ASEM SMEs Eco-Innovation Center

EGM on Green Economy for Sustainable Development Goals
National Implementation of Low Carbon Development
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Collaborative approaches to Green Economy of Industrial Sector: Eco-Industrial Park case

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Industrial Locations

- Industrial locations refer to spaces where industrial activities are performed

- Planned Locations : Industrial locations developed by governments, public organizations or private enterprises in accordance with plans by selecting the locations with excellent conditions for the purpose of establishing and promoting a cluster factories

- Unplanned Locations - Industrial locations which are located at the areas other than industrial complexes and purchased and individually approved as factory sites according to individual enterprises' needs and intentions including business conditions, geographical factors and land prices

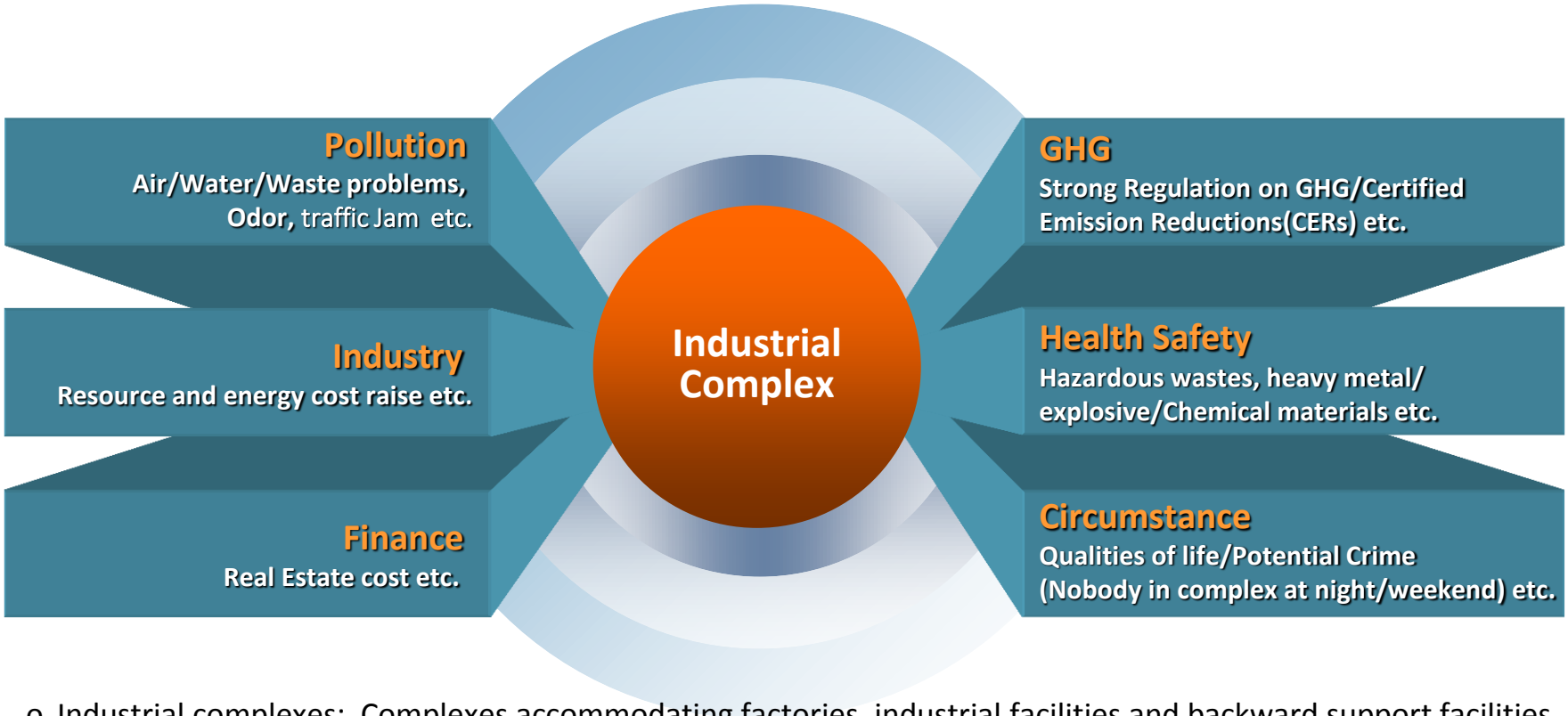
- Purposes of Industrial Park Development

Systematic operation of the national land development programs including the industrial park development program

1) Regional development (UK) – developed countries
2) Industrialization (S. Korea) – successfully achieved industrialization in a short time through industrial park development – developing countries

(Source: Korea Industrial Complex Corporation (KICOX))

