



Industrial symbiosis concept, its benefits and advantages

Serhii Plashykhin

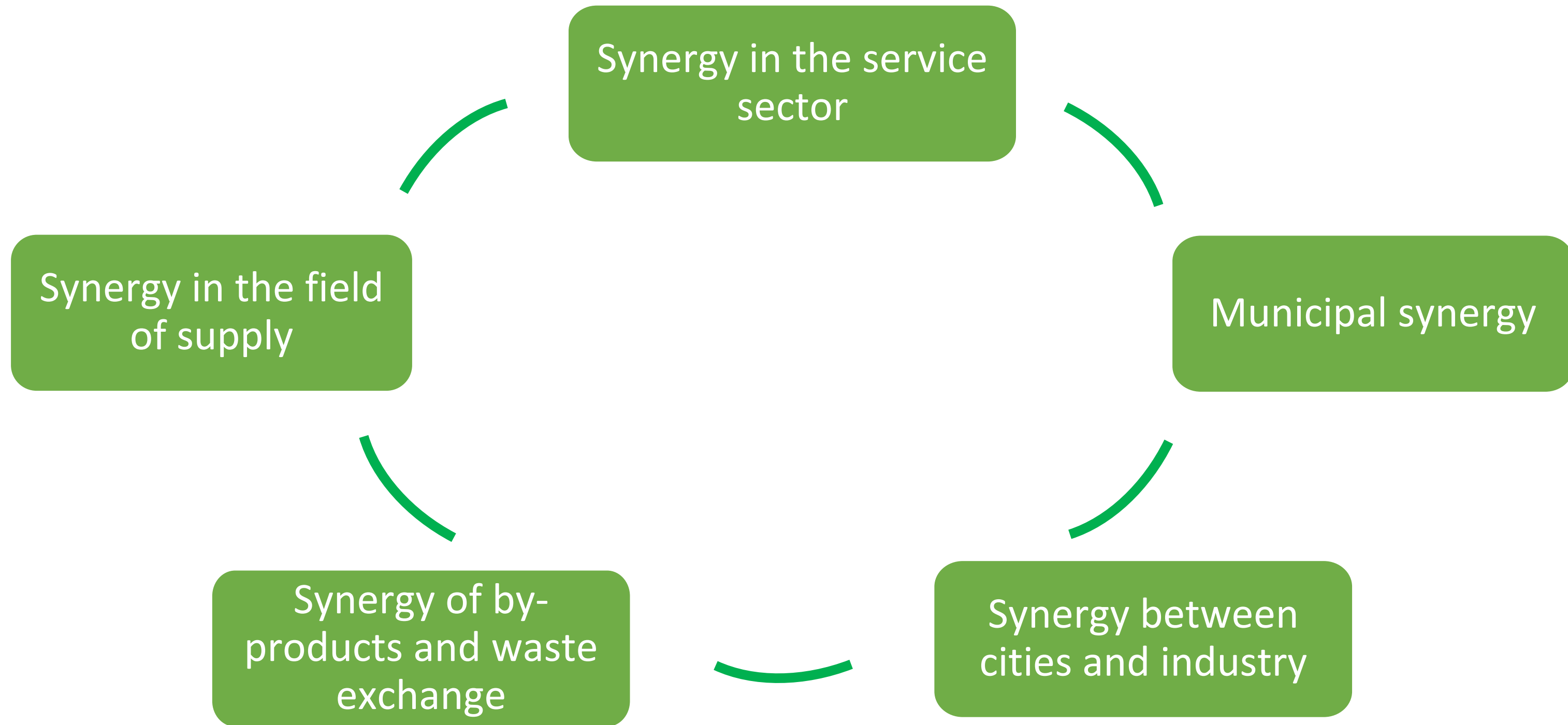


What is industrial symbiosis?





