ORGANIZACIÓN DE LAS NACIONES UNIDAS PARA EL DESARROLLO INDUSTRIAL
Progreso mediante la innovación

ZIS PERÚ

Punto focal: PERÚ Ministerio de la Producción

Punto focal de Gef: PERÚ Ministerio del Ambiente

ZIS Perú financiado por: gef fondo para el medio ambiente mundial INVERTIMOS EN NUESTRO PLANETA

Success factors of Sustainable Industrial Zones: Lessons learned from around the globe

Lima, 25th of November 2025
Prof. Dr. Hannes Utikal
Frankfurt, Germany

www.zisperu.org

Agenda

1. Introduction
2. Status Quo and Perspectives of Industry in Peru
3. Role of Sustainable Industrial Zones in Sustainable development
4. Success factors of Sustainable Industrial Zones
5. Conclusion

Prof. Dr. Hannes Utikal

- Professor for Management and Sustainability at Provadis University of Applied Sciences
- Head of the Center for Industry and Sustainability
- Based at the industrial park Frankfurt/Höchst Germany
- Co-editor of the Journal of Business Chemistry
- 15 + years of experience with sustainable industrial park management
- National and international innovative education and consultancy projects

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Industrial Park Frankfurt Höchst

Founded 1863

Goal: economically successful and climate-neutral by 2045

Center for Industry and Sustainability (ZIN)
Think and do tank for sustainable industry at Industriepark Höchst

Mission:
We support the industry in its sustainable development

Center for Industry and Sustainability

Let's create a sustainable industry together

provadis Hochschule

Transforming Industries

We are supporting the industry to become more sustainable, reduce CO_2 emissions and benefit from digitalization. Through our projects we identify options for industry defossilization and new business development.

Accelerating Sustainable Businesses

We conceptualized the EIT Climate-KIC cleantech accelerator and managed it both regionally and internationally. We offer start-ups mentorship and support with sustainable business model development. For organizations we develop business creation and matchmaking formats.

Educating Change Makers

We create learning opportunities for national and international change makers. Our formats (e.g., workshops, trainings, summer schools) focus on real-life challenges and bring latest knowledge in effect. We make knowledge work!

20+ high-impact projects on regional, national and global scale with partners from academia, industry and public authority.

Key facts since 2016

Cooperations with 50+ companies

350+ start-ups in 13 countries supported

2.500+ participants in our education formats

Activities with a funding of 18 million euros

Selected Projects

CO_2 -Neutrality: Process4Sustainability cluster

Process4 Sustainability

HESSEN Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Wohnen

Management of European Cleantech Accelerator

eit Climate-KIC

Climate-KIC is supported by the EIT, a body of the European Union

Sustainable Industrial Area (SIA) Management Courses with GIZ

giz Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH

Sustainable Industrial Area Management

Projects with impact in 30+ countries

www.zisperu.org

- Heck, J.; Utikal, H.; Leker, J. (2024): Industrial symbiosis as enabler and barrier for defossilization: The case of Höchst Industrial Park, Environmental Technology & Innovation, 36, 2024, https://doi.org/10.1016/j.eti.2024.103850.

- Winters, B. (2023): Sustainable industrial area management: Using the materiality analysis at a multi-stakeholder industrial park to align activities, In: Journal of Business Chemistry. 20(2), June 2023, p. 129-135, DOI: 10.17879/30069520281

- Loewert, M.; Utikal, H.; Heck, J. (2023): Transform the European process industries: A multi-level perspective (extended editorial), In: Journal of Business Chemistry, 20(2), June 2023, p. 75-86, DOI: 10.17879/30069520775

- Utikal, H. et al.: Industry 4.0 in Sustainable Industrial Areas in Emerging and Developing Countries: Applicability of Technologies and the Role of the Park Management. published by GIZ 2019.

Process4 Sustainability

HESSEN
Hessisches Ministerium für Wirtschaft, Energie, Verkehr und Wohnen

Sustainable Industrial Area Management

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Global Economy 2025

Risks

1. Escalation of trade barriers s
2. Policy uncertainty and weak confidence
3. Technology and sustainability-transition stress
4. Weak momentum in advanced economies
5. Environmental / climate and extreme-weather shocks

Opportunities

1. Digital-and-technology adoption
2. Green transition and low-carbon investment
3. Emerging-market growth and diversification
4. Infrastructure and connectivity expansion
5. Global trade re-engineering / new value-chains

World Bank 2025
https://openknowledge.worldbank.org/bitstreams/8816eb8e-c1b4-4f0b-8264-a8efd8ff7438/download

Peru Economy Trends 2025

Risks

1. External vulnerability: trade policy uncertainty, commodity price swings
2. Domestic political and social instability
3. Productivity, institutional weakness and regional inequalities
4. Fiscal risks and public investment management
5. Climate- and environment-related vulnerabilities

Opportunities

1. Agribusiness and agro-export expansion
2. Tourism and cultural heritage economy
3. Mining / commodities in energy-transition context
4. Business-environment reforms & FDI attraction
5. Reducing territorial and productivity gaps via infrastructure investment

Peru - Country Economic Memorandum: Seizing Opportunities for Growth and Prosperity

Status Quo of Industry in Peru

Key figures (2025)

- **GDP per capita:** ~$6,892 USD
- **Projected GDP growth:** 3.0%
- **Inflation:** Expected to remain within the 1-3% target range

- Manufacturing: 12-13% of GDP (mining and refining of minerals, steel, metal fabrication, and petroleum extraction and refining)

Peru's structural vulnerabilities:

- Highly dependent on commodity exports—especially mining
- Exposure to climate events such as El Niño continues to disrupt production and logistics.

- Diversification toward higher-value manufacturing and sustainable industrialization as an opportunity.
- Industrial zones on Peru with traditional models: provide basic infrastructure, utilities, and land leases, but few offer integrated environmental management or shared service systems.
- Policy momentum: The Circular Economy Roadmap for Industry 2020

Peru Overview: Development news, research, data | World Bank

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Role of Sustainable Industrial Zones in Sustainable development

Sustainable Industrial Zones	Eco-Industrial parks	Special Economic Zones
▪ Broad framework integrating economic, environmental, and social sustainability ▪ in the planning, construction, and management of industrial zones.	▪ businesses cooperate with each other / local community to improve economic, environmental, and social performance. ▪ resource efficiency, circular economy, high standards of social and environmental management ▪ design, operation, governance	geographic areas within a country with special regulatory, fiscal, and administrative arrangements to attract investment, promote export-oriented activities, accelerate industrial development, and test policy reforms.

All Eco-Industrial Parks can be part of Sustainable Industrial Zones, but not all Sustainable Industrial Zones are Eco-Industrial Parks.