Problems of Industrial Complex



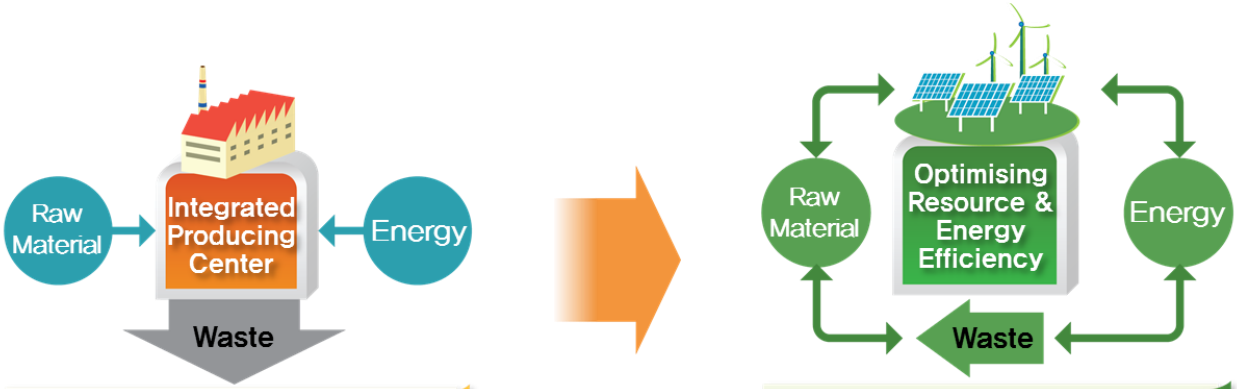
o Industrial complexes: Complexes accommodating factories, industrial facilities and backward support facilities (such as residential and healthcare facilities)

Source: Dr. Dukgyu Han / KICOX

Circular Economy and Korean Eco-Industrial Park Initiatives

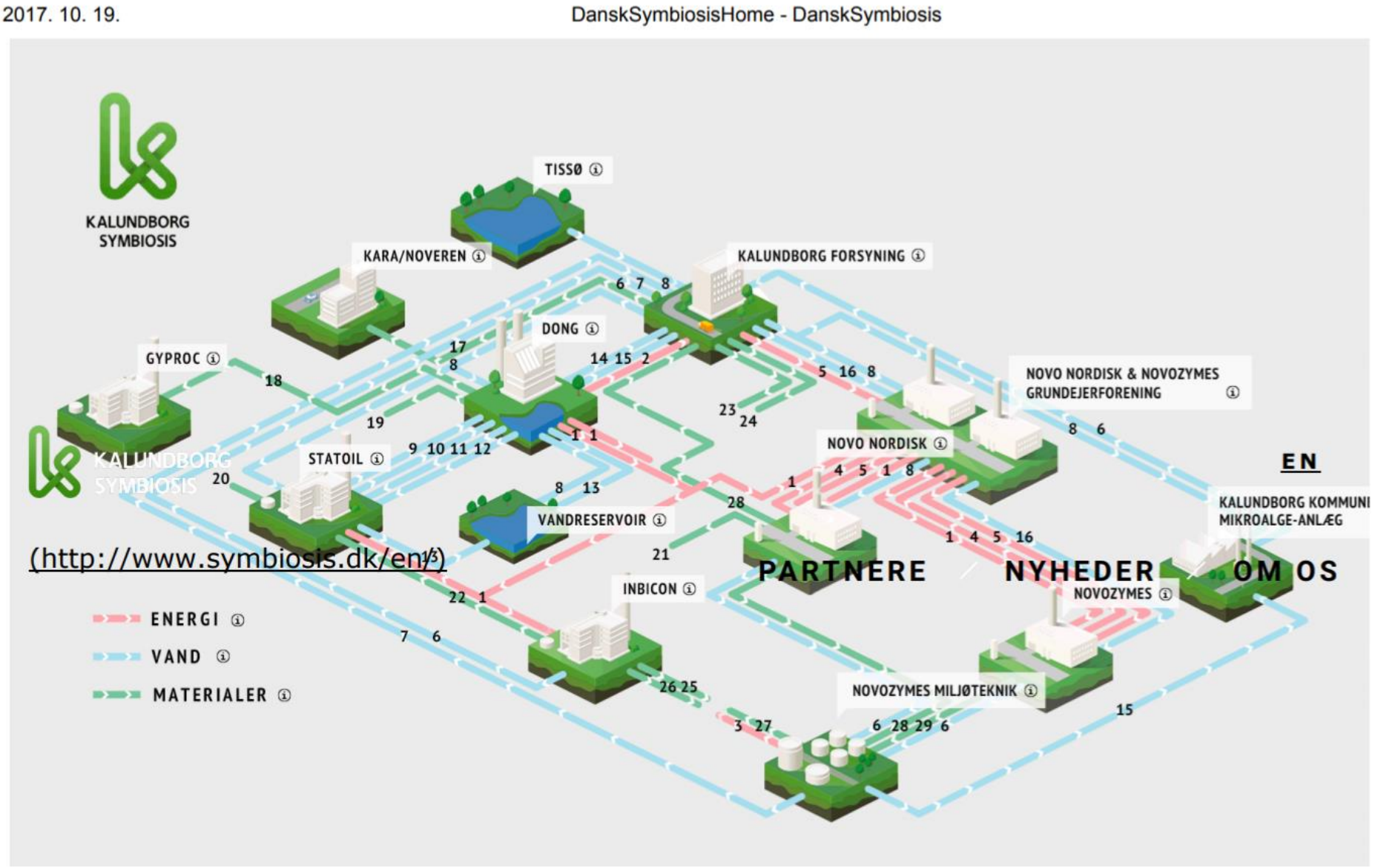
EIPs?