Types of industrial synergy





Synergy of by-products and waste exchange

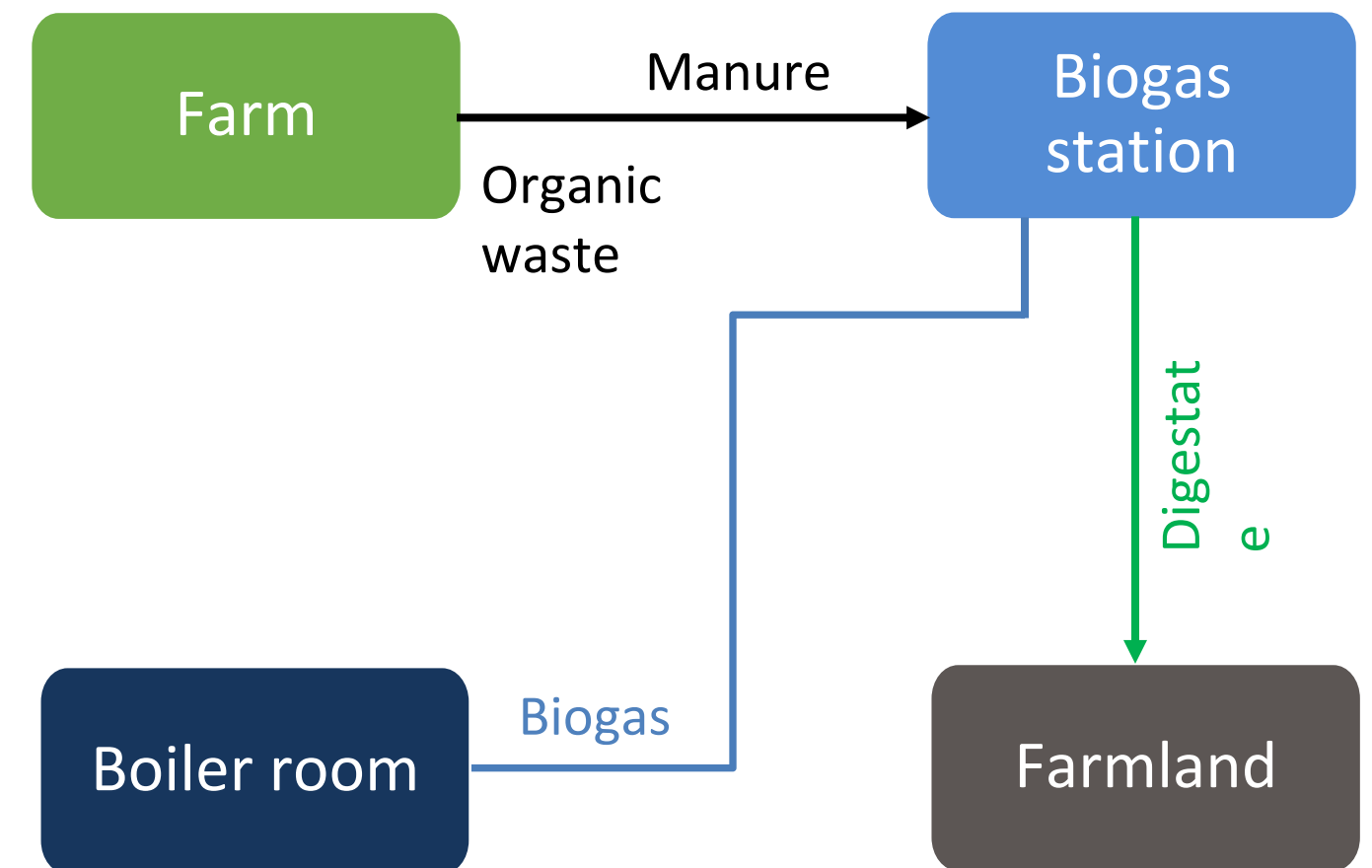
This is the most common form of industrial symbiosis, where the by-products or waste products of one enterprise become valuable raw materials for another.

Examples:

Sugar and alcohol industry. Molasses, a by-product of sugar production, can be used as raw material for bioethanol production, animal feed or yeast.