Sources:

GIZ (2017). *Sustainable Industrial Areas: Guidelines and Tools.;* UNIDO (2019). *International Guidelines for Industrial Parks;* UNIDO, World Bank & GIZ (2021). *An International Framework for Eco-Industrial Parks v2.0.;* OECD (2020). *Eco-Innovation in Industry: Enabling Green Growth.;* World Bank (2025). *Leveraging Eco-Industrial Parks for a Sustainable Transition.*

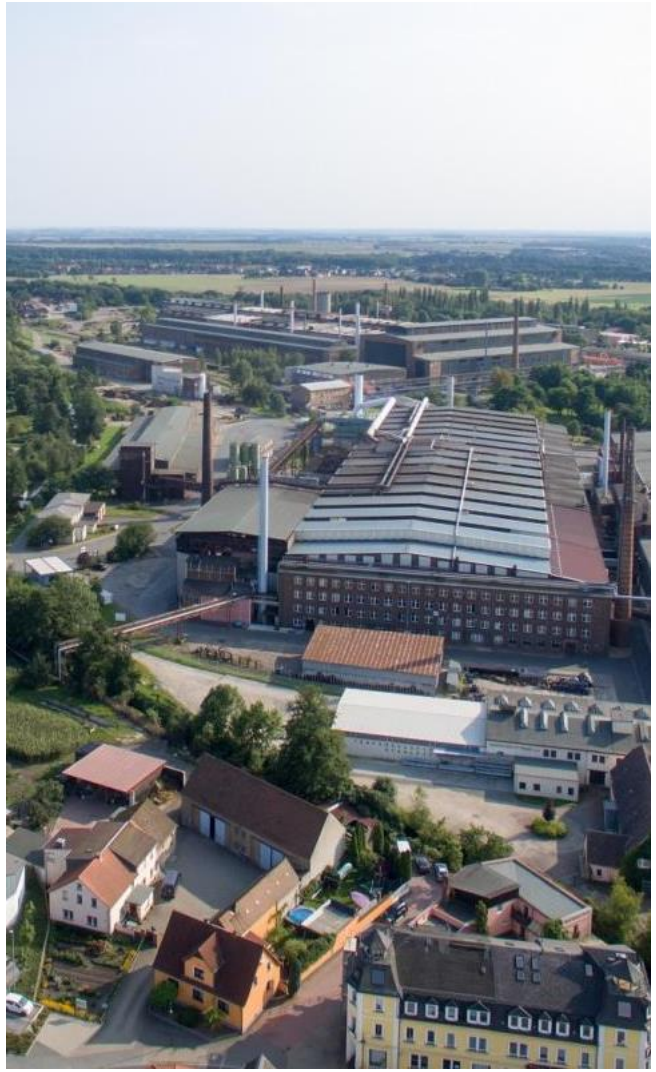
Role of Sustainable Industrial Zones in Sustainable development

Sustainable Industrial Zones	Eco-Industrial parks	Special Economic Zomes
Broad framework integrating ec su co in	Focus on inter-firm collaboration and re sy im l	geographic areas within a country w ac at or in pe conditions.
No figures on a global level	Industrial areas in process of developing towards EIPs	In 2019: 5.300+

Insights from all three pillars of sustainable industrial zones will be used on the following.

Around 5,400 SEZs exist worldwide (UNCTAD 2019: https://unctad.org/publication/world-investment-report-2019) and about 438 eco-industrial parks were identified globally by 2020 (Aggeri 2021 via UNIDO EIP Framework: https://www.unido.org/eip)

Role of Sustainable Industrial Zones in Sustainable development



A Sustainable Industrial Zone is more than a collection of factories

it is a planned and managed industrial area that integrates environmental, social, and economic sustainability aspects

at every stage, from site selection and design to operation and governance

SIZ contribute directly to multiple sustainable development goals

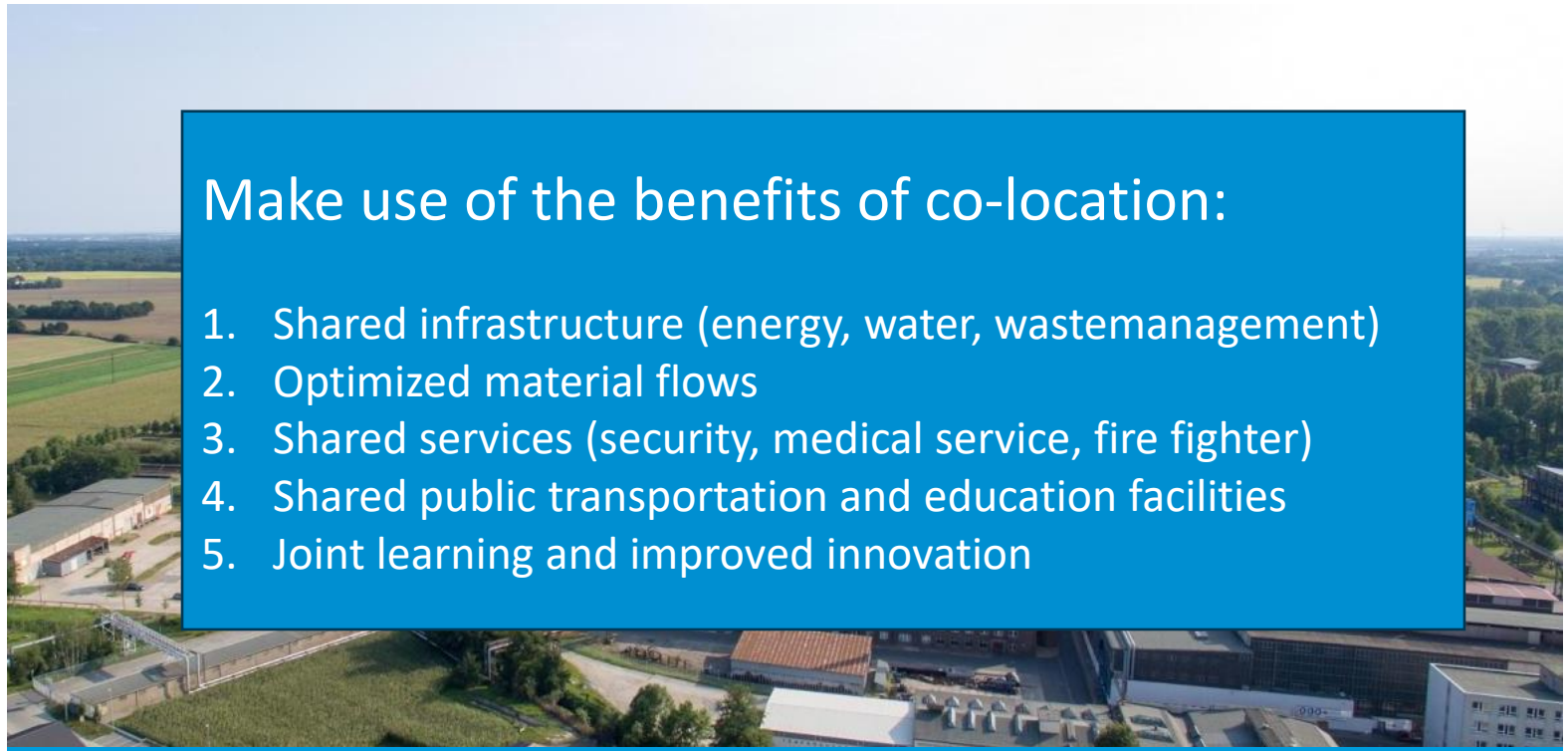
- sustained, inclusive, and sustainable economic growth, full and productive employment
- decent work for all

- reduce resource needs,
- create closed loops,
- improve recycling and waste management

- resilient, inclusive, and sustainable infrastructure, industrialization,
- innovation to support economic growth and human well-being

- Reduce CO_2-emissions
- resilience to climate-related disasters,
- climate-smart water management

Benefits of sustainable industrial zones

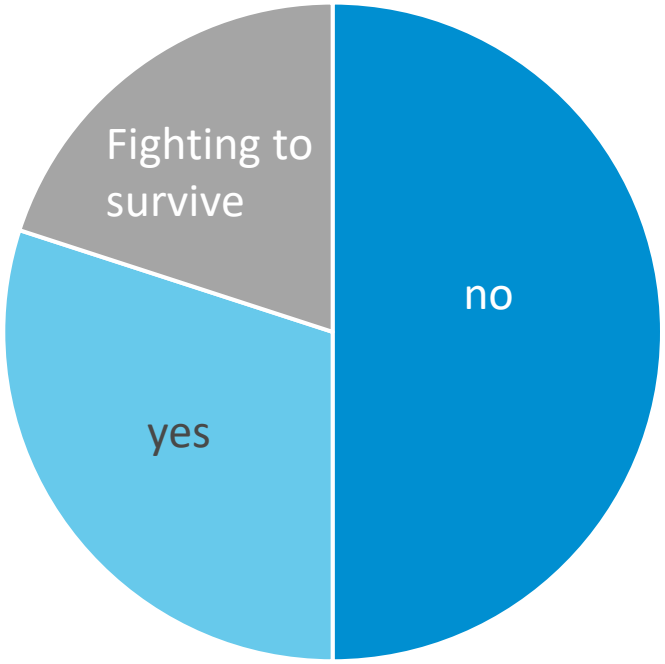


Make use of the benefits of co-location:

1. Shared infrastructure (energy, water, wastemanagement)
2. Optimized material flows
3. Shared services (security, medical service, fire fighter)
4. Shared public transportation and education facilities
5. Joint learning and improved innovation

SIZs can lower infrastructure costs, ease environmental oversight and promote collaboration among firms:
=> more jobs, less negative ecological impact

Are SEZ successful? 50+% of global SEZ are not



There is no single global failure rate, but evidence from UNCTAD, World Bank and OECD studies shows

- Around 50–70% of SEZs fail to meet their stated objectives
- Only 20–30% become true success cases with measurable industrialization, exports, technology spillovers and local job creation
- The rest are “survival zones” —operating but with limited economic impact

Ranking - Most important barriers to success

Rank	
1	Governance & regulatory weaknesses
2	Infrastructure shortcomings
3	No clear value proposition
4	Weak local integration / skills
5	Financial overextension

Based on cross-analysis of World Bank, UNCTAD, OECD research and >200 zone case studies

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What drives success?

What differentiates the successful 20–30%?

- Enabling policy and regulation
- Targeted incentives
- Clear competitive value proposition
- Stable governance with true regulatory facilitation
- Professional private or PPP zone management
- High-quality services, not just infrastructure
- Anchor investors and strong investment pipeline

1. Enabling Policies and Regulation

Effective SIZ implementation depends on supportive policy frameworks.

International experience shows that countries that define clear national standards for sustainable industrial zones achieve faster results (UNIDO, 2019; GIZ, 2017).

Aspects:

- planning,
- environmental management,
- social safeguards, and
- economic performance.

You may follow the eco-industrial park guidelines, too. (Worldbank, GIZ, UNIDO)

1. Enabling Policies and Regulation - Dubai JAFZA

Scale

- 11,000 companies
- 160,000 jobs
- “nearly 75 % of Dubai’s FDI in manufacturing, trade and transport”

Competitive incentives & infrastructure

- JAFZA offers 100 % foreign ownership, zero corporate tax, full repatriation of capital, and zero import/re-export duties.
- multimodal access (sea, air, road) to global markets

Recognition:

- Financial Times’ fDi Intelligence: #1 global free zone (2024), ‘Industrial Zone of the Year’ and ‘Top Sustainable Zone’.
- Austainability agenda: net-zero by 2050, large renewable energy installations, waste diversion targets

Success factor: Enabling Policies and Regulation

2. Targeted Incentive Mechanisms

Incentive mechanisms are crucial.

Aspects:

- Tax reduction
- performance-linked utility rebates,
- tax incentives for resource-efficient technologies,
- fast-track permitting for certified zones.

Development banks can offer green financing for shared infrastructure projects such as wastewater treatment or renewable energy systems (OECD, 2020; World Bank, 2025).

2. Incentive Mechanisms – Example Albania

Maximize your profits with Durana Tech Park!

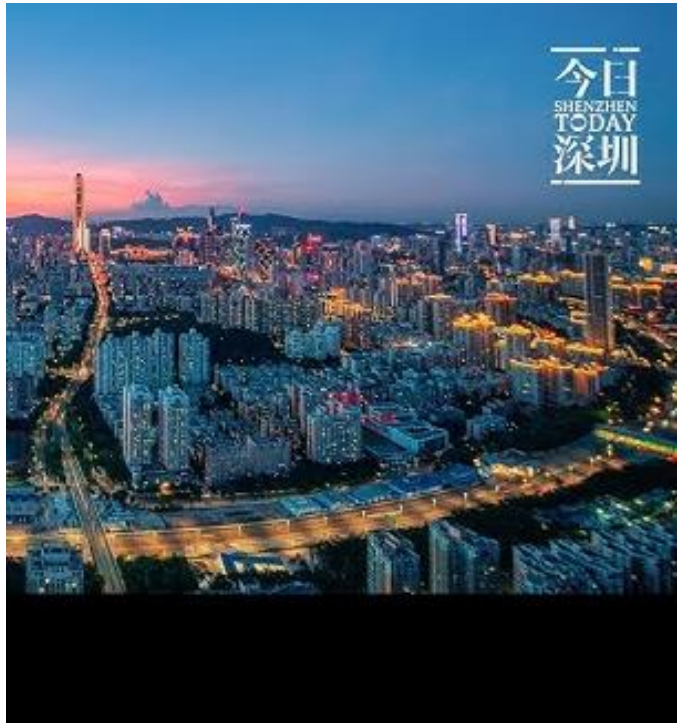
Durana Residents		Non-Residents
0%	VAT	20%
0%	Corporate Income Tax	15%
0%	Employment Income Tax	0-23%
8%	Tax on Dividents	8%
€95/month	Social Contribution	24.5%
3.4%	Social & Health Employee	3.4%

Success factor: Targeted Incentive Mechanisms

3. Clear Value Proposition

- Why should I invest in your industrial zone?
- What‘s in for me?
- And what can‘t I get somewhere else?

3. Clear Value Proposition - Shenzhen



Key facts

- Founded 1980
- Advantages: **proximity to Hong Kong (important for foreign direct investment (FDI)), technology transfer and export-oriented manufacturing**.
- Shenzhen was granted unusually broad legislative and administrative authority compared to other parts of China (allowed experimentation with market-oriented reforms)

Transition toward innovation and high-tech industries

- moved from low-cost manufacturing to higher value-added, tech and innovation industries.
- Today: reputation as an innovation hub.

Success factor: Clear Value Proposition

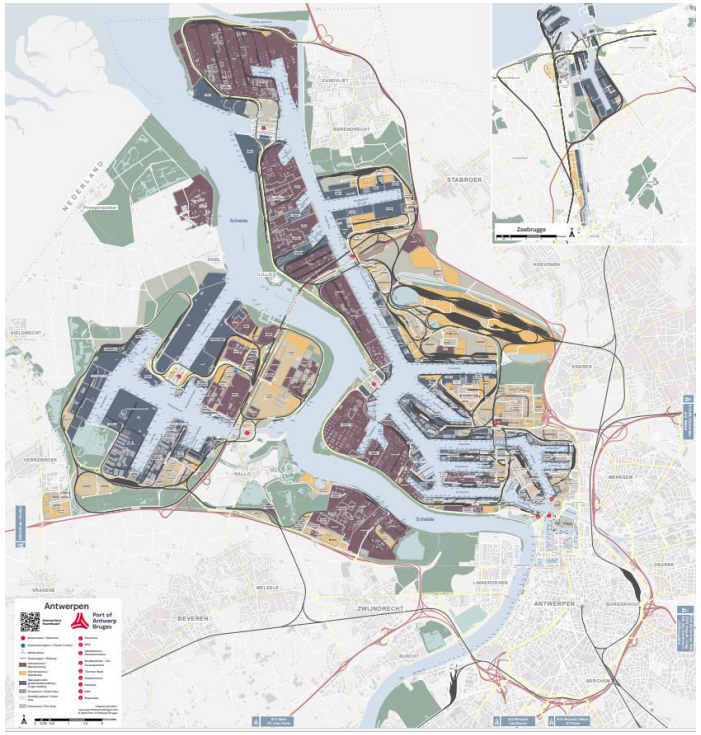
4. Effective Governance

- Clear reporting lines: The responsibilities for the industrial zone developments have to be clear. The zone managers should report to one single authority (e.g. one ministry) to ensure consistency in its development.

- Professional Zone Management: Each zone requires a dedicated management authority with clear mandates for planning, monitoring, and service delivery.