Environment friendly industrial parks whose mission is
to maximize resource efficiency and to minimize environmental concern
by utilizing by-products from A company for resources/energy to B company



Conventional industrial parks	Criteria	Eco industrial parks
Economic benefit		Economic & Environmental consideration
Focused on raw material, products	Network	products, & by–products, waste heat
Disposed by individual or groups	Waste disposal	Reuse and recycle
Large quantity	Waste generation	Minimal/zero quantity
Causes pollution	Social image	Eco–friendly industry
Environmental conflict	Community	Community friendly

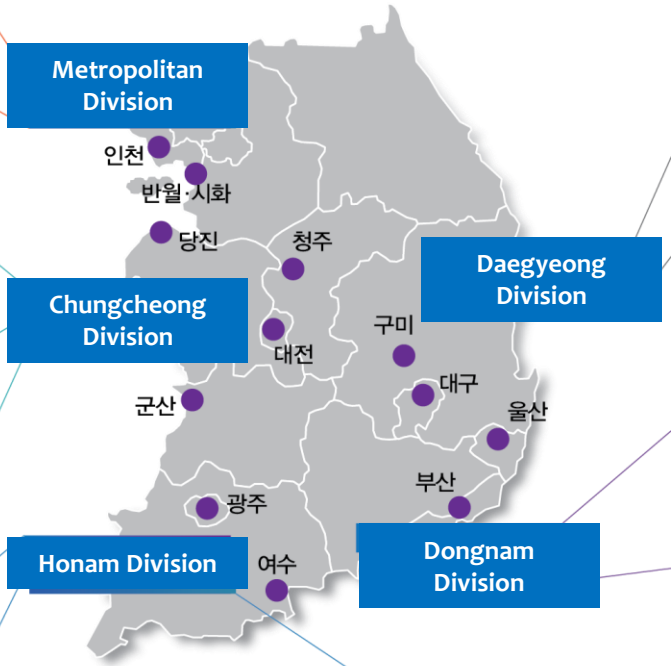
(EIP case) - Denmark Kalundborg

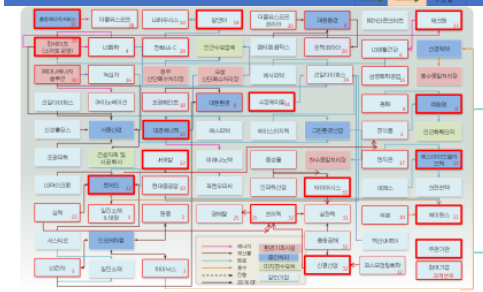


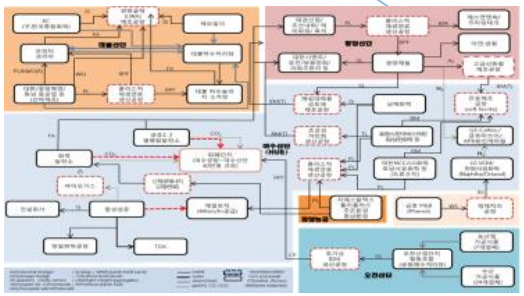
(EIP case) Korea EIP - Industrial Symbiosis maps

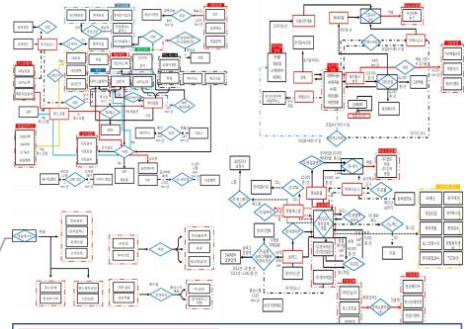
EIP project

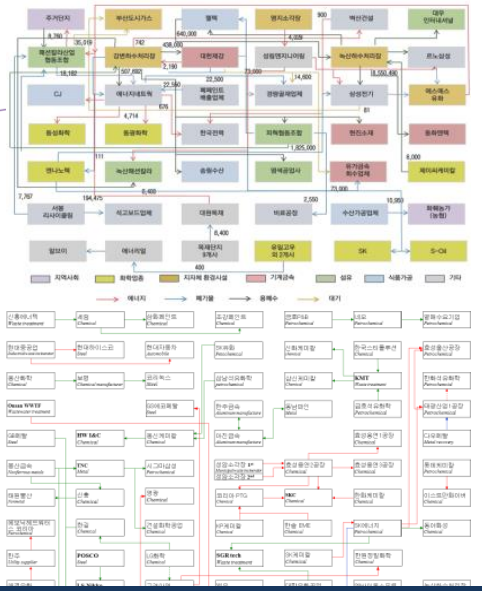
3rd Phase 12 EIP centers (5 Divisions), 105 EIPs











(EIP case) Korea EIP – Outcomes (as of 2016)

For 11 years, 1,831 companies participated,
66.2% (235) among 355 feasibility studies supported by EIP program went **into businesses**