Forestry and pulp and paper industry. Wood waste (sawdust, bark, wood chips) can be processed into biofuel (pellets), fertilizers or components for the furniture industry. Wastewater and lignin from pulp and paper production can be used to generate biogas or to produce chemicals.

Agriculture and biogas plants. Manure and other organic waste from farms are processed in biogas plants. This produces biogas, which can be used as fuel, and digestate, a high-quality organic fertilizer. This allows farmers not only to obtain energy, but also to reduce their expenditure on mineral fertilizers.





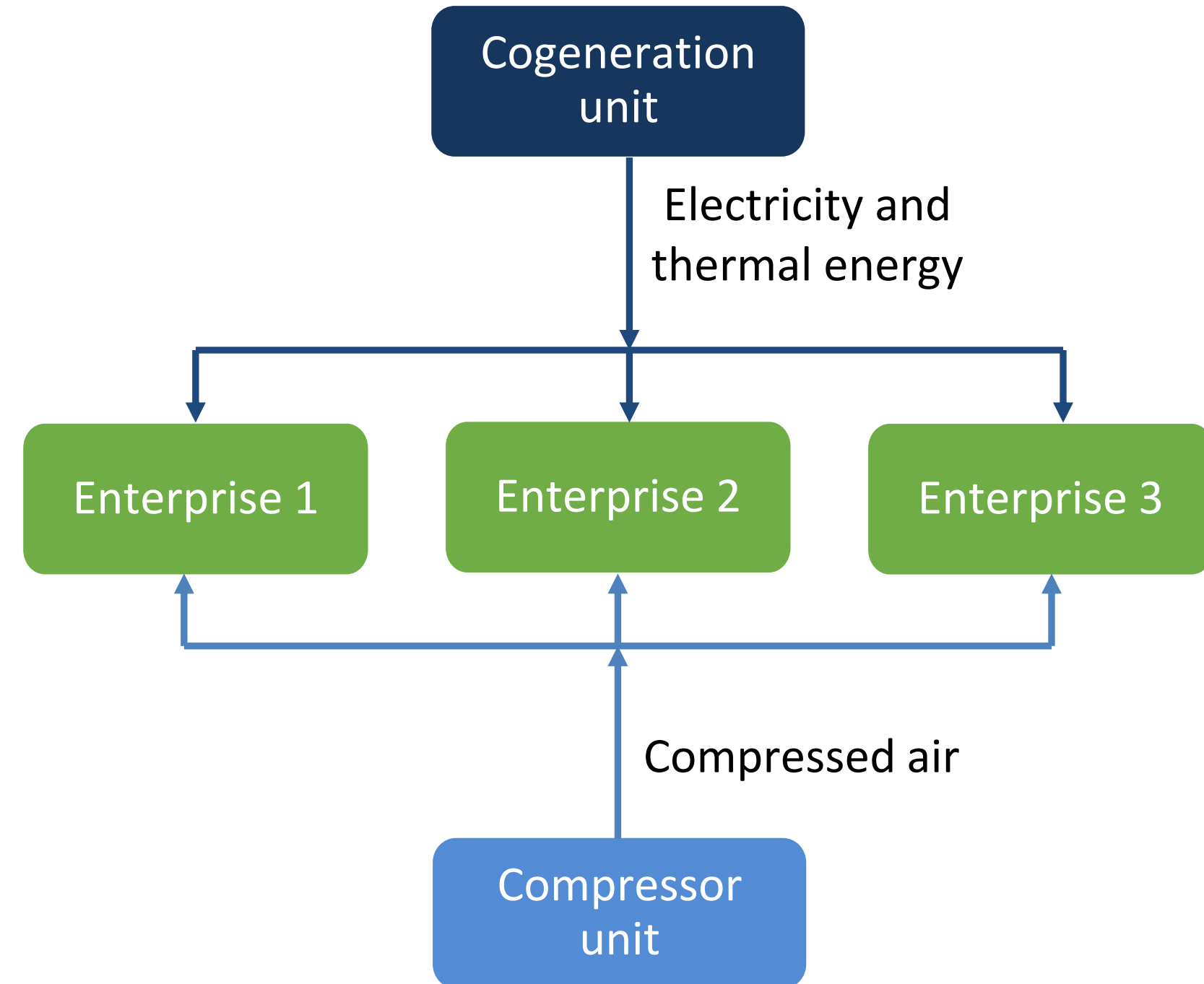
Municipal synergy and shared infrastructure use