- Strong collaboration between business and government.
  - Co-designing standards and incentives encourages compliance and innovation.
  - Governments can provide streamlined permitting and infrastructure, while firms contribute investment and operational expertise.

4. Effective Governance – Port of Antwerp and Bruges



Key aspects

1) Among the largest ports in Europe
2) Logistics, energy, and raw material supply
3) Creation of H2 and CO2 networks for Northern Europe (CCUS)

Implications :

- Governance handles operational complexity (large ships, many terminals, high throughput).
- Need to align public/regional policy (e.g., sustainability, land use) with commercial competitiveness (terminal throughput, cost efficiency).
- Port authority acts as enabler/coordinator

Governance

- Landlord-type governance model; publicly-owned port authority,
- Board/Executive structure, responsible for infrastructure and strategic policy, private-operator models for terminal operations
- Strong emphasis on stakeholder networks, hinterland integration, and sustainability.

Success factor: Effective Governance and Professional Zone Management

4. Professional Zone Management

Traditional management skills „get things done“ plus

- Understanding of systems
- Networking
- Creating cooperations
- Cross-industry, cross-disciplinary collaboration
- Perseverance
- Monitoring & Learning

Success factor: Professional Zone Management

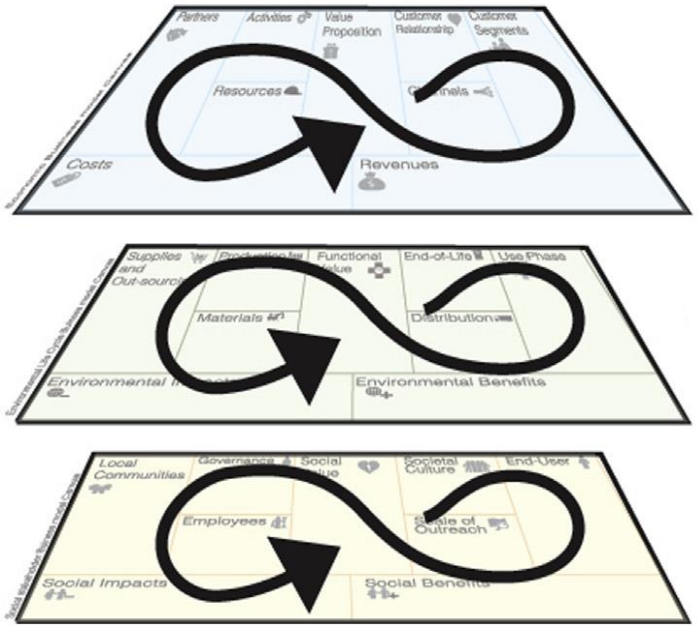
5. High quality services – not just infrastructure

Sustainable Industrial areas can support tenants in their economic success by a variety of value added-services

1. Infrastructure: labs, utility services, waste management. conference& event facilities, food & catering options, fitness / wellness facilities, retails services
2. Digital infrastructure: eg cloud hosting, cybersecurity services, homepage)
3. Community & governance services: digital platform, member directory, community forums,)
4. Coordinating services: One-Stop-services, central reception & information desk, administrative & regulator liaison,
5. Business support, visitor & partner services, company formation
6. Innovation, incubation & acceleration services
7. Cluster & community development
8. Internationalization and market access support
9. Smart management, eg ESG dashboards
10. Events, training & capacity building

6. Innovative business models

Horizontal Coherence

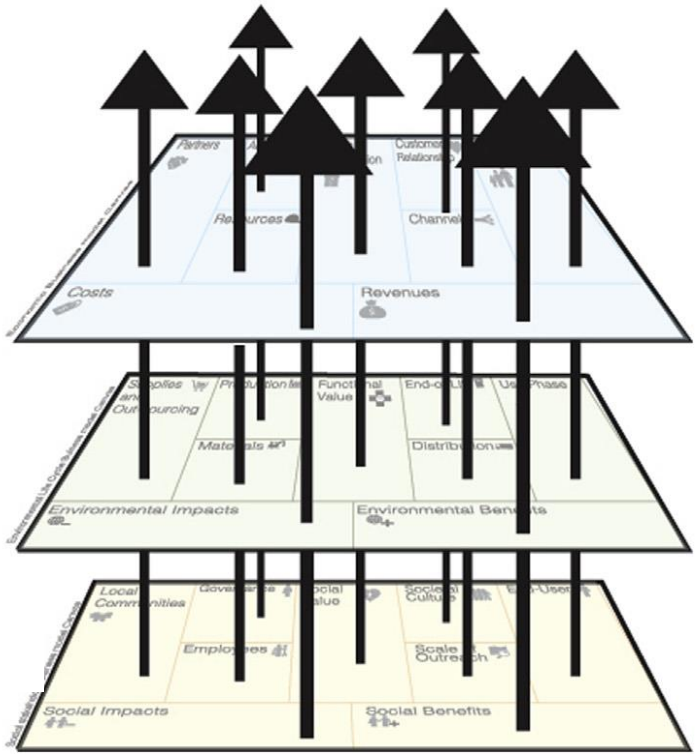


economic layer

environmental layer

social layer

Vertical Coherence



Source: Joyce, A. and Paquin R.L., (2016): The triple layered business model canvas: A tool to design more sustainable business models, Journal of Cleaner Production, 135, 1474- 1486.

6. Innovative business models – Industrial park Höchst

Managed by Infraserv Höchst

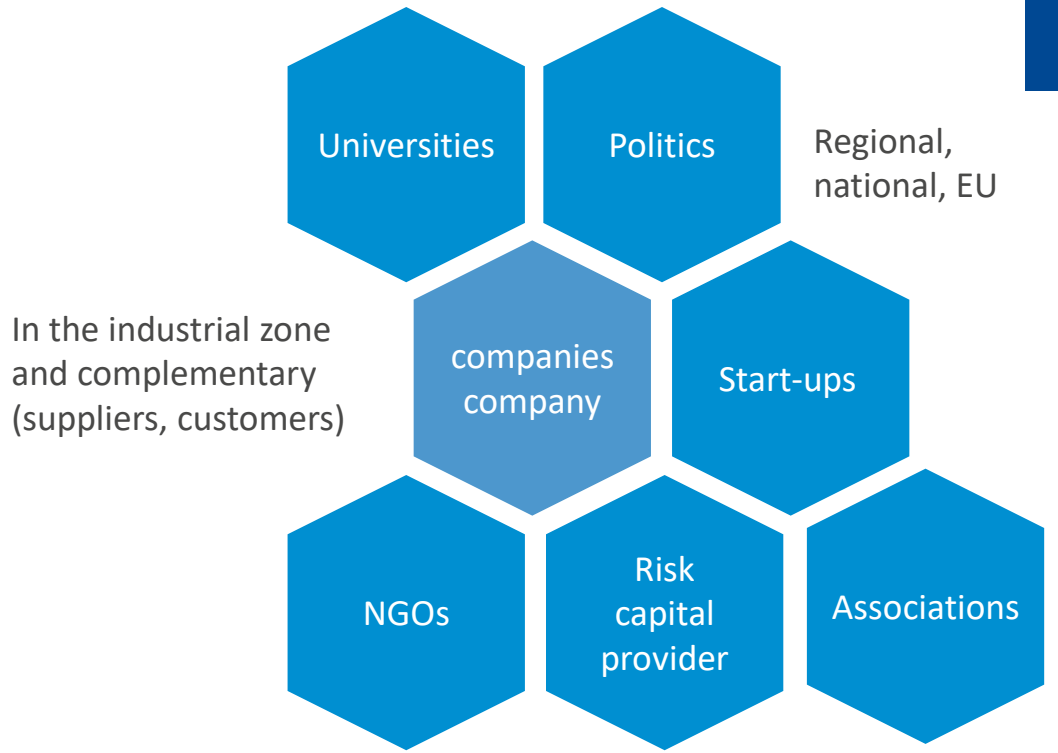
2.400 Employees
1.2 bn Euro revenue

profitable

Broad service portfolio:
Energy and waste management, facility management, education (TVET; further education, university of applied sciences), management of public authorities and others

7. Collaboration and innovation

Manage the innovation ecosystem!