Economic effects	**Cost cut from Raw Material Purchase & Waste Treatment** Added Revenue from New Product Sales	**Cost cut** KWR 943 billion Revenue KRW 1,479 billion Sum KRW 2,423 billion
Environmental effects	Energy Saving (reduction of energy consumption) **Reduction of Greenhouse Gas** Reduction of Waste Discharge Reduction of waster consumption (Water saving) Reduction of SOx, Nox emission	Energy 1.73 million toe **CO_2** 8.54 million ton By-product 6.85 million ton **Water** 11.09 million ton Air 1.24 million ton
Social effects	Promotion of new investment to recycle facility **Job Creation**	**Investment** KRW 761.3 billion **Job Creation** 992 persons

*KRW 1 billion ≒ USD 0.92 million
USD 1 million ≒ KRW 1.08 billion
(March-02- 2018)

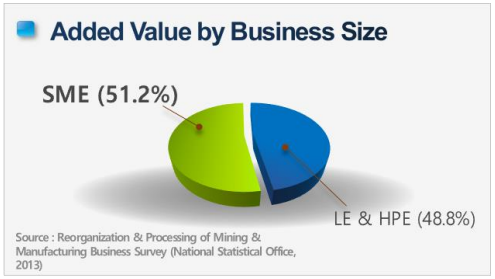
Small and Medium-sized Enterprises (SMEs)

- SMEs (Source: Improving Energy Efficiency in Industrial Energy Systems)

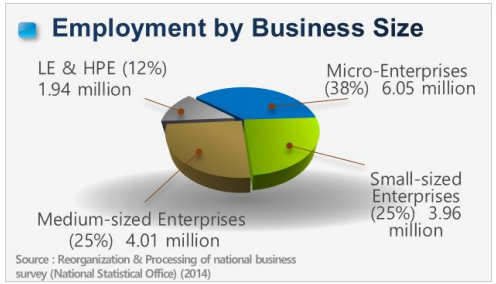
- "Industrial SMEs represent more than 99% of the total aggregated number of companies in most countries.
- (EC 2007) In the EU-25, some 23 million SMEs provide around 75 million jobs.
- (European Commission 2011) SMEs provide two out of three of the private sector jobs and contribute to more than half of the total value-added created by businesses in the EU. Nine out of ten SMEs are actually micro enterprises with less than ten employees."

- Status of Korean SMEs (Source: Korean Ministry of SMEs and Startups)

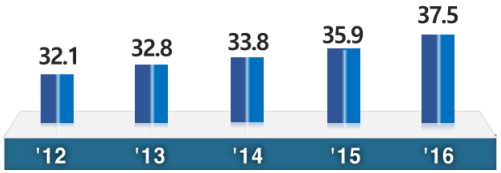
No. of Enterprises : 99.9%



Employment : 87.9%



Export : 37.5%



SMEs and Energy/Resource Efficiency

- Some Challenges

- A lack of knowledge and information about new and modern technologies and measures in the field
- A little investment capital for research and development as well as buying new technologies.
- Limitations on Economies of Scale in resource circulation and industrial symbiosis

- Energy efficiency measures for SMEs (Source: Improving Energy Efficiency in Industrial Energy Systems)

- dominantly support processes for non-energy intensive industries

Measures related to Support processes	**Heavily capital-intensive production processes**
The processes needed to support the production processes but not directly needed for production Soderstrom(1996) defined (11 production processes) decomposition, mixing, cutting, joining, coating, forming, heating, melting, drying/concentration, cooling/freezing, and packing -Implemented at an operational level -Such as ventilation, space heating, lighting	The processes needed to produce products (7 support processes) lighting, compressed air, ventilation, pumping, space heating and cooling, hot tap water, and internal transport More closely concern Strategic activities

<Practice 1> Energy Efficiency for Surface Processing Industry

- Eco-Industrial Park project (Korea)

Background

Social problem

- ○ recognized as 3D and environmentally harmful industry
- ○ Poor Working environment

Environmental problem

- ○ Poor countermeasures for enforcing environmental regulation
- ○ Aging of processing facilities

