

Module 3: The role of local authorities and municipalities in I-US

This project has received funding from the European Union's Horizon Europe program under GA Project 101058426.





Module Overview

This module explores how Industrial-Urban Symbiosis (I-US) can be leveraged by cities and regions to advance sustainability, economic development, and resource efficiency. It explains the environmental, economic, and social benefits for local authorities in I-US and explores the roles that they can take to support it. Case studies in Europe are included.

- [Chapter 3.1: Why I-US Matters for Cities and Regions](#)
- [Chapter 3.2: Roles of Local Authorities in I-US Initiatives](#)
- [Chapter 3.3: I-US examples across Europe – experiences from local authorities and municipalities](#)





SYMSITES

Chapter 3.1: Why I-US Matters for Cities and Regions

This chapter establishes the strategic importance of I-US for local governments, highlighting how it supports urban sustainability, economic growth, and resource efficiency. It covers how I-US fits into local and regional sustainability goals (e.g., climate action plans, circular economy strategies) and its economic advantages, such as job creation and industry competitiveness, as well as economic and social advantages that support urban resilience.

- Target audience: Local Authorities and Municipalities
- Estimated time: 15 minutes
- Includes: Explanations

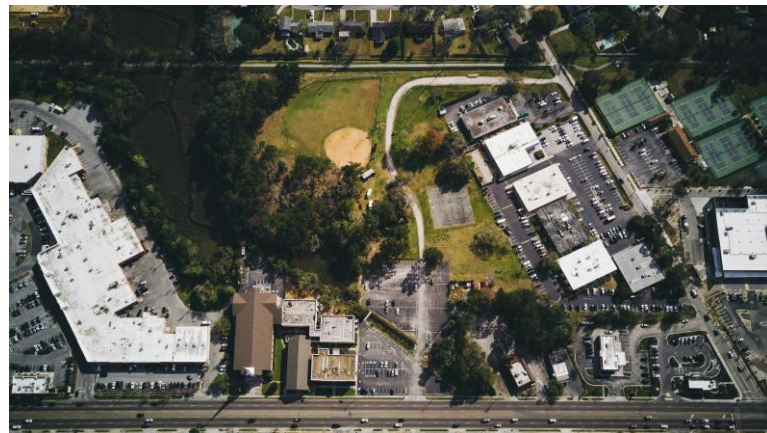




Why I-US matters for cities and regions

Industrial Urban Symbiosis (I-US) is an innovative approach to urban and regional development that leverages resource efficiency, industrial collaboration, and sustainable urban planning to generate environmental, economic, and social benefits. For local and regional authorities, understanding the strategic importance of I-US is essential, as it can directly contribute to the long-term sustainability, competitiveness, and resilience of cities and regions.

I-US represents a systemic approach to improving the sustainability of cities and regions by optimizing the use of resources across industrial, municipal, and urban systems. Rather than viewing waste streams, excess energy, or underutilized infrastructure as isolated issues, I-US enables municipalities to treat them as **valuable resources within a connected urban metabolism**.

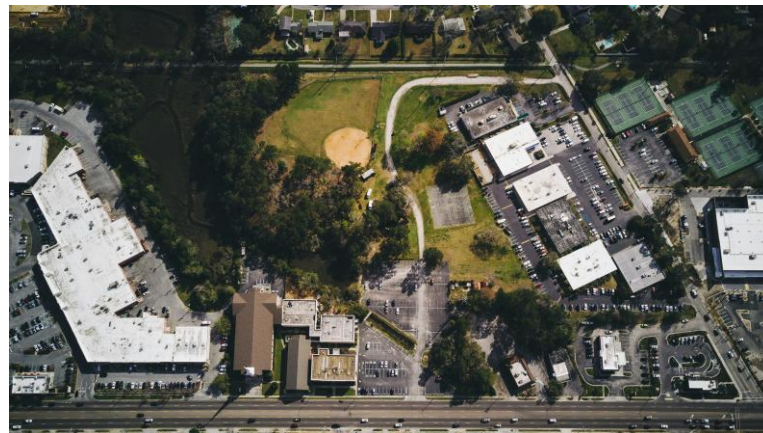




Why I-US matters for cities and regions

At its core, I-US applies the principles of industrial symbiosis and circular economy within urban environments. Industries, municipal infrastructure, utilities, and service providers collaborate to exchange materials, energy, water, and by-products, creating closed or partially closed loops that reduce environmental impacts and increase efficiency.