This type of cooperation involves the shared use of infrastructure. Such synergy promotes more efficient use of resources and better results than if each party acted separately. This ensures improved service quality, reduced costs and sustainable development.

Examples:

Centralized park management, which organizes security, cleaning and maintenance.

Communal synergy also provides for shared electricity, water supply and wastewater treatment systems. This shared use of resources allows each enterprise to save significant funds that would otherwise have to be spent on building its own infrastructure from scratch.





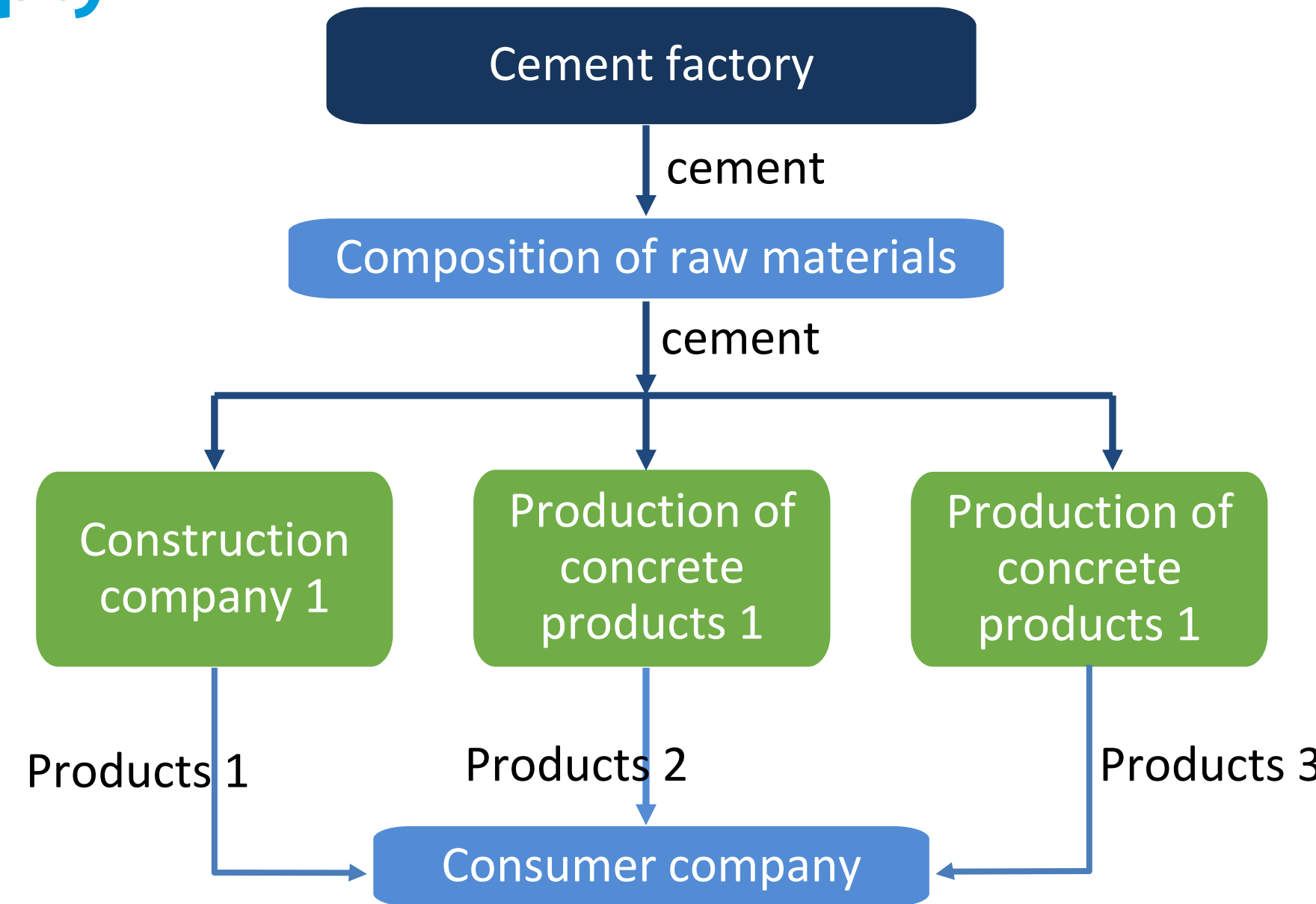
Synergy in the field of supply

When different participants in the supply chain (manufacturers, suppliers, distributors, logistics companies) cooperate and coordinate their actions in such a way that their joint result exceeds the sum of the results of each individually.

Examples:

Shared warehouses and distribution centres. Several companies that are not direct competitors can use a single warehouse to reduce costs for rent, staff and equipment. This is particularly beneficial for small and medium-sized businesses.

Shared transport. Instead of each company sending its cargo in half-empty trucks, they can combine their shipments. This optimizes routes, reduces fuel costs and lowers the carbon footprint.