Value creation in the system: 1. Realize new ideas, 2. Access to know-how, 3. Access to finance

Three examples of the design of innovative ecosystems
Goals, content, financing and governance

provadis Hochschule

	Industriepark Höchst and the Process4Sustainability cluster	Industrial park Geelen, NL	TEDA, China
Selected project	Process4Sustainability.eu, Cluster for a climate-neutral process industry in Hesse	Brightlands Circular Space	TEDA, Park Management and Center for Sustainability
Volume	250 thousand euros per year (office) plus projects	100 million euros invested in Innovation Space and Demonstrator	Not specified
Approach	▪ Joint illumination of transformation paths ▪ Project acquisition ▪ Public Advocacy	▪ Development of an innovation ecosystem on the topic of "Circular Plastic" ▪ New product development	▪ Industrial symbiosis ▪ Central specifications and establishment of complementary companies

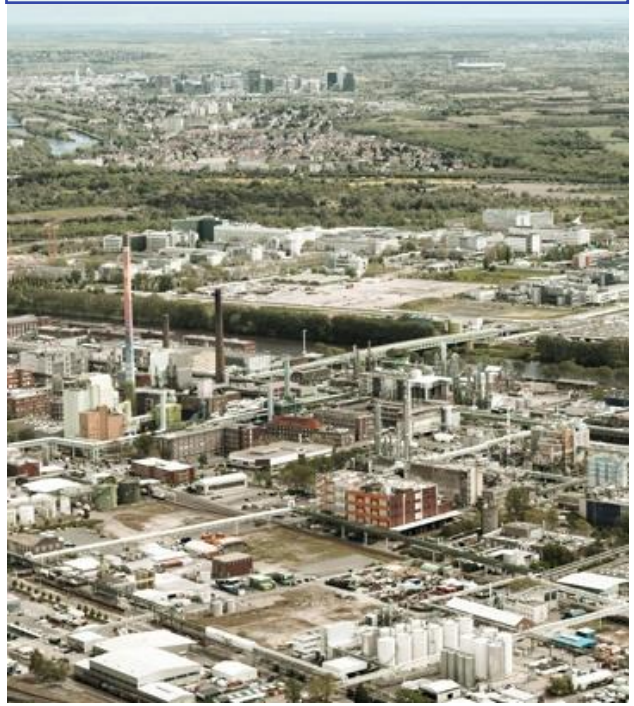
Process4 Sustainability

Brightlands Circular Space

TEDA 天津经济技术开发区-泰达 Tianjin Economic-Technological Development Area

Industriepark Höchst
Mission of the Process4Sustainability cluster

Mission:
We want the transformation to be economically successful.
succeed.



120
Production Plants

The German chemical industry in compact form

Pigments, polymers, coatings, dyes, salt, gases, biogas, acids, alcohols, aldehydes, amines, fungicides, herbicides, insecticides, silicates, biofuels, food additives, powders, sulphur chemicals, fluorides, functional chemicals, fine chemicals, agrochemicals, enzymes, antibodies, pharmaceutical products, ...

460
Hectare
Total area

980
Lease and rented buildings

8
One billion Euro to Investments 2000 to 2020

90
The company at the location

Potentially 90 different targets and opinions, mostly international production companies with globally oriented strategies

2.000
gigawatt hours of electricity per year

22.000
Employees

3.500
gigawatt hours of heat per year

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Process4Sustainability cluster

Shaping an economically successful transformation

Process4 Sustainability

The challenge

Europe wants to become CO_2 -neutral - as soon as possible, but by 2050 at the latest. The process industry and its partners are key to the success of this change: **together,** we can open up **new markets**, **save energy and raw materials, replace fossil** CO_2 sources and increasingly **use CO_2 as a resource** through **innovative solutions.**

Approach

Establishment and **management** of a **cluster.**
We translate the goal of CO_2 neutrality for individual companies and the **specific local conditions** and offer our partners practical knowledge about the **levers** of CO_2 neutrality, new **markets** and innovative **business models**. We **create future markets** by connecting solution providers with the demand side.

Process4Sustainability is a platform for the Alliance of the Willing.

Industry partner

AMBIVATION
ARCUS
BAYER
bse methanol
CAPHENIA
Celanese The chemistry inside innovation
CO2BIOCLEAN
INERATEC
infraserv höchst
kuraray
NEOCARBON
reverion
right
sanofi

Innovation and solution partner

DECHEMA
eit Manufacturing
House of Energy
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TECHNISCHE UNIVERSITÄT DARMSTADT
VCI

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Process4Sustainability

Focus of the cluster work in 2025

- Strong foundation: In the new funding period, the cluster will continue its previous work towards an economically successful transformation path.
- Multi-optionality: The transformation path must be able to flexibly accommodate changes in the external framework conditions (grid expansion, financing, geopolitics).

2021

Initiation phase

- Common understanding developed
- UN Sustainable Development Goals for the Industrial park translated

2022-2023

Build-up phase

- CO_2 footprint determined
- Levers identified
- Transformation model developed
- Positioned in networks
- First funding acquired

2024-2026

Stabilization phase

- Annual update of the transformation model
- Technology radar: Observing the 12 levers
- Update on the development of the infrastructural and regulatory framework for Industriepark Höchst (H_2 , green electricity, CO_2 regulation (CCUS))
- Benchmarking the transformation of other EU locations (technology and business models)
- Cluster growth (in the industrial park plus external solution providers)
- Positioning in networks
- Funding acquisition and demonstration projects

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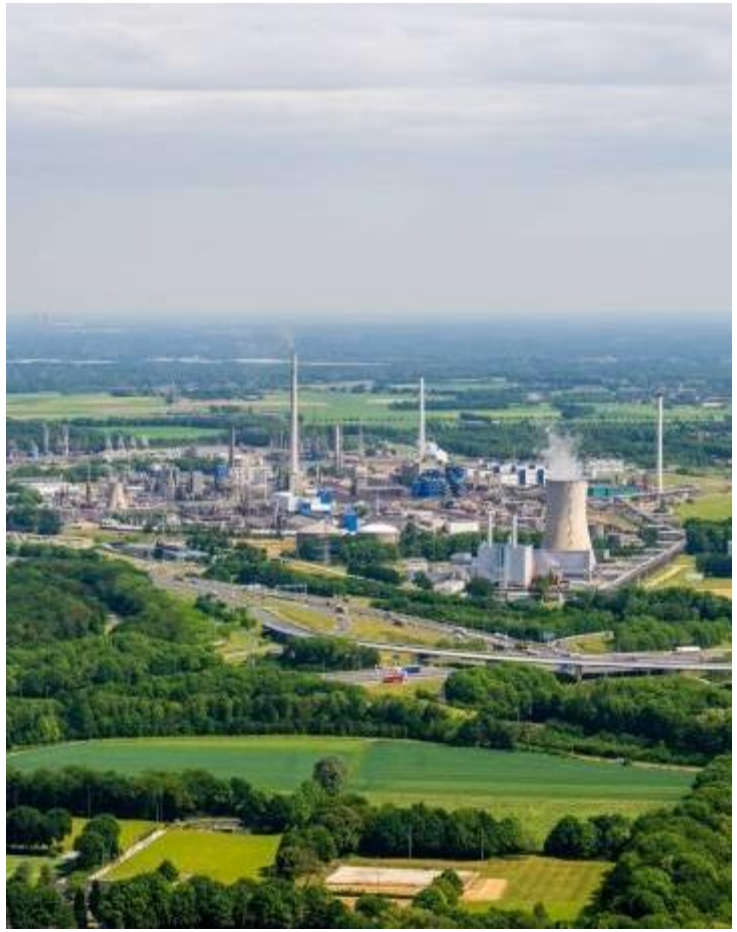
Presentation Industrial Park Geleen, Netherlands