For local authorities, I-US offers a **practical governance tool** to translate sustainability ambitions into operational projects. While many cities have adopted climate action plans, circular economy strategies, and sustainable urban development frameworks, implementation often remains fragmented across departments (energy, waste, industry, urban planning). I-US can act as an **integrative mechanism**, linking these sectors through concrete resource exchanges and infrastructure planning.



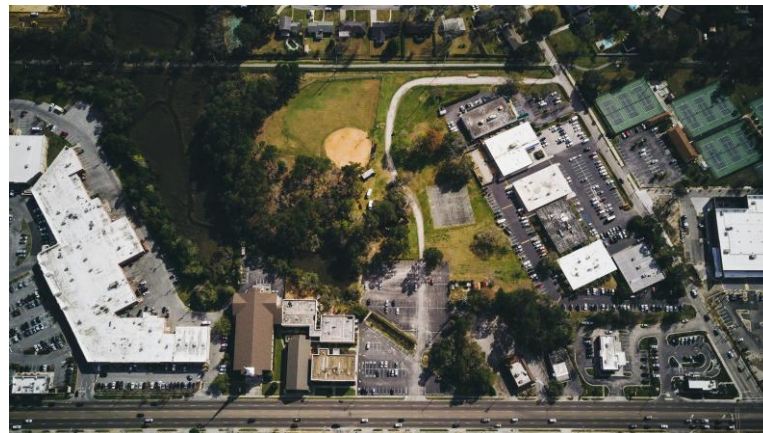


I-US within Urban Sustainability Policy Frameworks

I-US supports several key policy agendas pursued by cities and regions across Europe and globally.

Cities are responsible for a significant share of global greenhouse gas emissions, particularly through energy use, waste management, and industrial activities. I-US contributes directly to climate mitigation through several mechanisms:

- Recovery and use of industrial excess heat in district heating networks.
- Reduction of emissions associated with primary raw material extraction.
- Avoidance of methane emissions from landfilled organic waste.
- Reduced transport emissions through localized resource loops.





I-US within Urban Sustainability Policy Frameworks

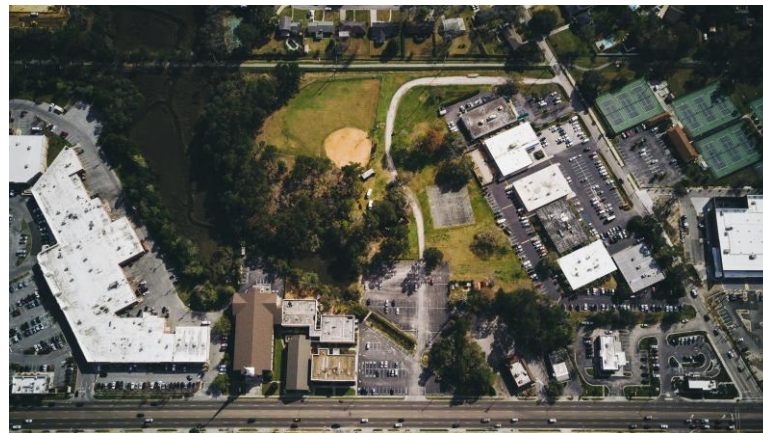
Typical examples include:

- Industrial excess heat used to supply municipal heating networks
- Organic waste converted into biogas for local energy systems
- Industrial CO₂ streams reused in greenhouse agriculture or synthetic fuel production

These approaches allow municipalities to reduce Scope 1 and Scope 2 emissions, while also influencing Scope 3 emissions across supply chains.

Local Climate Action Plans

Many cities develop Local Climate Action Plans (LCAPs) or similar strategies to reduce greenhouse gas emissions and enhance climate resilience. These plans typically include sectoral targets covering energy, transport, buildings, waste management, and industry.