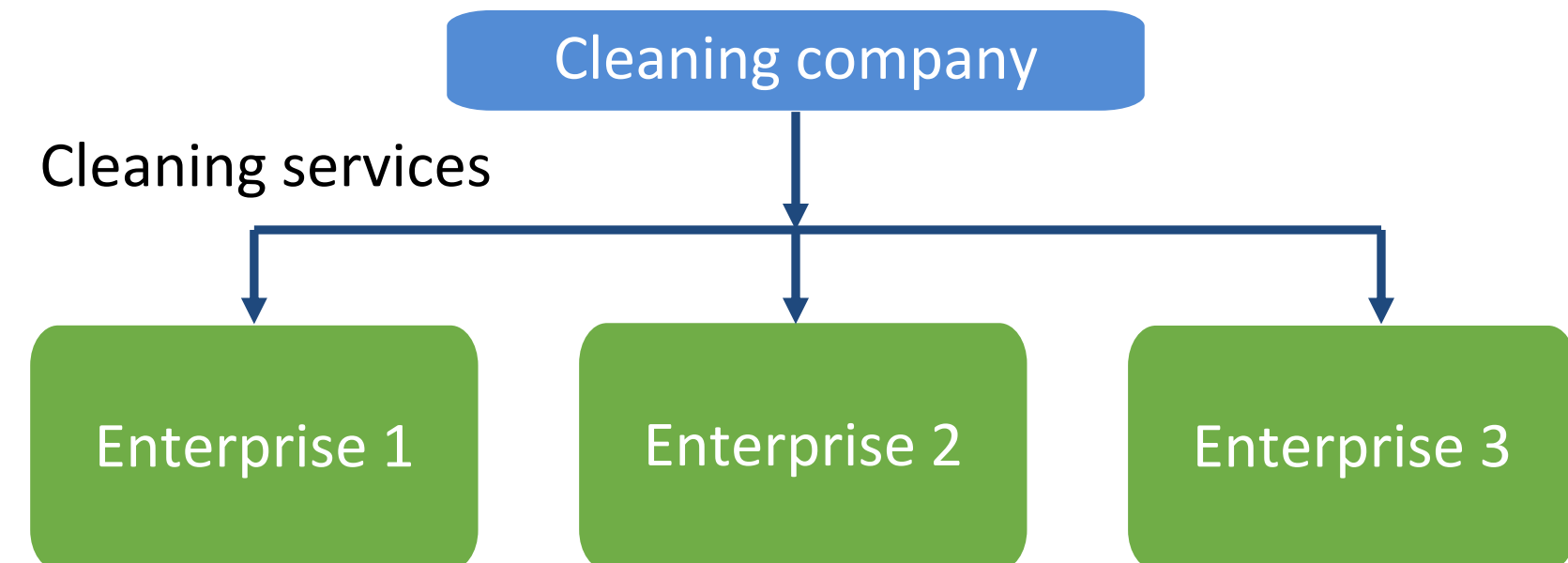
Synergy in the service sector

Shared use of services and joint activities of enterprises in an industrial zone. This allows for a reduction in individual costs, an improvement in service quality, and access to resources that would be unavailable to a single company.

Examples:

Joint staff training. Several companies operating in the same industry can organise training courses together to improve their employees' skills. This enables them to share the costs of highly qualified trainers, as well as facilitating the exchange of experience and best practices between employees of different companies.