Chemelot Industrial Park

- 800 hectares of land
- 60 companies, large "site users": SABIC, OCI Nitrogen, DSM, LANXESS Elastomers, LVM-INEOS Chlorvinyls, Sekisui S-Lec, Borealis, Polyscope Polymers, QCP and EdeA
- 8,000 employees

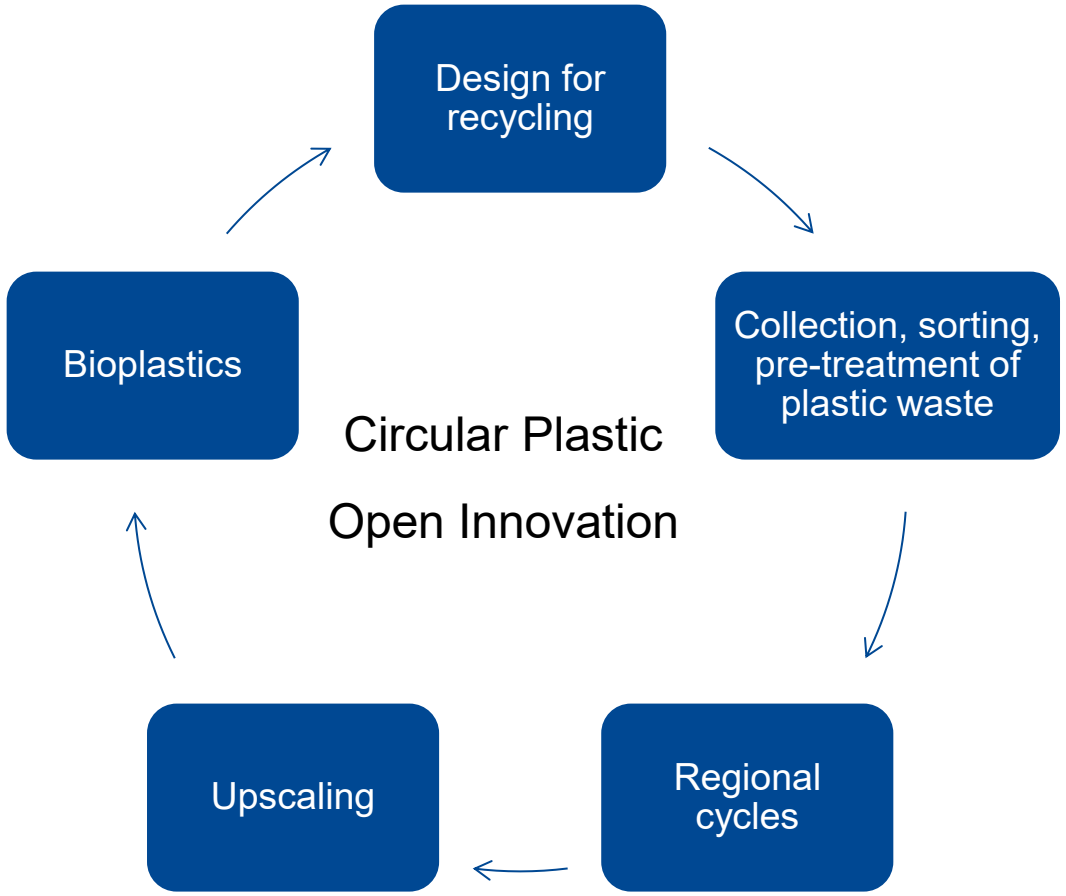
Brightlands Chemelot Campus

- Open Innovation Campus
- 21 companies and institutes (training, research, development and production)
- Ambitious development program
- 200 new patents per year
- 1,500 knowledge workers

Source: Presentation by Lia Voermans, President Steering Group
Brightlands Circular Space on 29.11.2023 in Geleen (Brightlands Circular Space: Making dreams come true)

Brightlands Chemelot Campus: Current project, focus on "Circular Plastic"

provadis Hochschule



1. Infrastructure and R&D
2. New business models
3. New partnerships
4. City Lab: collaboration with end users

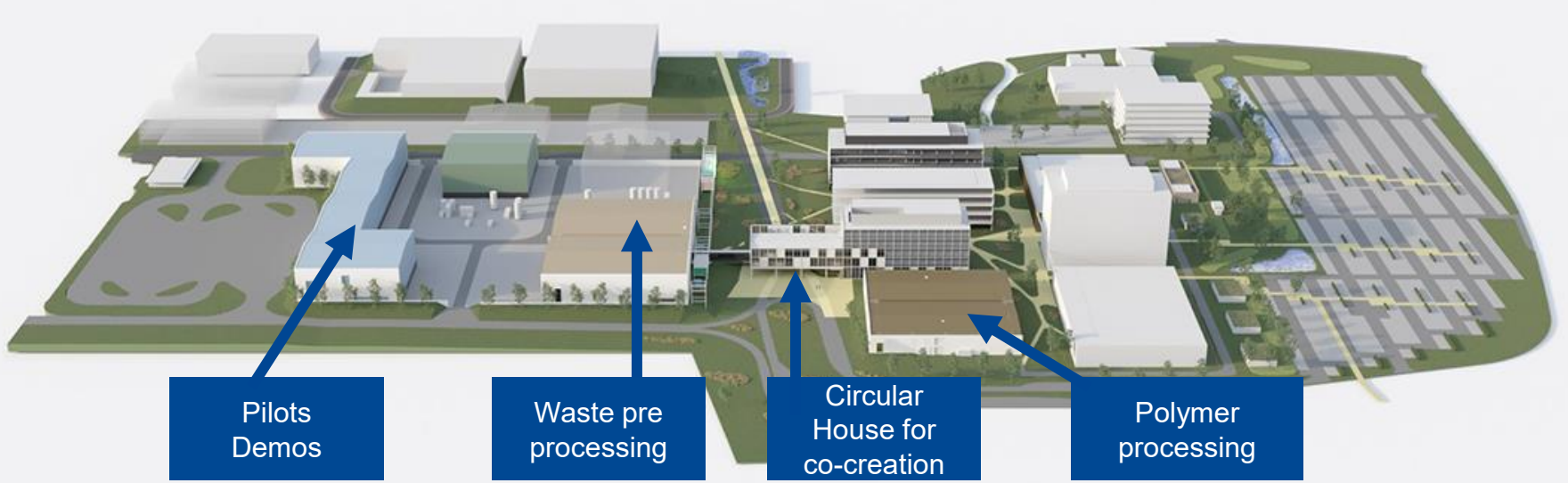
Source: Presentation by Lia Voermans, President Steering Group
Brightlands Circular Space on 29.11.2023 in Geleen (Brightlands Circular Space: Making dreams come true)

STUDENTS BY PROVADIS THINKING INDUSTRY NEW

Brightlands Chemelot Campus: Focus on "Circular Plastic" Start-ups and university directly in the industrial park

provadis Hochschule

One of the world's first fully circular open space demonstrators



Brightlands Circular Space

Public private partnership

Brightlands, Maastricht University, TNO
+
Corporate investors
+
EU, national, regional

Investments:
2023-2026
100 million euros
in laboratories, offices, production

Source: Presentation by Lia Voermans, President Steering Group
Brightlands Circular Space on 29.11.2023 in Geleen (Brightlands Circular Space: Making dreams come true)

STUDENTS BY PROVADIS THINKING INDUSTRY NEW

Tianjin Industrial Zone China

1984

2024

The **Tianjin Economic and Technological Development Area (TEDA)** is one of more than 220 national economic development zones in China
Its center is located in the Binhai district (port, commercial areas, residential areas)

