traditional local acceptance of, and experience in, the chemical and synthetic materials sector.

The conditions for settlement in the ValuePark are very specific because the site is to valuable to give away to just some company who does not profit the advantages of the existing infrastructure and the presence of raw materials to be processed.

The land is owned by Dow and given out in leasehold for a maximum of 99 years. Only long time contracts will be granted. For shorter time contract there are other possibilities in the region.

The following plastic products are available to customers and ValuePark investors:

Table 3.3 *Available plastic products*

High-pressure polyethylene (LDPE)	PB rubber
Linear low-density PE (LLDPE)	SSBR rubber
PE compounds - wire & cable	Hydrocarbon resins
Polypropylene	Powdered dispersing agent (E-VAc)
PET	Extruded polystyrene foam
PVC	Caustic soda
Polystyrene HI/GP	Aniline
EPS	Acrylic acids
Syndiotactic PS	Acryl acid ester
ESBR rubber	

Note:
The yearly production of plastics of BSL as a whole is about 1 million tons. 20%-30% of this material is processed further by industries on the site of BSL.

European Vinyls Corporation (Deutschland) GmbH (EVC) and Buna Sow Leuna Olefinverbund GmbH (BSL) agreed that EVC would construct a new polyvinyl chloride (PVC) plant at Schkopau as well as acquiring BSL's existing PVC assets. The agreement was completed in the first quarter of 1998.

3.3.8 Human Resources

There are common programs for training the employees of similar category of industry or sector. Dow organises these training's for different sectors.

Before the Berlin Wall came down and East Germany was integrated with West Germany, BSL employed 25,000 people. Today BSL employs closer to 2,500. But those numbers are misleading. The 25,000 included people the company employed: schoolteachers, shopkeepers, nursery workers, and the like.

"Every chemical industry job at BSL creates four additional jobs in the region". Thus the 2,500 jobs directly associated with the BSL sites create an additional 10,000 jobs in the region.

The 400 jobs at ValuePark create 1600 jobs in the region.

The Dow Company funds a large network of technical education. The capacity of this education is twice the volume of what is needed for the Dow/BSL companies. This is considered as a contribution to the development of the region. At the universities of Halle and Leipzig Dow has

sponsored two chairs for professors. A large number of stagiairs and PGD's is working in the factories and laboratories of Dow. Dow started a project together with the middles schools in the cities of settlements that is called "Chemie zum Anfassen" (chemistry you can touch).

Dow has its own research centre on rubber and PET which co-operates with the universities in the region. Dow and others undertake serious actions for the settlement of the Fraunhofer Institute for polymer technology and material characterisation in the region.

3.3.9 Quality of life and Community connections

The company has a travelling agency for business travels, which can also be used by employees for holiday travels.

The day care for children before the Change was incorporated within the companies. After the Change this task has been taken over by the cities.

With respect to the employment of long term diseased or unemployed people there is a good co-operation with the city employment office.

3.3.10 Information and Communication Tools

The whole site is served by one central telephone system within easy low cost internal connections.

3.4 Procedures for Town Planning

Due to the restructuring of the sites after the Change (Wende) and the closure of factories the green area became much larger than before. The same applies for emissions, which became much less. As a result thereof the acceptance of the inhabitants of the region and the ecological value of the region is very high. The preservation of the falcon nests is an example of environmental positive attitude during the restructuring of buildings. Those nests were kept in tact during the refurbishment of the buildings and the falcons kept breeding in it.

The land is owned by Dow and given out in leasehold for maximum 99 years. Only long time contracts will be granted. For shorter time contract there are other possibilities in the region.

"Every chemical industry job at BSL creates four additional jobs in the region". Thus the 2,500 jobs directly associated with the BSL sites create an additional 10,000 jobs in the region.

Because of the existing physical, technical and social infrastructure the investment per new employee is at an average 0,5 million Euro. The investment in other regions in the east without this optimal proposition is at an average 2 to 5 million Euro per worker in the chemical industry.

3.5 Key Points of Town Planning Related to Industrial Parks

The communication with the cities of settlement is partially problem- and partially time-controlled. The communication partner is mostly the department of business or the department of environment. Every quarter of the year a meeting is organised with the city departments and PR-representatives of Dow. Every half-year a paper is published and spread around the cities with news about the Dow activities, changes, etcetera.

The measurement and control of environmental issues like the emission of gases, dust and noise are the responsibility in the first place of the companies itself. The national institutes like the TüV and the environmental office are checking without annunciation the values. The wastewater values are continuously checked.

The acceptance for the activities of Dow is very high due to the historical situation. The environmental load on the region was very high before the nineties (during the communist period). The situation has become much better since that time. Another reason for the acceptance is that this industry as a whole is responsible for a great deal of employment in the region.

Dow offers to new companies assistance to the acquisition of permits. These permits concern environmental issues like emissions of gases, dust, noise, etc. and must be requested at the national government of the lands Saxony (Böhlen: Leipzig) and Saxony-Anhalt (Schkopau, Leuna: Halle). The national office for environment is responsible for the inspection of installation next to the federal institutes like for instance the TüV.

The building office of Merseburg is responsible for the buildings to comply with building requirements such as noise production, height, green surface, building factor, etc. The Dow Company also assists with respect to these permits.

Annex 1

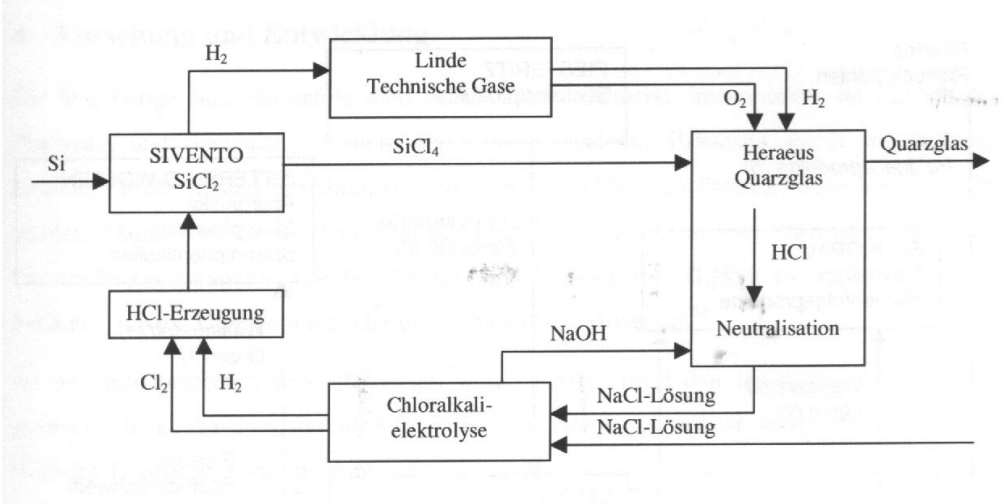

Figure 3.6 *Chlorine cycle*

Although it is poisonous, Chlorine is, due to its high reactivity, used for various applications in chemistry. Chlorine could cause great environmental problems, especially if it is burned without taking the necessary precautions (dioxins). Reprocessing and recycling are therefore important measures to reduce the problems. The quarts glass industry in Böhlen is a good example of a safe closed loop process for Chlorine. The inert material of silicium is oxidised by the chlorine and hydrogen and can be processed to quarts glass. The chlorine and the hydrogen are being recycled.