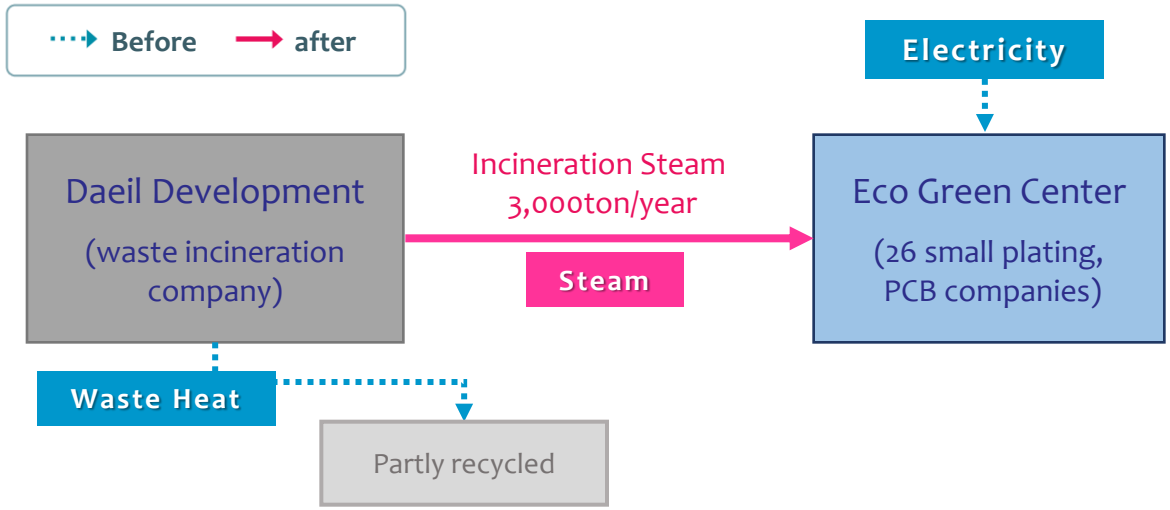
Economic problem

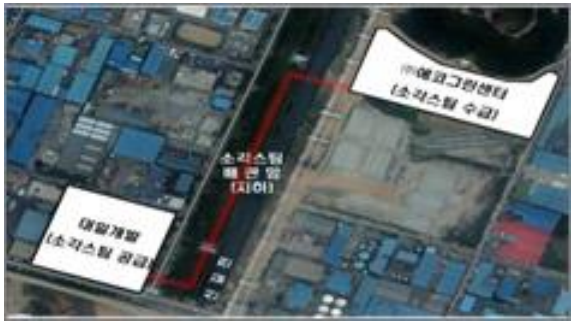
- ○ Rising costs for raw materials and energy
- ○ Increase in environmental processing cos

- 17 plating clusters in Ansan/Siheng Smarthub parks (222 enterprises In 2010), Electric energy efficiency is low (37%)
- Reduction of production cost and enhancement of company competitiveness by co-operation of environmental treatment facilities based on resource conversion through collecting of plating and PCB industry, utilization of alternative energy of electric power, establishment of fire prevention and clean process production

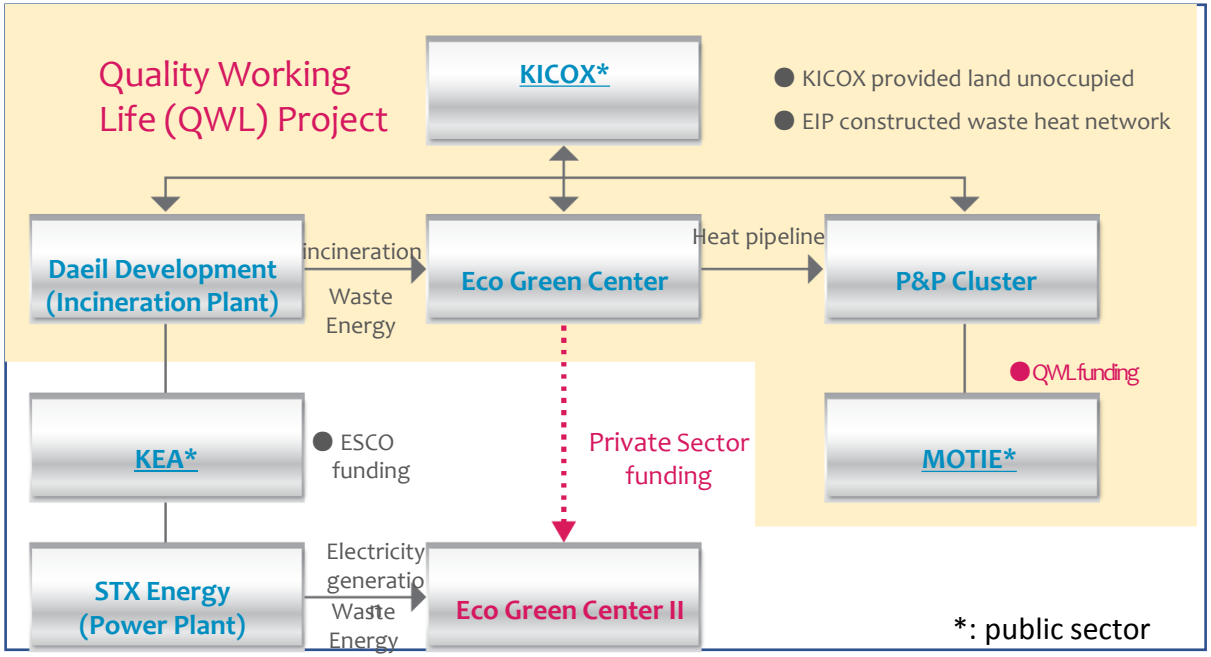
Source: Dr. Dukgyu Han / KICOX

<Practice 1> Energy efficiency Surface Processing Industry (continued)