Founded in 1984, today more than 3,000 international companies on site (including Novo Nordisk, Nestlé, Volkswagen)

Sectors: Manufacturing, information technology, renewable energy, chemicals and healthcare

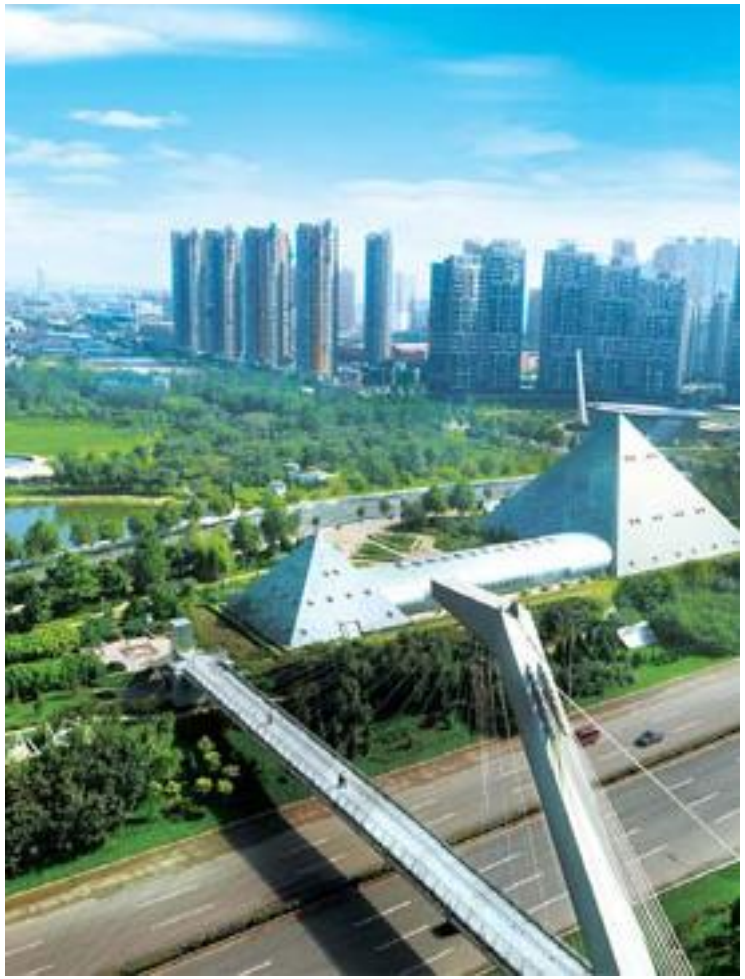
From 2009-2014 area developed for environmental technologies ("middle area")
Focus on the energy-saving and environmental protection sector, renewable energies, composite materials, electronics and information technology

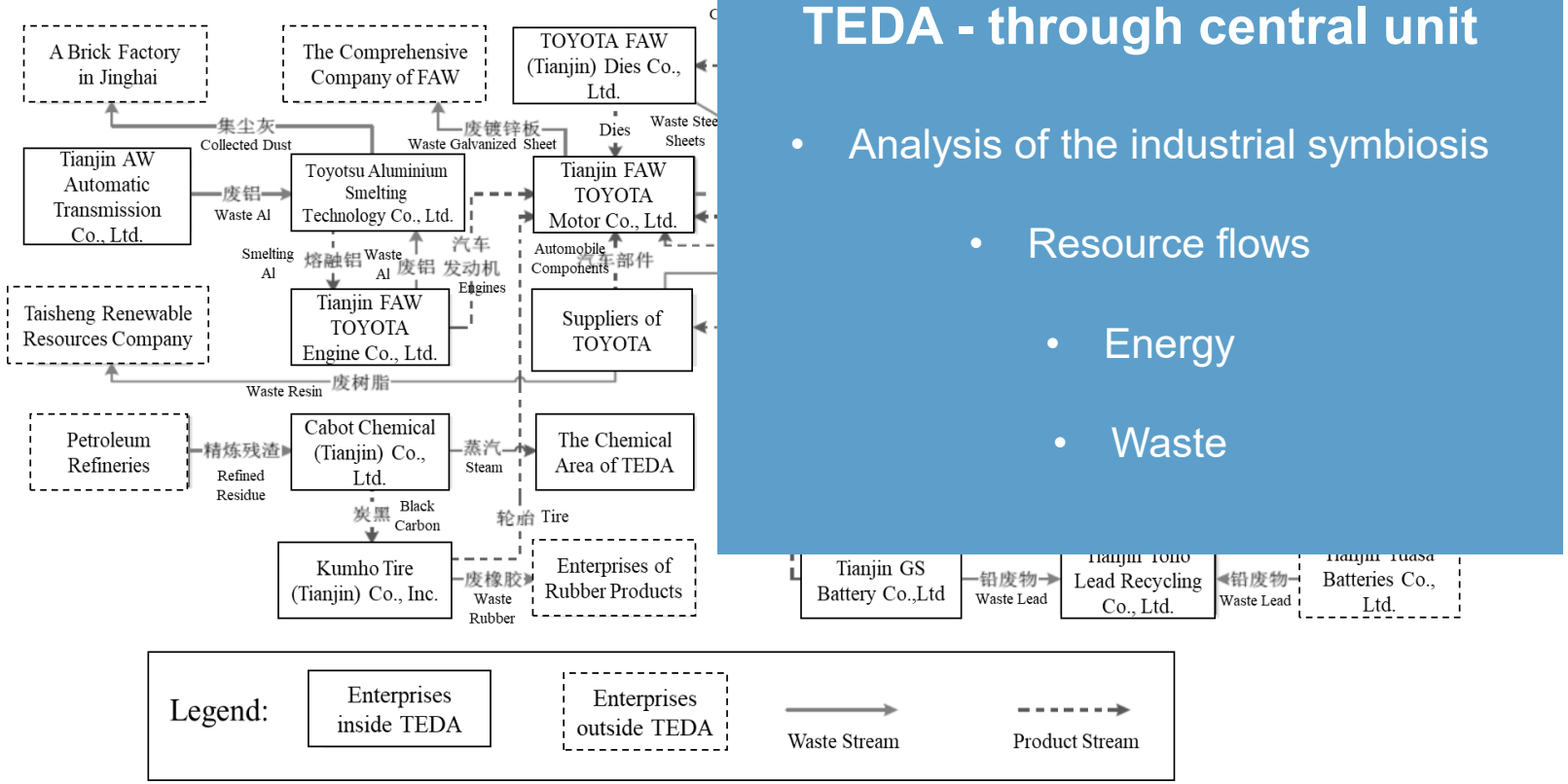
Innovative:

- Resource recycling projects for metals and industrial waste
- Research on CCUS
- Energy: electrification, photovoltaics, onshore wind power and geothermal energy

Source: Tianjin Economic-Technological Development Area (teda.gov.cn)

Tianjin Industrial Park, China
Industrial symbiosis in the industrial park and the region (2015)