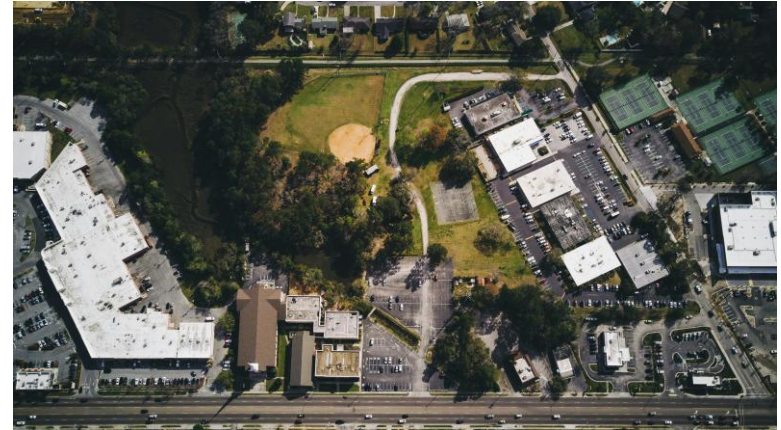




I-US within Urban Sustainability Policy Frameworks

However, implementation often requires cross-sector solutions that integrate multiple urban systems, an area where I-US can play a decisive role.

I-US contributes to climate action plans by **enabling systemic emissions reductions across multiple sectors simultaneously**. For example, excess heat generated by industrial facilities or data centres can be captured and redistributed through district heating networks, reducing reliance on fossil-fuel-based heating systems. Similarly, organic waste from households, food processing industries, and agriculture can be converted into biogas for electricity generation or transport fuel, reducing methane emissions from landfills and displacing fossil fuels.



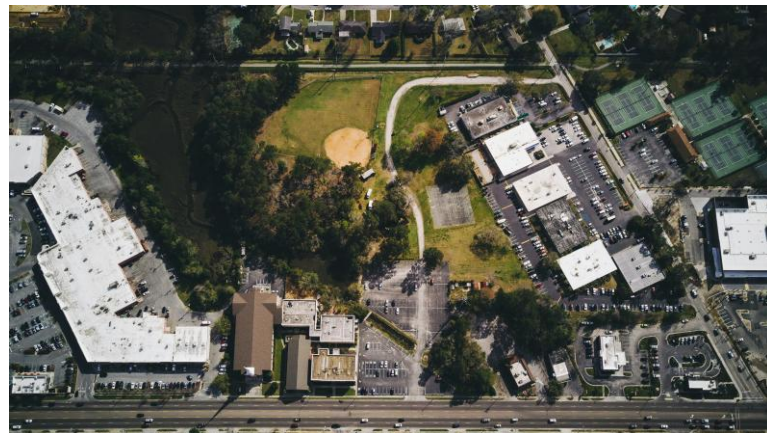


I-US within Urban Sustainability Policy Frameworks

Another important contribution lies in **reducing emissions associated with material production and waste management**. When industrial by-products are reused as secondary raw materials, the need for energy-intensive extraction and processing of virgin materials decreases. This can significantly reduce lifecycle emissions in sectors such as construction, manufacturing, and agriculture.

Local authorities can incorporate I-US projects into climate action plans through:

- industrial excess heat recovery programs
- municipal–industrial waste-to-energy projects
- resource exchange platforms connecting local industries
- circular construction material initiatives





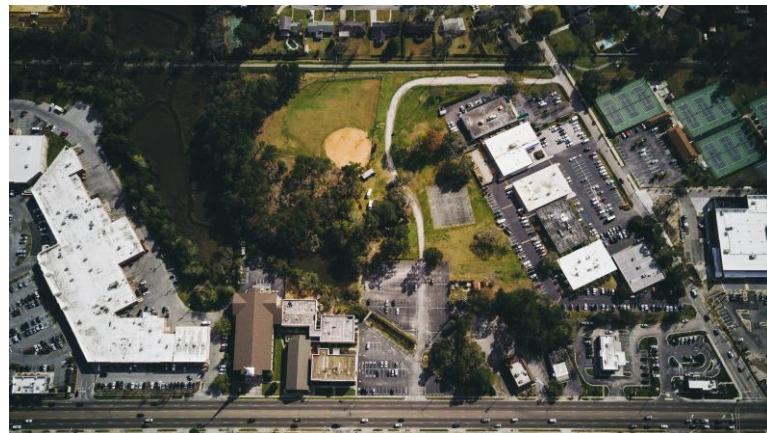
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Sustainable Energy and Climate Action Plans (SECAPs)

Many European municipalities participate in the Covenant of Mayors for Climate and Energy, which requires them to develop Sustainable Energy and Climate Action Plans (SECAPs). SECAPs outline strategies for reducing greenhouse gas emissions, improving energy efficiency, and increasing renewable energy deployment.