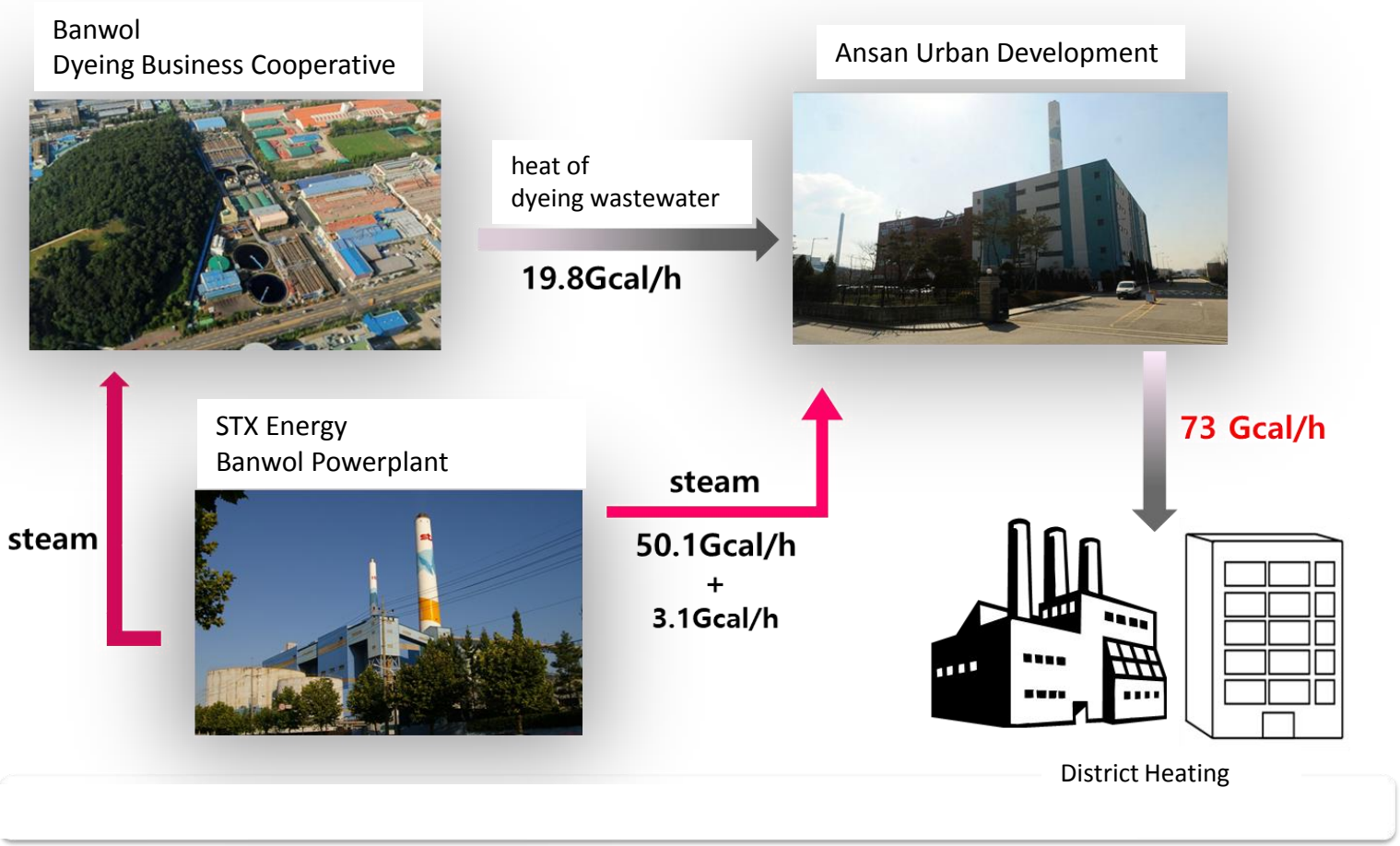
Integrated wastewater treatment plant newly being operated



Source: Dr. Dukgyu Han / KICOX

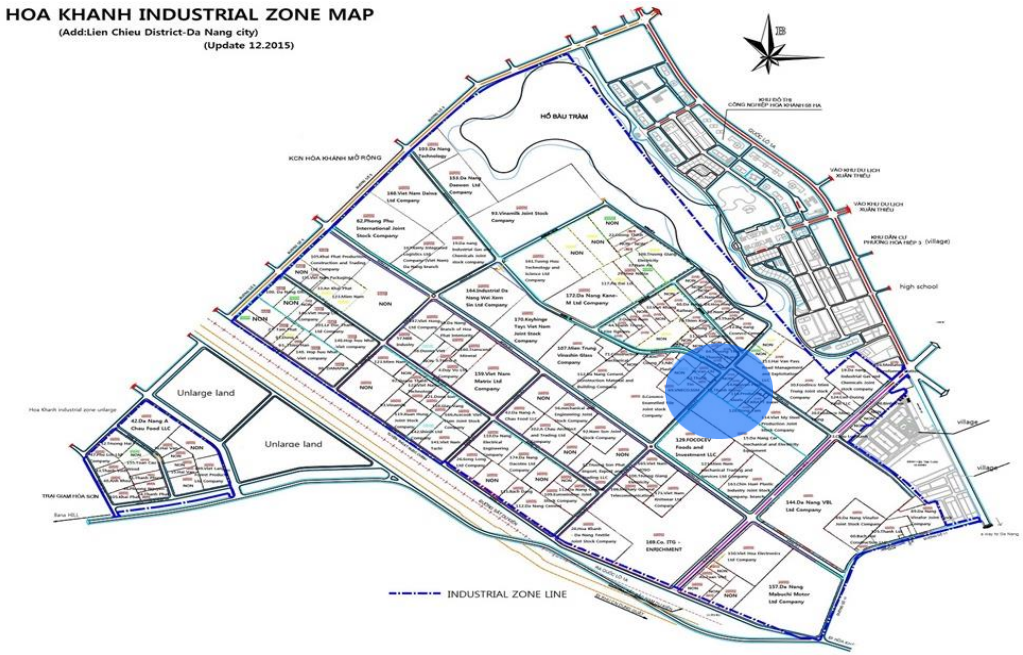
<Practice 2> Utilizing Waste Heat of Dyeing Industry