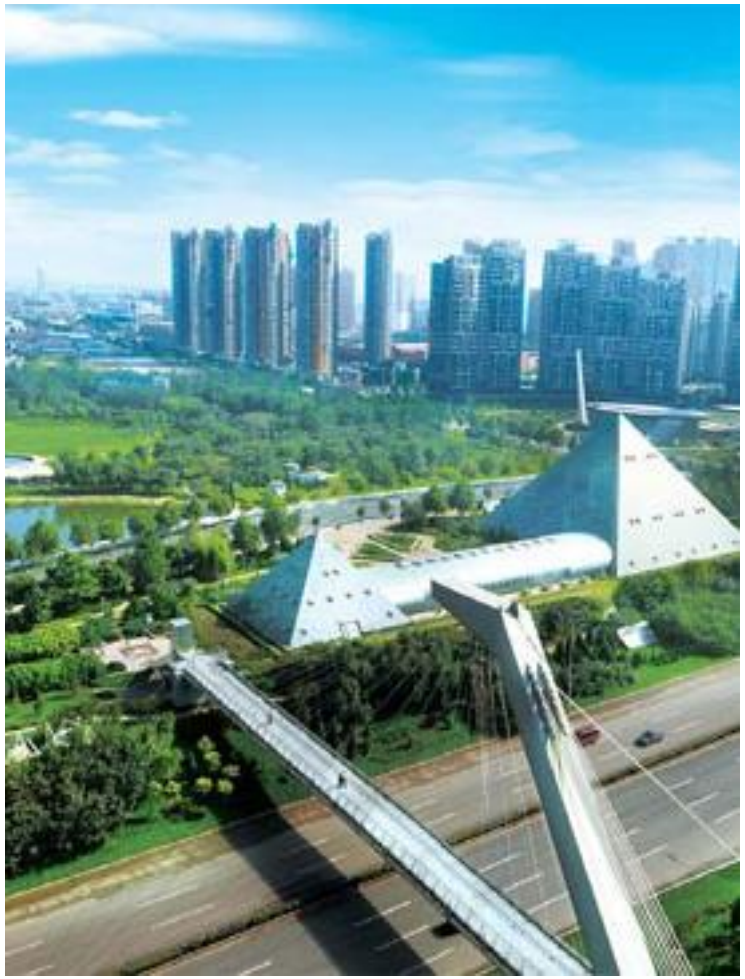


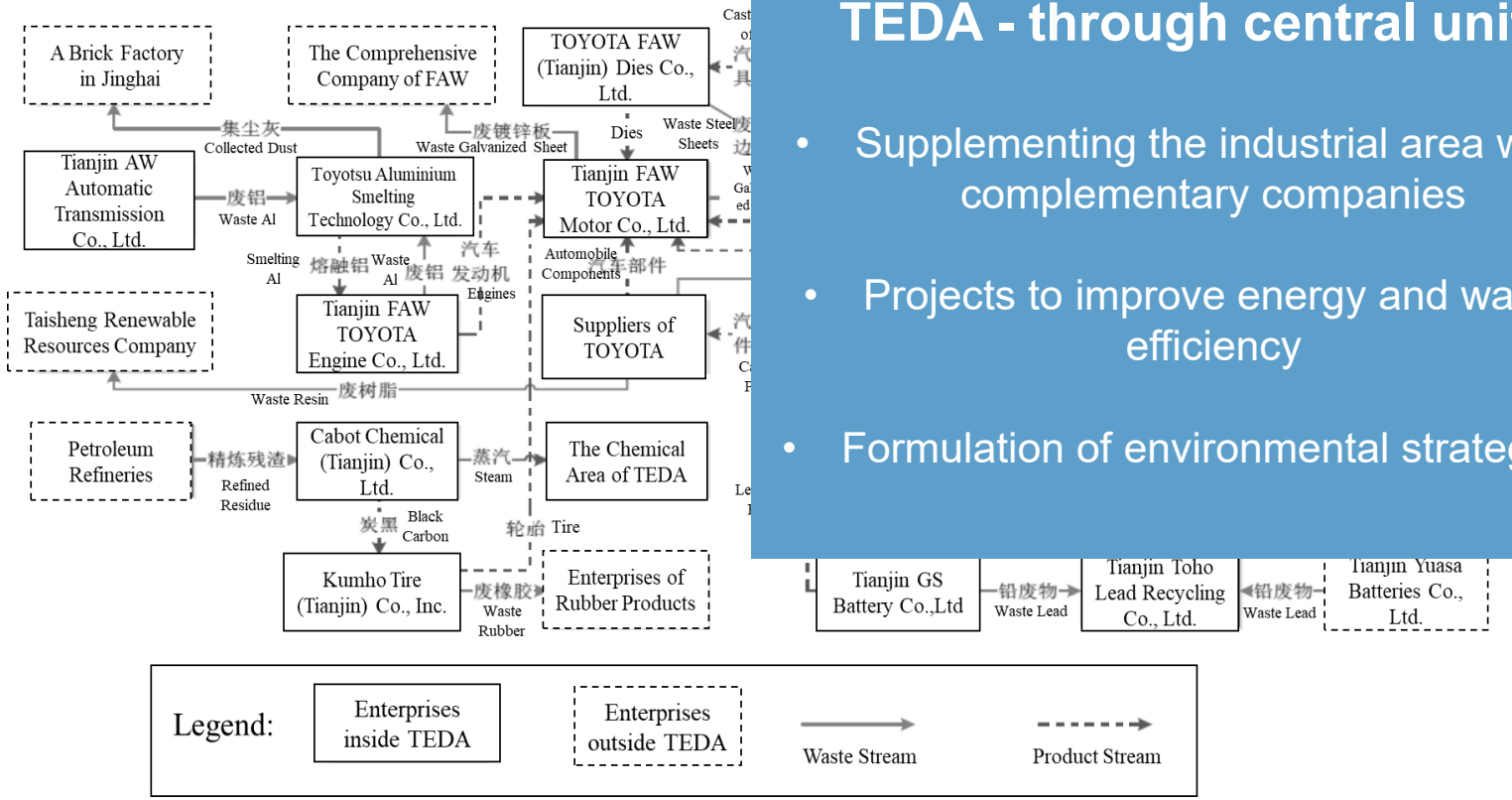
TEDA - through central unit

- Analysis of the industrial symbiosis
- Resource flows
- Energy
- Waste

Tianjin Industrial Park, China
Industrial symbiosis in the industrial park and the region (2015)

provadis Hochschule





TEDA - through central unit

- Supplementing the industrial area with complementary companies
- Projects to improve energy and water efficiency
- Formulation of environmental strategies

STUDENTS BY PROVADIS
THINKING INDUSTRY NEW

7. Collaboration and innovation

1. SEZ are platforms for the future: Industrial zones can use existing infrastructures as innovation hubs to attract new business and scale up innovative technologies.

2. They must actively build and manage topic-specific innovation ecosystems - and also work together with players from other sectors.

3. The respective approach to managing the innovation ecosystem is context-specific (objectives, content: financing, governance):

   Höchst: Focus on jointly analyzing transformation paths, funding programs and public advocacy

   Geleen: Open Innovation in the field of "Circular Plastics" - Investment in innovation infrastructures

   Tianjin: centrally managed further development of the innovation ecosystem (complementary industries and companies, environmental strategies)

4. Commonality: Innovative ecosystems focus on (regional) integration in order to strengthen themselves in the global competition between production locations.

Agenda

1. Introduction
2. Status Quo and Perspectives of Industry in Peru
3. Role of Sustainable Industrial Zones in Sustainable development
4. Success factors of Sustainable Industrial Zones
5. Conclusion

Conclusion

- Sustainable Industrial Zones represent a **practical pathway** for Peru to align industrial competitiveness with sustainability.
- By adopting international best practices—particularly in governance, collaboration, and innovation —Peru can build a **new generation of industrial infrastructure** that supports both economic growth and environmental protection
- The recommended actions are clear: establish a national SIZ standard and KPI framework (or use the one from Worldbank); select pilot zones; install professional management, launch performance-linked incentives; develop a transparent monitoring and reporting platform.
- With **coordinated leadership and partnership across sectors**, Peru can become a regional model for sustainable industrialization.

Why work with the Center for Industry and Sustainability?

Benefit

- Consulting and industry know-how: 15+ years of experience in national and international industrial park management projects
- Located at one of the largest industrial parks in Europe and close cooperation with the decision-makers at the industrial park
- Didactic know-how: 15+ years of experience in the development of continuing education and study programs
- Network management experts: 15+ years of experience in managing transnational multi-stakeholder networks
- Professionalism: Affiliation with one of Germany's leading training providers for the chemical industry with expertise in e-technology solutions, vocational training, further education and accredited degree programs.

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