I-US supports SECAP implementation primarily through integrated energy systems and circular resource management. In particular, industrial symbiosis can unlock opportunities that conventional energy planning often overlooks, such as the reuse of excess industrial energy.

Common I-US contributions to SECAP goals include:





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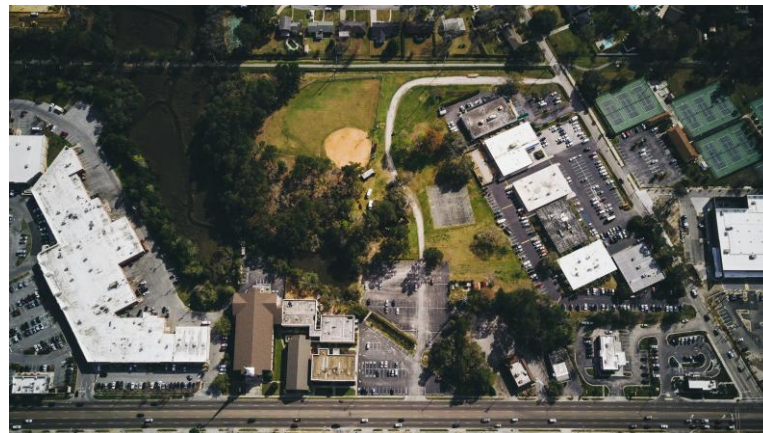
Common I-US contributions to SECAP goals include:

Energy Efficiency Improvements

Industrial processes frequently generate significant amounts of unused thermal energy. Through symbiotic networks, this energy can be redirected to:

- district heating systems
- neighbouring industrial facilities
- agricultural greenhouses
- aquaculture operations

This improves the overall efficiency of the urban energy system, reducing primary energy demand.





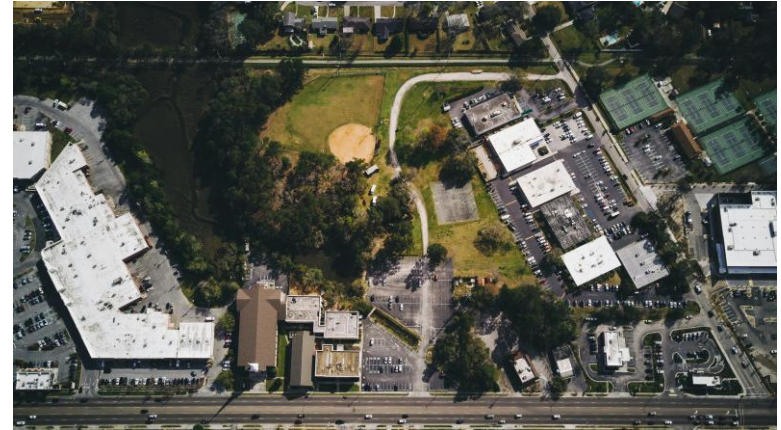
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Renewable and Low-Carbon Energy Production

Organic waste streams from urban areas and industries can be used to produce renewable energy sources such as:

- Biogas
- Biomethane
- Bio-based fuels

These energy carriers can be integrated into municipal energy systems, supporting renewable energy targets outlined in SECAPs.





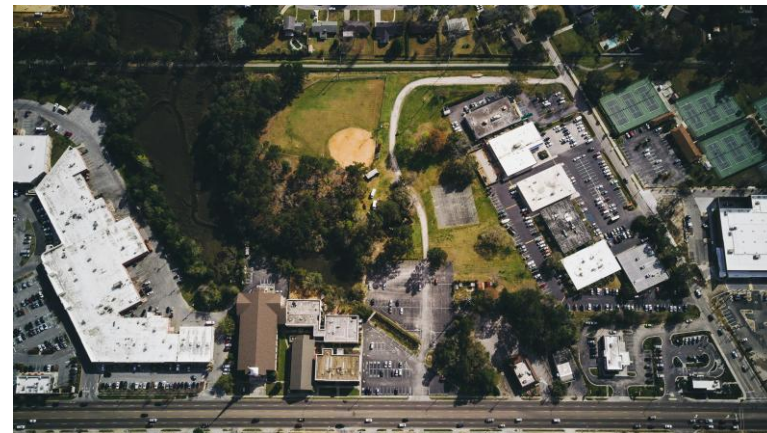
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Decentralized Energy Systems

I-US often supports the development of localized energy networks, which can include:

- industrial microgrids
- shared heat networks
- local energy recovery facilities

These systems increase energy resilience and reduce dependency on centralized fossil-based energy sources.