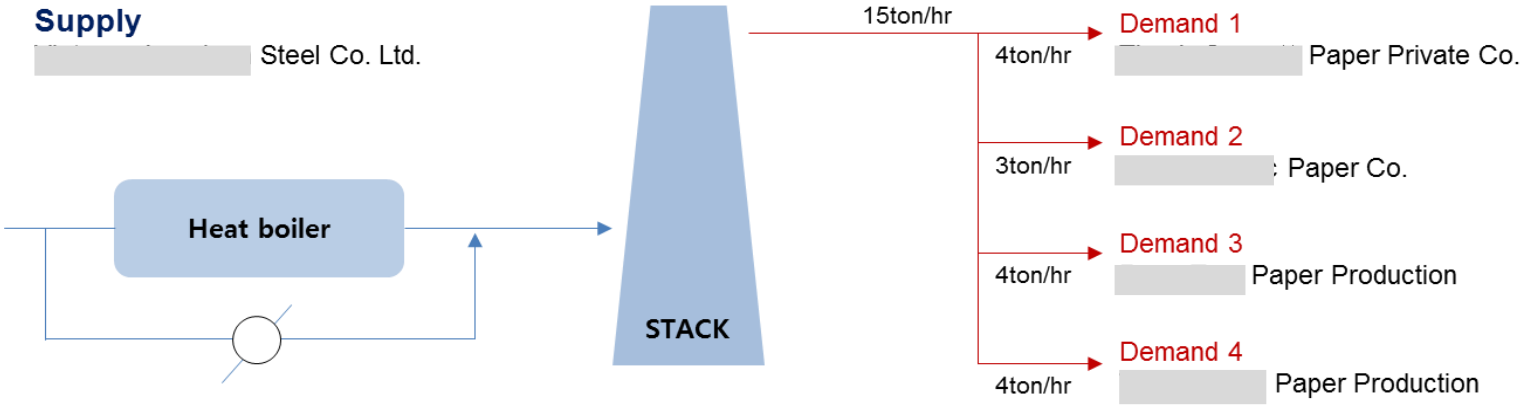
- Eco-Industrial Park project (Korea)



Source: Dr. Dukgyu Han / KICOX

Identified Potential Case : Steel company to neighboring paper companies (Vietnam)





Implications

- Economies of Scale
- Facilitator
- Creating Success stories and dissemination
- Government and International Societies' support

Thank You for Your Attention.

Mi Hoon JEONG

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<Annex> Planned Locations vs. Unplanned Locations

Items	Planned Locations	Unplanned Locations
Strength	▫ Diverse tax and financial support ▫ Easing of regulations on building area ratios and floor area ratios ▫ Favorable SOC conditions including industrial infrastructure	▫ Acquisition of lands at lower prices ▫ Timely selection of locations at right places ▫ Easier disposition and expansion of factory sites
Weakness	▫ Difficulties in timely acquisition of lands at right places ▫ Higher prices compared to unplanned locations ▫ Restrictions of types of businesses of resident enterprises	▫ Complicated approval and permission procedures related to factory establishment ▫ Lack of diverse incentives including tax support ▫ Lack of support facilities like SOC, educational and cultural facilities
Opportunities	▫ Minimization of environmental problems (clustering of factories) ▫ Synergy effects like promotion of clusters ▫ Job creation and ripple effects (combined complexes)	▫ Easing of regulations on corporations ▫ Reinforcement of local governments' support measures ▫ Easing of regulations on locations
Threat	▫ Oversupply amid easing of regulations ▫ Increase of financial costs for long-term residency ▫ Lack of flexibility due to fixed locations	▫ Instability in real estate markets (fluctuations in land prices) ▫ Increase of civil complaints about factory establishment