Research and development. Creating joint research and development centres enables companies to pool their intellectual resources and invest in developments that would otherwise be too costly for a single company. This approach accelerates innovation and creates competitive advantages for all participants.



Synergy between cities and industry

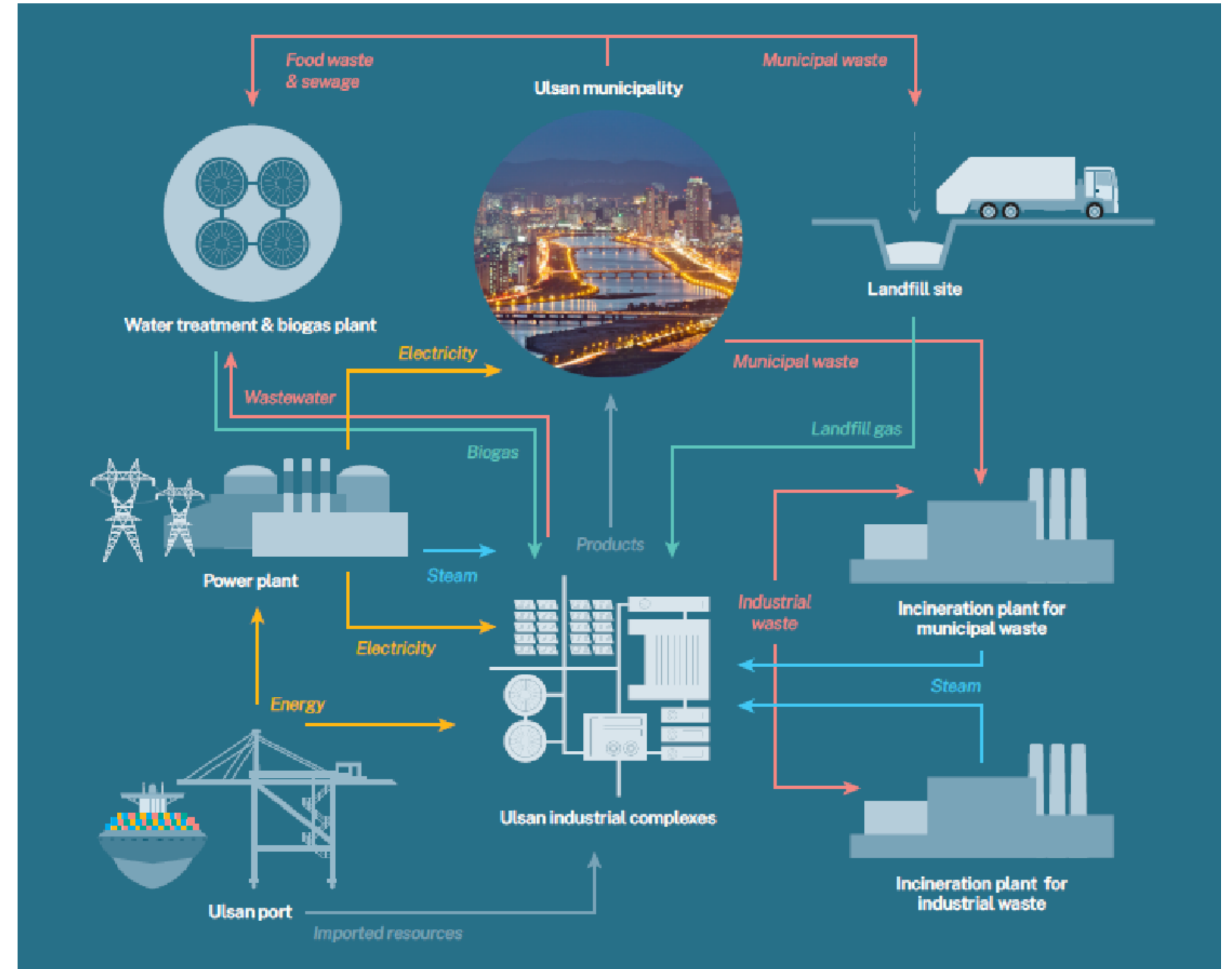
Interconnections and cooperation between businesses and cities/municipalities regarding the collection, processing and reuse of materials, waste, energy and water resources.