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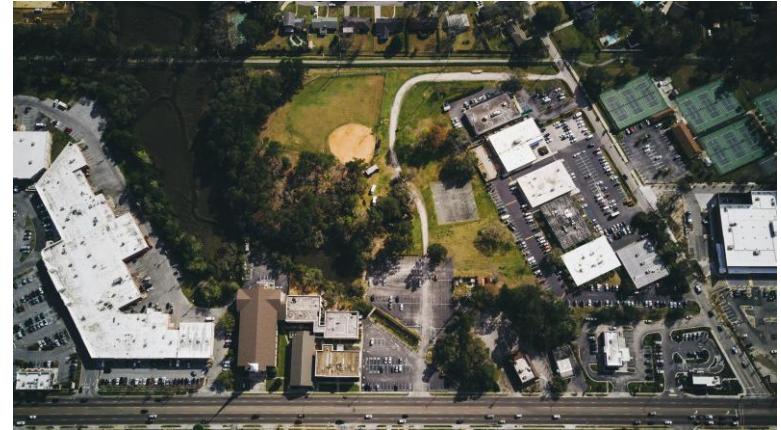
I-US within Urban Sustainability Policy Frameworks

Net-Zero City Strategies

An increasing number of cities are committing to net-zero emissions targets, often aiming to eliminate or offset all greenhouse gas emissions by 2050 or earlier. Achieving net-zero status requires deep transformations across urban systems, including energy production, industrial activity, transport, and resource use.

I-US contributes to these strategies by addressing three critical challenges of net-zero transitions:

- Reducing industrial emissions
- Increasing resource efficiency
- Supporting low-carbon energy systems





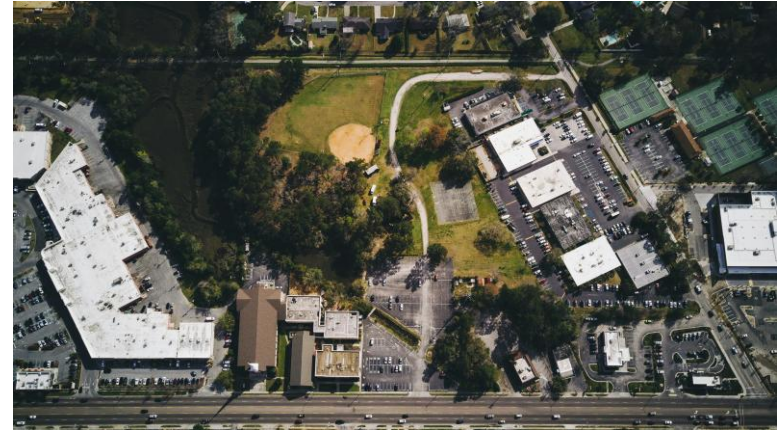
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Decarbonizing Industrial Processes

Industry is one of the most difficult sectors to decarbonize due to energy-intensive production processes and complex supply chains. I-US can reduce emissions by:

- enabling material substitution with lower-carbon secondary materials
- capturing and reusing industrial waste heat
- integrating carbon capture and utilization (CCU) technologies

For instance, captured CO₂ from industrial facilities may be reused in nearby industries such as greenhouse agriculture or synthetic fuel production.