Annex 2

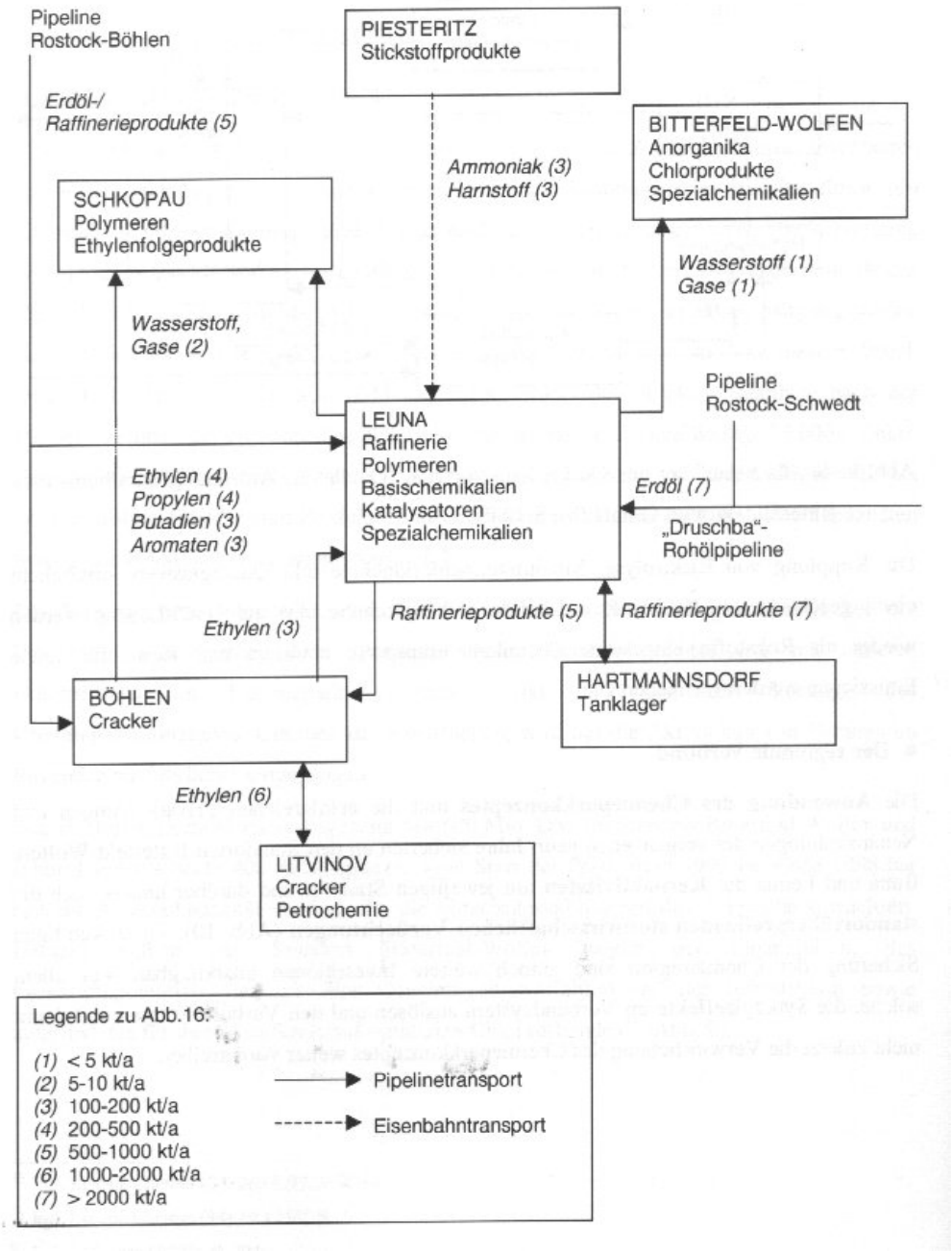

Figure 3.7 *Material flows*

The basic material in the total processing scheme is crude oil. This material is being cracked and refined at which process several products originate. For a great deal the processing of those products and by-products takes places at the sites of Dow/BSL (plastics, glass). This means a reduction of waste, transport energy and transport risk.

4. INDUSTRIAL PARK, HEERLEN/AACHEN

4.1 General Information

Avantis Grenzüberschreitendes Gewerbegebiet Aachen-Heerlen

Figure 4.1 *Centre of the park with the first completed building*

The first steps for founding a new industrial park in this area were taken in 1976. The initiative of this industrial park was taken by the municipality of Aachen. At the time the unemployment rates were on the level of 12% to 14%. Nowadays it is on the level of more than 16%. Aachen does not profit from the benefits of the Rhein railway and the prosperity of the Ruhr area. In the middle of the eighties the provincial government (Bezirksregierung) rejected a plan for an industrial park because of a general status-quo policy. In 1989 after the change of city government a policy of improvement of employment in the region emerged.

In 1992 both cities of Heerlen and Aachen signed a letter of intend to jointly develop an industrial park across the German-Dutch border. The presence of the technical high school of Aachen and all kinds of private companies connected to this school is considered as an important factor to attracting the Hi-tech industry (research and development, production of small components). In addition to this category the project aims at settlement of light industries like logistics. A small part of the area is reserved for catering and small service industry. The former categories should not harm the local shopkeepers.

At the design period, the government of Aachen consisted of the Grünen (green party) and the SPD (social Party). The character of this government could be considered as the main reason for

the green character of the park. From 1999 on the government of Aachen has switched to the CDU. This change did not affect the plans because the land-use plan was already settled.

The management of the park is covered by an incorporated company, which owns the ground. The stakeholders of this company are:

- the municipality of Heerlen (25% of the shares)
- the municipality of Aachen (25% of the shares)
- the LIOF bank (the regional development company in Maastricht, the Netherlands,25% of the shares)
- the LEG (Ländes Entwicklungs Geselschaft, 25% of the shares)

In order to develop a common industrial park a bi-national steering committee with subordinated project teams has been set up. The project was additionally funded by the INTERREG program. One German (LEG: Landes Entwicklungs Geselschaft) and two private Dutch consultants were ordered to make a study of the project which consisted of three analyses concerning:

- Finance
- Market
- Area

Finance
The costs are divided into three categories: land price and land shaping work, transport provisions (roads) and infrastructure. There is a difference between Germany and the Netherlands by accrediting these costs. The governmental bodies in Germany mostly fund the public facilities like drinking water, natural gas, electricity and the sewing system. In the Netherlands these costs are amortised by the ground price.