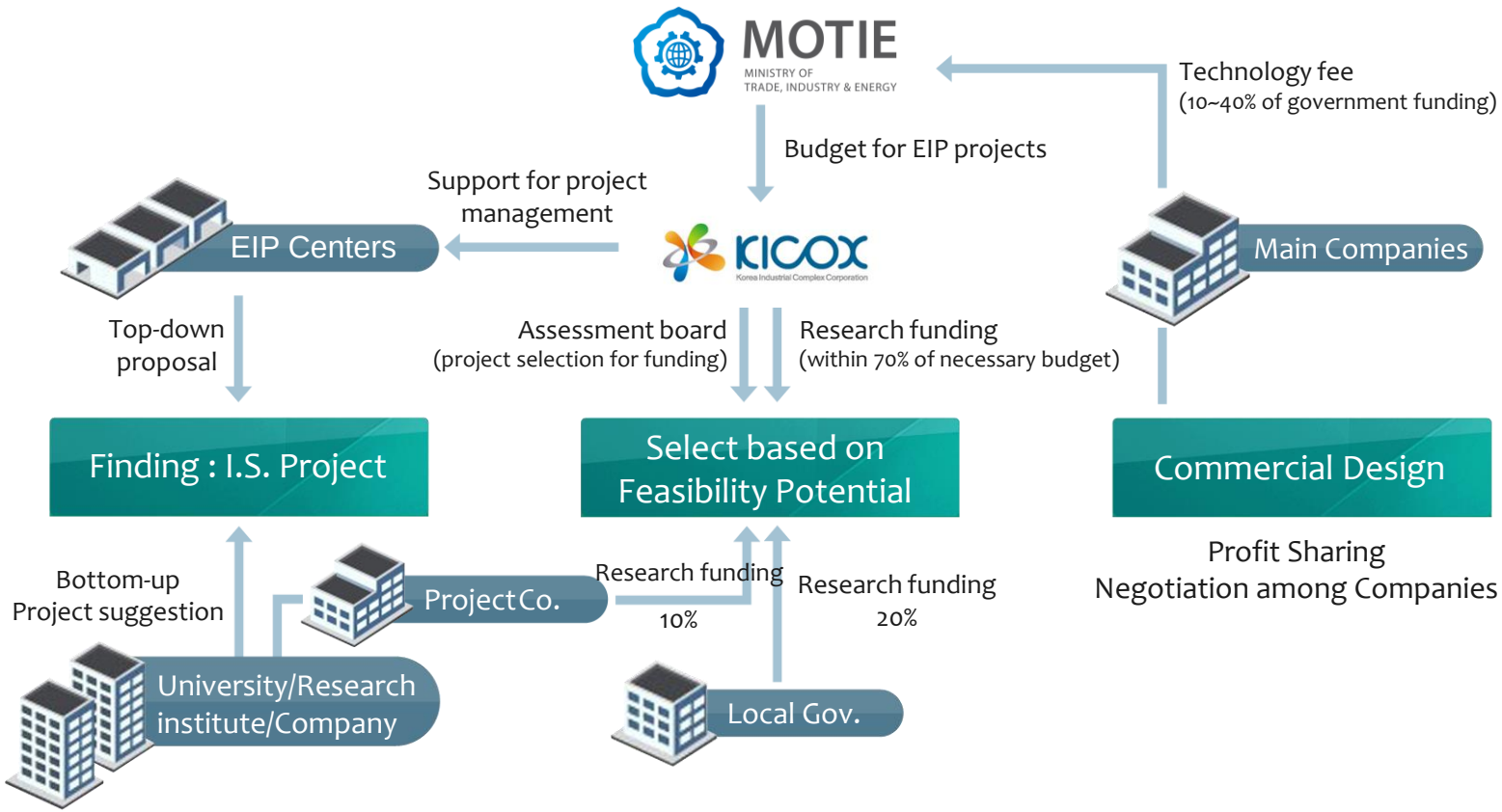
(Source: Korea Industrial Complex Corporation)

<Annex> EIP project contributors(participants) in Korea

Funding Source

Central Gov.(70%) & Local Gov.(20% : matching), Private Co.(10% : technology fee)

Stakeholders



<Annex> International Efforts of Eco-Industrial Park & Industrial Symbiosis

- **Basic EIP** (Korea EIP project)

  R&D based industrial symbiosis focusing on energy, water, by-products circulation in/for industrial parks

  - Economic effects (cost cut, revenue increase), Waste/wastewater reduction, GHG reduction, Job creation and related new investment

- **Industrial Symbiosis** in industrial parks and also elsewhere (urban, orchard..)

  - Industrial symbiosis not only limited to energy, water, material resources issues
  - Industrial symbiosis not only limited to for industrial parks
  - Eco-Industrial Park and Urban symbiosis

- **Sustainable Industrial Zone**

  - The basic EIP component and also other sustainable issues in Industrial Parks
  - ex) guidelines, industrial competitiveness, renewable energy, energy efficiency, waste management, water management, smart factories, other targeted issues

<Annex> Data survey for Industrial Zone level Comprehensive Assessment

<Examples of necessary data for data survey>

① Zone layout, zone's industrial overview
② Energy, water, resource supply system
③ Wastewater and solid waste treatment system
④ Individual companies' information
- production, resource consumption, discharge

<Some Criteria for selecting target companies>

① High energy/water/resource consumption
② Association of similar industries
③ Facilities affecting the zone level such as waste collecting and treatment, wastewater treatment system, power plant and incineration Plant

< data survey form >

Basic Information				
Company name	Address			
Contact person	Contact number	Industry	Main product	Number of Employee

Raw material				
Name	Amount	Unit	Price	Use

Product				
Name	Amount	Unit	Price	Use
Electricity				
Steam				
Hot water				

Energy Use				
Type	Amount	Unit	Price	Use
Coal				
Oil				
Gas				
Electricity				
Others				

Waste					
Name	Amount (ton/year)	Component	Self-disposal (ton/year)	Consignment Processing (ton/year)	Disposal Cost (VND)

Wastewater			
Water consumption (m^3/day)	Wastewater Discharge (m^3/day)	Component	Sludge Amount (m^3/year)