Examples:

Waste recycling: Municipalities can supply industrial enterprises with sorted organic waste, such as that from the food industry and households, for use in producing biogas or compost.

Water resources: Treated wastewater generated in cities can be used by industrial enterprises for technical purposes (e.g. cooling equipment) instead of fresh water.

Energy: Excess heat generated by industrial enterprises (e.g. metallurgical plants and power stations) can be used to heat residential buildings and public facilities. This reduces the need for separate boiler rooms and cuts emissions.





Identifying opportunities for synergy

There are various ways to identify and exploit synergistic opportunities.

One method is to collect information about the input and output resource flows of enterprises and search for connections.

- This is the most comprehensive and resource-intensive method.
- Which outgoing resource flows (e.g. effluents, waste/by-products, emissions, waste heat) from some companies could be used as input resources by others?

Bilateral dialogue with park managers and residents

- If you explain the concept of industrial synergy to company representatives, they will often come up with several promising ideas themselves.
- Park managers and infrastructure operators can often suggest good synergy opportunities in utilities, supply, and services.

Analysis of international experience

- Industrial synergy is developing in many parks around the world.
- Taking into account the types of industry represented in the park, opportunities can be proposed based on foreign models.

Seminars are held to identify synergy opportunities

- As a rule, representatives of the management and residents are invited to such an event, which lasts about half a day. Participants work in groups to identify and prioritize these opportunities with the help of facilitators.

Use of automated tools

- e.g. the UNIDO tool for identifying industrial symbiosis:
<https://hub.unido.org/sites/default/files/publications/UNIDO%20Industrial%20Symbiosis%20Identification%20Tool%20V2.xlsx>
- and other UNIDO instruments <https://hub.unido.org/eco-industrial-parks-tools>



The advantages and benefits of implementing industrial symbiosis

- 1. Environmental:** Reduced fuel and water consumption, as well as lower emissions into the atmosphere. The exchange system typically converts negative environmental factors, **such as waste, into positive ones, reducing pollution and eliminating the need for raw materials.**
- 2. Economic:** Companies that participate in industrial symbiosis receive significant financial benefits. Firstly, they save on waste disposal costs, as their by-products become raw materials for other companies. Secondly, they reduce the cost of purchasing and transporting materials by obtaining them from neighbouring partners at a lower price. Cooperation of this kind invariably leads to lower production costs.
- 3. Social:** Eco-industrial parks that implement this model create new jobs and improve working conditions. Integrating industrial parks with local communities and creating social infrastructure improves residents' standard of living. Regions become less dependent on external supplies of resources. Environmental awareness is fostered.



11

Serhii Plashykhin
RECP Centre expert

s.plashykhin@recpc.org

Thank you