Market
The city of Aachen expanded during the last 20 years from 245.000 to 255.000 inhabitants. The neighbourhood of the technical high school of Aachen (40.000 students) and the research and development companies in Aachen and Heerlen are the most important incentives to creating high quality employment at the Aachen-Heerlen industrial park. The analysts are counting on a number of 10.000 employees of which a part high quality at the industrial park and another part outside the park.

Area
The analyses of the area resulted into recommendations about highway connections and water treatment.A great difference in this phase of the project between Germany and The Netherlands is the involvement of market parties in the Dutch side against governmental parties at the German side. The next step was to commission three urban planning bureau's to make a plan. The plan of the English Bureau Aukett was chosen as the best fit. To this point the preparation of the plan amounted about 4 million Guilders. The park is located between Aachen and Heerlen, crossing the border of Germany and The Netherlands

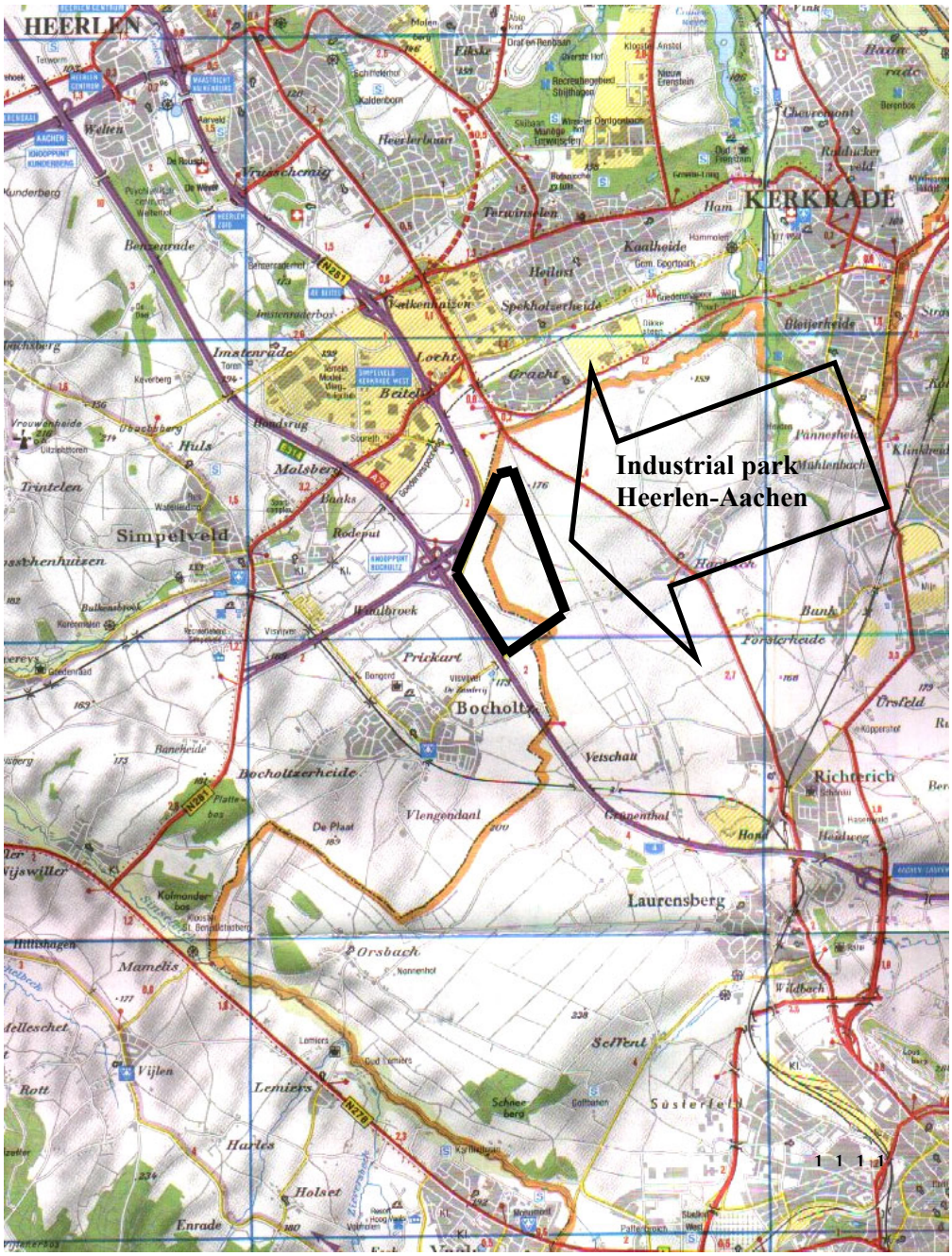

Figure 4.2 *Location of the industrial park between the cities.*

The educational level is estimated to be medium. Maastricht and Aachen have universities and Heerlen has several high schools. The unemployment rate is 16% on the German side of the border.

The area is located next to an important European crossroad were nowadays some 35000 vehicles pass per day. Rail connections with Heerlen and Maastricht are present but not optimal. Therefore plans are made to renew an old rail connection between Aachen and Heerlen, which has been put out of operation some years ago, and change it into a light rail connection. In the close neighbourhood of Maastricht an airport is located. Aachen does not profit from the benefits of the Rhein railway and the Rhein waterway.

The park counts 100 ha industrial area including special destinations (service facilities e.g. hotel). To this date there is one building completed.

Branches represented in the park are Information technology, biotechnology.

Table 4.1 *Companies in Avantis Park*

Company	*m^2 floor surface*	*employees*	*branch*
Syntrack (Libertel-Vodafoon and Ericsson)	*7000*	*150*	*ICT*
CSS	*3000*	*200*	*ICT*
Isotis Biotech	*2500*	*40*	*human tissue engineering*

All companies settled in 2001, 2002.
There are 390 employees in the industrial park. The daily average population of the industrial park is about 200.

Avantis Inc. is the owner of the buildings in the industrial park. The local authority has a 25% share in the Avantis company.

4.2 Procedures for Industrial Parks

Table 4.2 *Government structure*

level	Germany	The Netherlands	English translation of terms
national body	Bundesministerium für Raumordnung, Bauwesen und Städtebau	Ministerie van Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer	Federal ministry for spatial planning, building and urban design
national legislation	Bundesraumordnungs-gesetz	Wet op Ruimtelijke Ordening Rijksplanologische Kernbeslissing	Federal development plan
regional body	Bundeslander		Federal states
regional plan	Landesentwicklungs-plan		state development plan
regional body	Regierungsbezirke	provincies	Province
regional plan	Regionalplan	Streekplan	Regional development plan
municipa-lity	Kreise		Borrow
municipa-lity	Städte und Gemeinde	gemeenten	Municipalities
municipal plan	Flächennutzungsplan	structuurplan bestemmingsplan	Preparatory land-use plan
industrial park documents	Absichtserklärung	letter of intend	letter of intend
	Entwicklungsplan Bebauungsplan	Haalbaarheidsonderzoek bestemmingsplan	Development plan binding land-use plan
	Städtebaulich Entwurf Gestaltungsplan	masterplan	masterplan
		Milieu Effect Rapportage (MER)	Environmental Impact Assessment (EIA)
building documents	Bauplan	Milieuvergunning Bouwvergunning Bestek	Construction plan

The masterplan assesses the following aspects:

- building area
- function of buildings (industry, catering, office)
- balancing area: this area balances the building and green areas within the park
- private green area: area owned by the company with obligatory green destination
- transport area (rail, roads etc.)

The park is divided in three functional areas:

- GE (werbe) 1: light industry and logistics (factory halls).
- GE 2: high-tech (research and development); buildings are limited with respect to borderlines, surface (maximum, minimum) and number of storeys.
- GE 3: the Forum building: has the same description as the GE 2 area and in addition the function of catering and other services like hotel facilities, copying, meeting rooms, etc. This building could be considered as the centre of the park. The stop of the future light rail will be planned next to this building.

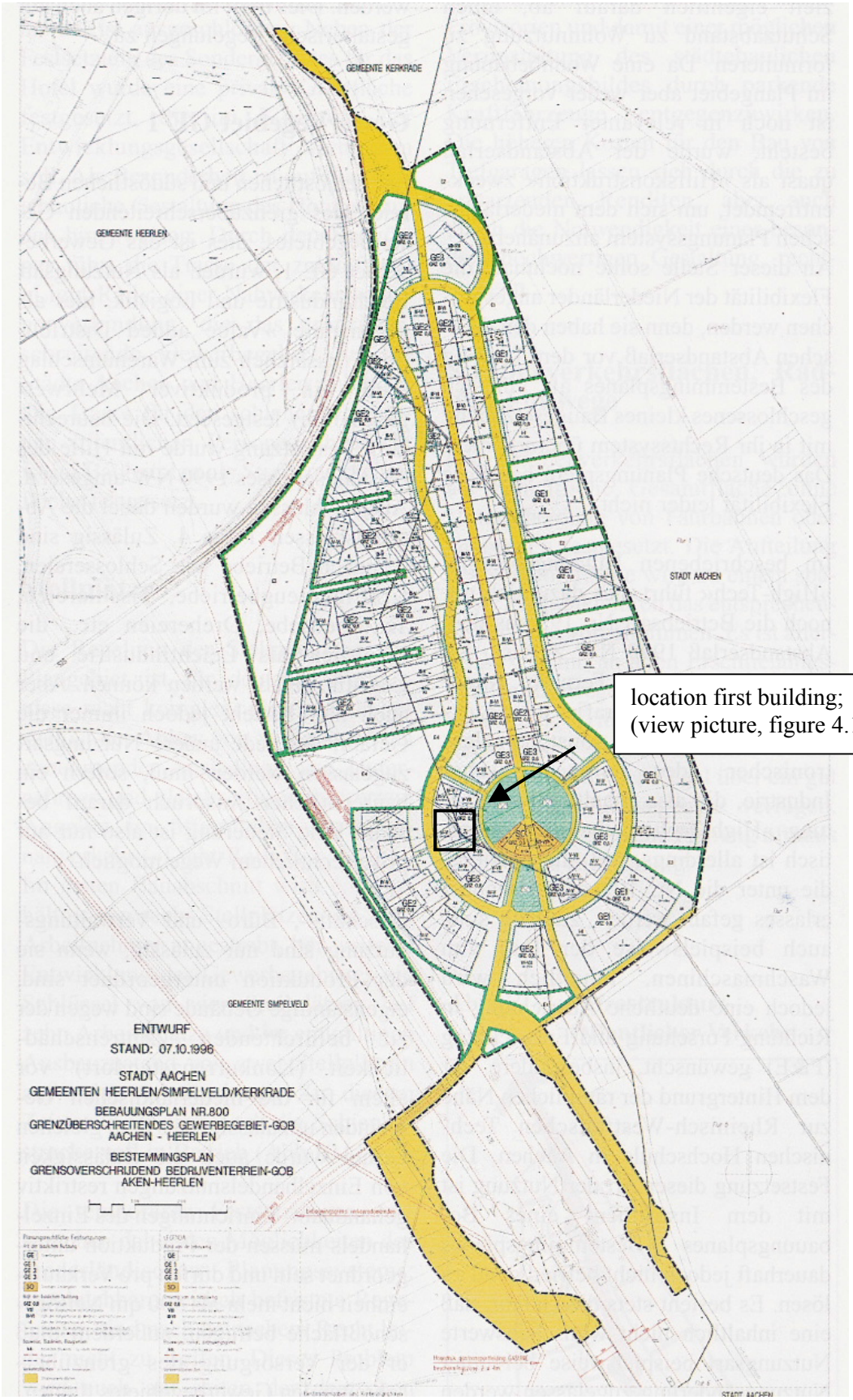

Figure 4.3 *Masterplan of the park*

A big problem with respect to the green areas was the planting list. The German legislation allows prescribing a detailed list of plants and trees to be planted in the area. The Dutch legislation has no such possibilities and leaves the kind of planting open.

A number of conditions for the park could not be caught in public rules. For instance the number of allowable parking bays per employee, the type of preferred companies to be settled, the building landscape conditions, energy performances of buildings and energy supply. Mostly the Dutch legislation is more flexible to those matters. As a solution to this problems the developing company will take care of a number of those issues (settled in the ground contract)

According to the green image of the park, the number of parking bays is limited to 2 versus 10 employees assuming that the light rail is in operation. Underground garages should create additional parking space. Following the Dutch tradition, cycle lanes are part of the road design

The difference between the German and the Dutch preparatory land-use plan lies in the fact that the German plan is much more elaborated and the Dutch plan is very compact but with a large amount of jurisprudence behind it.

During the development phase of the land-use plan the input of citizens and stakeholders was very high in both countries. Workshops and hearings were organised to discuss the consequences of the plan. In the Netherlands the influence of the provincial government is rather high and unpredictable.

In the preparatory land use plan some energy-related issues are taken into account such as the position of the area with respect to insulation, roads, railways, energy supply. The description of the area is: An international industrial area for technology orientated companies, which highly appreciate the infrastructure and the qualities of the site. Heat and power will be generated by use of a biogas installation, wood burning, wind turbines and solar power panels. The local authority has the possibility to impose the connection to and use of a district heating grid.

The community council is authorised to support the implementation of for instance district heating, or solar power by:

- Investment subsidies
- Offering high fees for delivery of electrical power to the grid

The local authority is entitled to regulate the number of parking bays.

The binding land use plan says: The maximum plot is 60.000 m^2 and the minimum plot counts 1670 m^2. The surface factor is 0,8. The maximum number of storeys is 8.

The high quality of the site will be guaranteed by a scenery quality plan (Bildqualitätsplan).

The energy concept of the park aims for minimising the energy consumption by extra insulation, heat recovery, making use of passive solar energy, application of energy efficient appliances as wel as demand controlled lighting and ventilation. The building energy consumption is limited to 75% with respect to the German energy performance requirements (Wärmeschutzanforderungen). This extra limitation will be mentioned in the ground contract with the estate developer as an obligation. Above all the state building code applies.

The local authority is responsible for licences with respect to building construction plan and to environmental issues according to the Federal Immision Control act.

As a result of the environmental impact assessment (MER Milieu-Effect Rapportage) it appeared that the area was possibly the habitat of a rare small animal called the “Korenwolf”. Following the Dutch legislation it is not allowed to destroy the habitat of a protected species.

The legal proceedings about this matter took some years before the permits for the industrial park were granted.

The management of the park is covered by an incorporated company, which owns the ground. The stakeholders of this company are:

- the municipality of Heerlen (25% of the shares)
- the municipality of Aachen (25% of the shares)
- the LIOF bank (the regional development company in Maastricht, the Netherlands) (25% of the shares)
- the LEG (Ländes Entwicklungs Geselschaft) (25% of the shares)

The local authorities are shareholders. The park management is responsible for acquisition, selection of companies, evaluation of plans of companies who want to settle, safeguarding the image of the park. The local authorities evaluate the plans with respect to building permits. The daughter company Avantis Services is responsible for some tasks e.g. maintenance of the park, security and waste management. Euroservices is a joint venture of Essent and Stawag and is responsible for energy supply. The building exploitation company e.g. Centipedes is responsible for building management.

4.3 Management Experience of the Industrial Park in terms of Policy Areas

Table 4.3 *The Scale of Activities per Policy Area*

	Individual Company level	Cluster of Companies	Industrial Park Level
Production process	x		
Materials	x		
Occupational Health and Safety	x		
Transport	x		x
Energy			x
Marketing			x
Human Resources	x		
Quality of Life & Community Connections			x

4.3.1 Production Process

The German government will take charge of the treatment of natural and wastewater. The terrain inclines to the German side, which is the reason to treat the water on the German side.

The local authorities and the land government (North Rhine-Westphalia) are responsible for evaluating and controlling the implementation and success of pollution prevention measures.

Syntrack is looking forward to work together with other companies in the field of ICT, which will hopefully settle in this park.

4.3.2 Management of Goods and Services

Avantis Services is a separate company, which supplies services like maintenance of green areas, roads, security and waste management. The services of this company are obligatory to the companies in the park. This obligation has been settled in the ground contract. The communication with the companies takes places during half-year meetings.

The hotel services will be covered by the future Forum building that is planned in the centre of the park. This will be a private business. There is a common policy for purchasing sustainable energy. Energy supplier: Euroservices. Facility management by Avantis Services (maintenance of park, security, waste management)

4.3.3 Occupational Health and Safety

There is a common security service offered by Avantis Services.

4.3.4 Transport

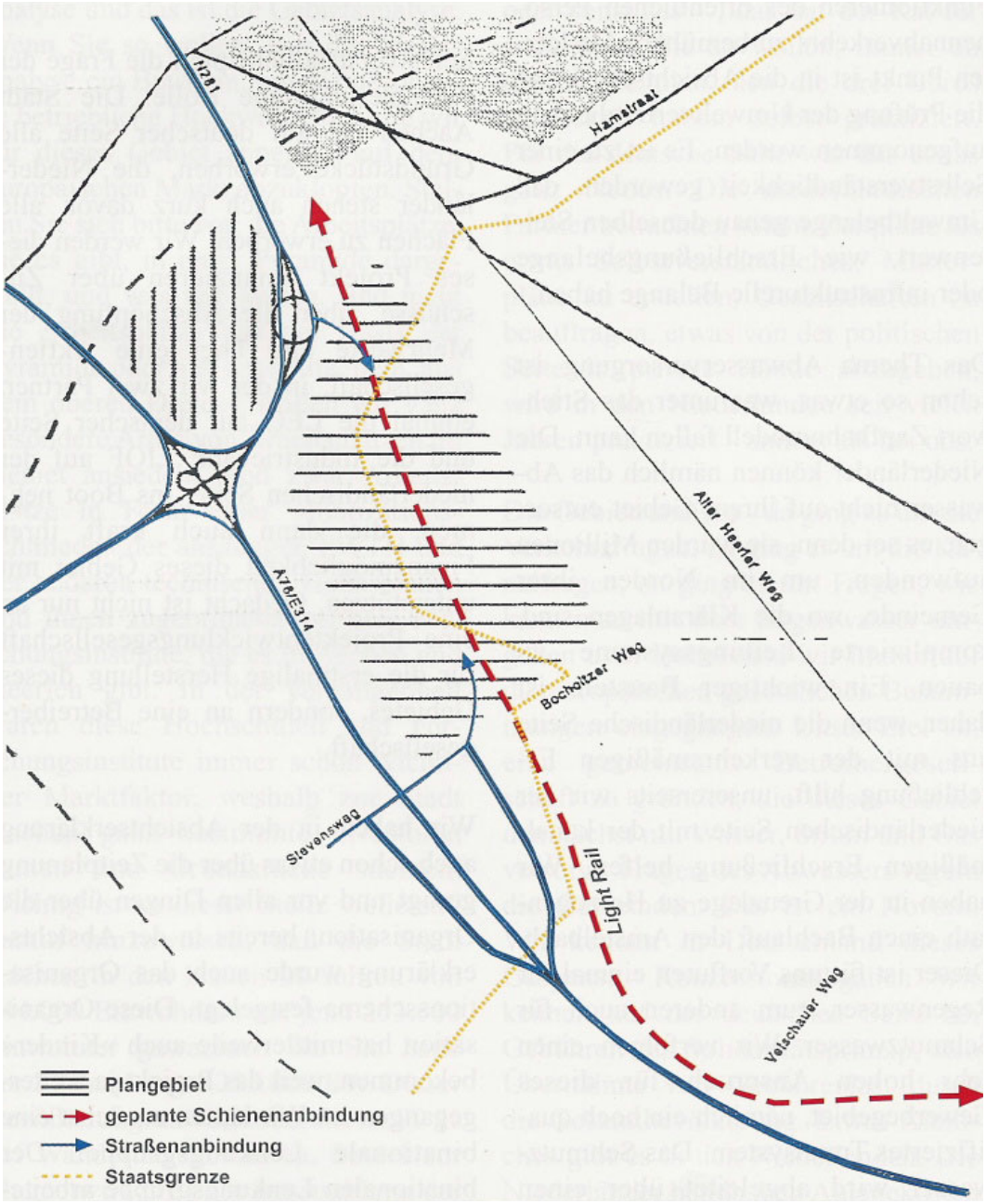

Figure 4.4 *Transport connections*

The Dutch governmental road Construction Company (Rijkswaterstaat) will undertake the connection to the motorways. The German government will take care of the treatment of natural and wastewater. This distribution of tasks resulted from natural circumstances. The main roads,

which are to be connected, are Dutch property. The terrain inclines to the German side, which is the reason to treat the water on the German side.

The existing bus line will be diverted to the park to connect the park buildings to the cities of Heerlen and Aachen. The frequency of the existing bus line is 2 times per hour. A traffic free bus lane has been projected across the park (to assure a quick passage of the bus) to be constructed after a number of years, when the roads become overloaded.

The business related transportation is prevented only by trying to attract companies of the same branch and companies with liaisons to the regional education centres.

The development of the railway connection was judged to be very important as a starting point for the industrial park. During the planning period the Deutsche Bahn has been thoroughly reorganised. Because of this the planning of the railway became very uncertain. The chances for a light rail only for transport of people are better and also more suitable to the activities in the park (low transport capacity demand of goods foreseen).

There are now 390 employees in the park. The target is to employ 6000 to 7000 people in the park within 15 to 20 years. 6 Parking bays per 7 employees are projected (earlier plans suggested 2 parking bays on 10 employees). However, when the number of employees has reached the final level it is clear that it is not preferable to have all those cars running in and out the area every day. At a certain moment the public transport has to offer an alternative for this traffic problem. Therefore plans have been developed to construct a light rail connection between the city of Heerlen and Aachen. The province levels of government in both countries are responsible for the implementation and financing of this project.

4.3.5 Energy

Energy supplier is Euroservices, a 50/50 joint venture of Essent and Stawag. This company supplies electricity and heat.

The electricity originates from renewable sources, so called “green power”. One could say that the electricity comes from the wind turbines that mark the horizon of the park.

Figure 4.5 *Looking from north to south; the main road, the building in the centre and the wind turbines are visible*

The heat for the buildings is supplied by a central gas fired boiler facility that is located just outside the centre of the park. A district heating system, which consists of a piping circuit round the centre of the park, covers the heat distribution. In future this system will be extended to the rest of the area. The construction of a waste incinerator in the neighbourhood of the park has been cancelled because of lack of sufficient waste in the region. The district heating system is also suitable for the application of a future combined heat and power plant that could also serve as emergency power system or a peek shaving system.

The electricity originates from renewable sources, so called "green power". One could say that the electricity comes from the wind turbines that mark the horizon of the park.

4.3.6 Construction and Building Technologies

Centipedes, Maastricht, have developed the first building in the park. The building meets the requirements of the Avantis company for image quality and sustainability. The following has been noticed:

- Building materials are glass, aluminium and steel. These materials have a high recycling value.
- The building uses low energy light sources.
- The cooling of the building is limited to a few degrees below outside temperature.
- Parking space has been created in the basement of the building. This is a high quality (and expensive) solution to the parking problem because it saves quite a lot of green area round the building.

Although a number of measures for sustainable building are taken, the target of 25% energy saving with respect to the energy performance standard is not likely to be achieved in practise.

The age of the park is 1-2 years. An architectural consultant is attached to the staff of the management company to evaluate the plans of new companies before they will be checked by the local authorities. The consultant will pay attention especially to the image building of the park.

4.3.7 Marketing

The marketing of the park is in the hands of the management company. The support of the Dutch and German cities is not very strong (due to the low economic climate and the competition with other regional areas).

The director of Avantis maintains the relations with universities and highschools of both cities. In both cities facilities are present for starting companies, which originate from the educational centres. The park offers space for building offices and workshops for these small high-tech companies.

There was a marketing and advertising campaign during the establishment phase of the park. The following categories of companies are selected for the park: information technology, biotechnology, automotive and aerospatial components, light industry and logistics.

The energy supplier, Euroservice, is a joint venture of a Dutch and a German company.

4.3.8 Human Resources

The expected growth for the number of employees is:
2002: 400 employees
2015-2020: 6000/7000 employees

4.3.9 Quality of life and Community connections

The hotel services will be covered by the future Forum building that is planned in the centre of the park. In the same building several facilities are planned such as sport facilities, day-care, etc. This will be a private business.

4.3.10 Information and Communication Tools

The basic network infrastructure in the park is glass fibre.

4.4 Procedures for Town Planning

The distribution of built area and green area is about 1:1 which is quite remarkable compared to other industrial parks. The large green percentage could be achieved by the low land price rates (the land had an agricultural destination).

A great deal of the green surface of the land is private property of the industrial companies, which are settled there. The settlements about the shaping of the green areas implies that there will be no difference noticeable between the public and the private green areas. Therefore planting schemes are appointed in the ground contracts.

Note:
The large green space attributes to a high microclimate quality (and a green image). In the United States research has proven that a high green area percentage reduces maximum outside temperatures in summertime. In the Netherlands a great deal of research has been carried out on the drying out of the underground in areas with high building density.

Above all the building requirements following the binding land use plan apply.

The following items are considered to be important following the planning documents of the park:

- employment rate
- selection of companies
- percentage of green surface
- (green, hi-tech) image of the park
- public transport
- renewable energy

APPENDIX A QUESTIONNAIRE INDUSTRIAL PARK DATA

A.1 With Respect to Gathering General Information

1. What is the name of the Industrial Park?

2. Establishment process of the industrial park
   a. the date of establishment
   b. by which stakeholders
   c. motivation statement for its establishment

3. Where is it located?
   a. in/nearby the city-centre?
   b. at the periphery of the city?

4. Please describe the location of the industrial park in relation to its surroundings in terms of:
   a. socio-economic structure of the surrounding neighbourhoods (if any) with respect to:
      - educational level of the inhabitants (state as low, medium or high if there is no registered data)
      - unemployment level (state as low, medium or high if there is nor registered data)
   b. the connection of the industrial park with road, highway, railway, inland waterway networks and harbours and airports (please, add a map of the area if possible)?

5. What is the size of the industrial park in terms of:
   a. hectares of land
   b. square meters (m^2) of constructed buildings and floor space
   c. number of buildings

6. Are there possibilities and/or plans for enlargement (expansion)?
   a. If so, to what extent (size, capacity?)?
   b. If not, what can be the possible reasons for that?
      - Lack of space
      - Other economic activities on site or nearby such as forestry, agriculture, tourism etc.
      - Any other?

7a. What types of industries/sectors are situated in the industrial park? (see Annex 1)
   b. What sort of products/services is produced?
   c. What is the amount of inputs (sources such as energy, water etc.) used for the production process?
   d. What is the amount of outputs (such as solid waste, hazardous waste, wastewater, emissions etc.) used for the production process?
   e. Are there any recycling activities?

8. How many companies are there in the industrial park?
   a. in total
   b. per industry/sector
   c. please categorize the companies in terms of their age.

9. How many employees are there in the industrial park?
   a. in total
   b. per industry/sector
   c. per company

10. What is the daily average population of the company/group of companies/industrial park?
   a. constant population (number of full-time and part-time employees and employees working in shifts)
   b. average number of temporary population (number of visitors)

11. Who can be considered as the owner of the buildings in the industrial park?
   a. Local authority
   b. Real estate agency
   c. Private firms
   d. Any other?

12. Can the industrial park be considered as an independent profit centre for the local authority?

A.2 With Respect to the Identification of Procedures for Industrial Parks

13. In which framework(s) is the industrial park policy in your locality defined? Is it in the:
   a. Local policy papers (local policy plans and schemes)?
   b. Management documents by:
      - An individual company/a group of companies of the industrial park
      - Industrial Park Management Board
      - Chamber of Commerce
   c. Are there sustainability indicators?
   d. Other documents?

14. What do these procedures (stated in the local policy papers and management documents) propose for:
   a. industrial park management in general, and
   b. issue-specific aspects of industrial park management such as:
      - pollution
      - energy (with particular focus on CO_2)
      - transport
      - building and construction
      - socio-economic issues
      - any other?
   c. Sustainability indicators?
   d. Do those procedures make a distinction between the companies with regards to the size (number of employees) of the company?

15a. Is there an Industrial Park Management Body (Board)? If so,
   b. Which organisations take part in it?
   c. What are the responsibilities of this Body (Board)?
   d. What is the division of responsibilities between stakeholders of this Body (Board)?

16a. Do the individual companies in the park have agreements to cooperate in some activity areas? If so, please state those areas.
   b. Are there round tables or forums for dialogue regularly organised between the individual companies, as well as between the companies and the stakeholders in the industrial park (planning, consensus construction, conflict resolution).

17. How do the local authorities and industrial park management body (or the companies) share the responsibilities for industrial park management? (Namely, who does what in this domain?)

18. Are there EMSs (Environmental Management Systems) already implemented by
   a. the individual companies
   b. the park management

A.3 With Respect to Identification of Management Experience of the Industrial Park in terms of Policy Areas

19. What is the connection between scale of organizations and the type of activities in the industrial park? Please, tick in the relevant boxes in the below table (and respond the issue-specific questions in each scale they are applied).

Table 4.4 *The Scale of Activities per Policy Area*

	Individual Company level	Cluster of Companies	Industrial Park Level
Production process			
Materials			
Occupational Health and Safety			
Transport			
Energy			
Marketing			
Human Resources			
Quality of Life & Community Connections			

A.3.1 Production Process

20. Are there prevention measures taken in the park against? If so, please describe the relevant ones.
   a. Air Pollution
   b. Water pollution (wastewater)
   c. Waste management (+ hazardous waste management)
   d. Soil Pollution
   e. Noise Nuisance

21. Who is responsible for evaluating and controlling the implementation and success of these measures?

22. Do the companies/park management have an agreement upon reusing waste or secondary raw material? If so, please describe it.

23. Is there a common effort in the park for technology innovation and interchange of technology? If so, what are the emerging production technologies?

24. Is eco-design used as a means to achieve sustainable products and services? If so, describe the process including the division of responsibilities.

25. Please describe if the companies /park management identified their ambitions and goals for sustainable production processes for the
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.2 Management of Goods and Services

26. Does the park management provide services and equipment for common use?

27. Is there a common policy for purchasing sustainable products?

28. How does the industrial park interact and communicate with its customers and suppliers? Are there Round Tables or Forums for Dialogue regularly organised between company / companies / industrial park with its/their customers and suppliers in order to integrate environmental issues in the use of materials?

29. Are there equipments or services provided by a common subcontractor for a number of member companies in the industrial park? Namely, is there a common contract for facility (utility) management for the industrial park? If so, please describe the process.

30. Please describe if the companies/park management identified their ambitions and goals for sustainable materials for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.3 Occupational Health and Safety

31. Please describe the process if the companies and/or the park management have measures for:
    a. preventing work-related health problems/disorders
    b. accident prevention

32. Please describe the process if there is an operable emergency response system for the companies/industrial park?

33. Is there a common security service for the industrial park?

34. Please describe if the companies /park management identified their ambitions and goals for sustainable occupational health and safety measures for the
    z. near future (3-5 years)
    aa. long term (15-20 years)

A.3.4 Transport

35. **Commuter (Home↔Work) transportation**

General Information

a. How many employees are there per company/per sector/ whole park?
b. Please provide the figures if there is an inventory of:
a. commuter distances (distance between the residence and workplace of the employees), and
b. the share (percentage) of the mode(s) of transportation (such as walking, biking, bus, tram, metro, train, personal car (alone or with others), scooter, motorcycles etc.) the employees use. Please state the difference if there is a change in the use of the modes of transportation in the summer and wintertime.

Transport Prevention:

36. Do the company/companies / a cluster of companies / park management attempt to prevent the commuter transportation? If so, by which means stated below:
    a. Flexible hours of working
    b. Tele-working (working some days at home)
    c. Any other?

Traffic Management and Logistical Systems:

37. Are there some measures taken in order to minimise the amount of traffic or minimise the negative environmental impacts of transportation? If so, by which means stated below:
    a. Car pooling
    b. Van pooling
    c. Shared Buses
    d. Environmentally friendly automated vehicles
    e. Bicycles
    f. Walking
    g. Any other?

38. Are there organizational programmes related to the above-mentioned measures?

Infrastructural Measures:

39. Are there general measures taken for the overall park? If so, by which means stated below:
    a. Common parking facilities
    b. Locked bicycle stalls
    c. Special bus lines
    d. Any other?

Transportation related to Business Visits

General Information:

40. Please provide the figures if there is an inventory of:
    a. how many visitors there are per day/per week etc. per company/per sector/ whole park?
    b. from what distance the visitors come to the industrial park and to what distance the company representatives visit places out of the industrial park, and
    c. what is the share (percentage) of mode(s) of transportation (such as walking, biking, bus, tram, metro, train, using personal car, taxi etc.) they use.

Transport Prevention:

41. Do the company/companies / a cluster of companies / park management attempt to prevent the business related transportation? If so, by which means stated below:
    a. Tele-meeting (using ICT tools to transfer and exchange business related data)
    b. Any other?

Traffic Management and Logistical Systems:

42. Are there some measures taken in order to minimise the amount of traffic or minimise the negative environmental impacts of transportation? If so, by which means stated below:
    a. Stimulating the use of environmentally friendly automated vehicles,
    b. Renting cars, specially for short term business visits (such as the action of Green Wheels in the Netherlands)
    c. Public transportation customised for business visits (such as the close co-operation between train and taxi operators in The Netherlands)
    d. Bicycles
    e. Any Other?

Infrastructural Measures:

43. Are there general measures taken for the overall park for business related visits? If so, by which means stated below:
    a. Common parking policies
    b. Locked bicycle stalls
    c. Special bus lines
    d. Any other?

44. Freight transportation

General Information:

45. Please provide the figures if there is an inventory on:
    a. number of freight transportation trips per day/per week etc.?
    b. the type (light or heavy) and number of trucks/other vehicles?

Transport Prevention:

46. Do the company/companies / a cluster of companies / park management attempt to prevent the freight transportation?

Traffic Management and Logistical Systems:

47. Are there some measures taken in order to minimise the amount of traffic or minimise the negative environmental impacts of freight transportation? If so, by which means stated below:
    a. shared containers/ trucks/other vehicles
    b. environmentally friendly automated vehicles
    c. ICT tools for data transportation
    d. Any other?

48. Is there a traffic flow (circulation) plan for freight transportation within the industrial park? If so, please provide the data or describe the programme.

Infrastructural Measures:

49. Is there a central location for loading and unloading:
    a. freight
    b. mail

50. Are there facilities for freight transportation such as:
    a. common parking facilities
    b. common maintenance
    c. any other?

51. Accessibility
    a. Are there problems in terms of accessing the industrial park (such as unfeasible road, railway, highway connections; traffic congestion; lack of public transportation connections). If so, please define them.
    b. Is there a public transport system? What sort of?
    c. What is the frequency of public transportation?

52. Please describe if the companies /park management identified their ambitions and goals for sustainable transport for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.5 Energy

53. Are there any figures available about energy consumption and distribution of energy consumption related to:
    c. heating
    d. ventilation
    e. cooling
    f. lighting
    g. office appliances
    h. industrial processes of the park?

54. What measures are taken in the industrial park for energy efficiency? Please, describe them in each sector such as transport, construction and building technologies, waste management etc.

55. Are there special (collective or individual) facilities present for:
    a. generating or distributing (sustainable) energy (heat, cold, electricity) such as CHP?
    b. buying or selling sustainable energy?

56. Does the industrial park make use of alternative energy sources? If so,
    a. which type of energy sources?
    b. What is the percentage of alternative energy sources in comparison with conventional energy sources used in the industrial park?
    c. Is there any reduction measured in the emissions?
    d. Is there any economic profit measured as a result of this process?

47. Please describe if the companies/park management identified their ambitions and goals for sustainable production processes for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.6 Construction and Building Technologies

48. Is the topic of sustainable building (green building/eco-building/environmental building) being addressed during planning, construction or operation of buildings in your park? Please address the contact details of the contact person if there is any.

49. In which terms are the topics identified:
    a. environmental aspects
    b. building performance / building properties
    c. both?

50. Are there clearly assigned responsibilities for different stakeholders during e.g. planning and operation of the buildings? If so, please describe the process.

51. Are there measures/indicators established in order to monitor environmental performance of the buildings? If so, please state them.

52. Are there established management routines in the park for building sector? If so, are they integrated into i.e. energy and cost management systems?

53. How old are the buildings in the park?

54. How many refurbishments and tenant adaptations have they gone through?

55. How often does it occur that the tenant changes for:
    a. office locations
    b. laboratory locations
    c. production facility locations
    d. retail locations

56. Do you have any anticipation of the total (remaining) service lifetime of the buildings?

A.3.7 Marketing

57. Was there a marketing and/or advertising campaign during the establishment phase of the park?

58. Does the park have any selection criteria for the new companies to be established in its territory?

59. Does the industrial park have business contacts with green markets? If so, please describe the process.

60. Do the member companies of the park have green labelling activities? If so, please describe the process.

61. Do the companies have common actions to increase their efficiency in production or service provision such as:
    a. forming joint ventures
    b. creating new companies
    If so, please describe the process.

62. Are new markets for new and relatively more sustainable materials sought for?

63. Please describe if the companies /park management identified their ambitions and goals for sustainable marketing for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.8 Human Resources

64. Is common knowledge (for organisational issues such as personnel administration, organisational development, industrial psychology etc.) pooled by the companies (via roundtables, forums for dialogue) in the industrial park for common use? If so, please describe the process.

65. Are there common programs for training the employees of similar category of industry or sector? If so, please describe the process.

66. What is the expected growth for the number of employees?

67. Is there an exchange of environmental information between the member companies and park management? If so, what sort of information, by which means and how?

68. Do the member companies of the industrial park create cooperative education opportunities for the employees? If so, please describe the process.

69. Please describe if the companies/park management identified their ambitions and goals for sustainable human resources management for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.9 Quality of life and Community connections

70. Which of the below mentioned facilities are present in the industrial park?
    a. any leisure time activity in the park in which the employees of different parks meet together?
    b. sport facilities for the employees?
    c. general (for non-occupational health problems) health care service
    d. a child-day care centre in the park?
    e. a pet day care centre in the park?

71. Is there an open day in the park or by individual companies?

72. Is the industrial park/companies involved in local planning in issues that have direct or indirect impact on the activity areas of the industrial park?

73. Do they provide employment opportunities for:
    a. the long-term unemployed inhabitants of the city?
    b. the unemployed minorities (if any)?
    c. the reintegration of long-term diseased or incapacitated people?

74. Please describe if the companies/park management identified their ambitions and goals for social sustainability for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.3.10 Information and Communication Tools

75. What is the basic network infrastructure in the park?

76. Is there any kind of information system tool (e.g. intranet) to communicate all the stakeholders in the park?

77. Please describe if the companies /park management identified their ambitions and goals for use of information and communication tools for sustainability for the:
    a. near future (3-5 years)
    b. long term (15-20 years)

A.4 With Respect to the Procedures for Town Planning

78. In which framework(s) are the procedures for town planning in your country defined at the local level? In administrative documents of:
    a. local council
    b. local voluntary initiatives
    c. any other?

79. What do the procedures propose for:
    a. town planning related to industrial parks, and
    b. issue-specific aspects of town planning related to industrial parks?
        - pollution
        - energy (with particular focus on CO_2)
        - transport
        - building and construction,
        - socio-economic issues
        - any other?

80. Does the local authority have already defined sustainability indicators? If so, what are the indicators related to industrial park management?

81. What do the local authorities expect from the new decision-making tool that would be created as a result of the ECOPADEV project?

A.5 With Respect to Key Points of Town Planning Related to Industrial Parks

82. What is the communication mechanisms between the different departments in the local authority related to industrial parks? Please, describe the process giving special emphasis on consensus building and conflict resolution.

83. Is there any kind of information tool used for linking local authority and industrial park?

84. What are the communication mechanisms between the local authority and industrial park? Please, describe the process giving special emphasis on consensus building and conflict resolution.

85. How do the local authority and industrial park exchange information in terms of controls of emission levels, industrial allowances and permits in the industrial park? Please, describe the process.

86. Do the local authority and the industrial park cooperate and/or discuss and negotiate in policy areas such as:
    a. production processes
    b. materials
    c. occupational health and safety
    d. transport
    e. energy
    f. marketing
    g. human resources
    h. quality of life / community connections
    i. …

87. Are there any information gaps detected in local authority to develop sustainable development? If so, in which areas?
    a. Production processes
    b. Materials
    c. Health and Safety
    d. Recycling
    e. Transport
    f. Energy
    g. Marketing
    h. Human Resources
    i. Quality of Life/Community Connections
    j. Horizontal collaboration of the different departments in the local authority for information flow and decision making
    k. …..

A.6 With Respect to the Public Policies and Future Perspectives

88. Of the all the rules, regulations and policy papers you have examined in NATIONAL DATA, to what extent can you say that the theory is integrated in the local authority objectives? Please, describe the situation briefly.