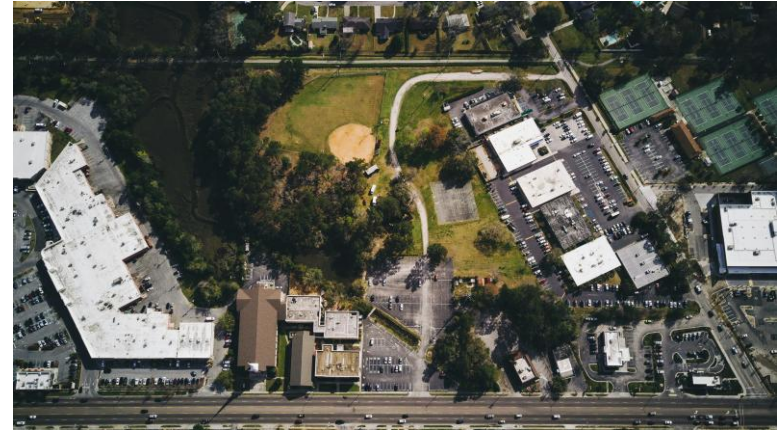
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Reducing Lifecycle Emissions

Net-zero strategies increasingly consider lifecycle emissions associated with materials and products. By promoting reuse and recycling of industrial materials, I-US reduces emissions embedded in supply chains.

This is particularly relevant in sectors such as:

- construction materials
- metals and plastics
- chemicals
- food production





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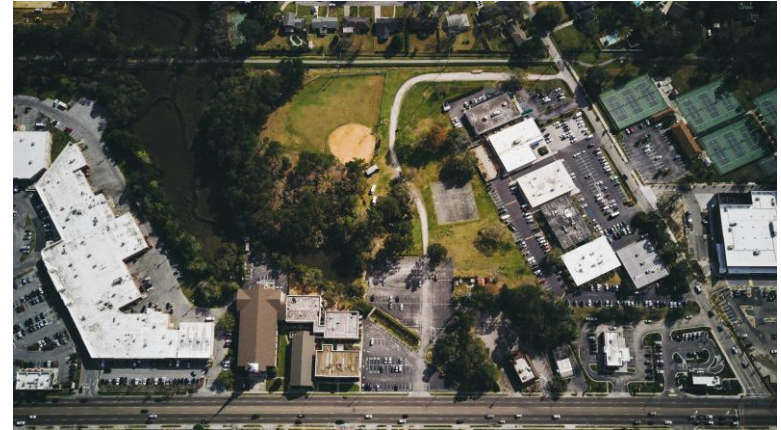
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Supporting Circular Low-Carbon Infrastructure

I-US encourages infrastructure development that supports net-zero goals, including:

- circular industrial parks
- integrated waste-to-energy systems
- district heating based on recovered heat
- water recycling infrastructure

These systems enable cities to move toward closed-loop resource management, reducing both emissions and resource consumption.





I-US within Urban Sustainability Policy Frameworks

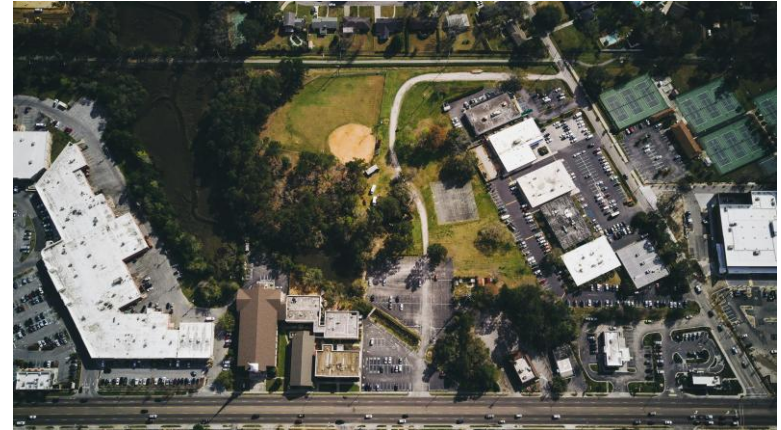
EU Green Deal Targets

The European Green Deal provides the overarching policy framework guiding Europe's transition toward a climate-neutral economy. It aims to achieve net-zero greenhouse gas emissions by 2050, while promoting sustainable economic growth and resource efficiency. I-US directly supports several key pillars of the Green Deal.

Circular Economy Action Plan

The EU Circular Economy Action Plan emphasizes reducing waste and maintaining the value of resources within the economy for as long as possible. I-US operationalizes this concept by enabling:

- industrial by-product reuse
- shared material flows across industries
- regional circular value chains





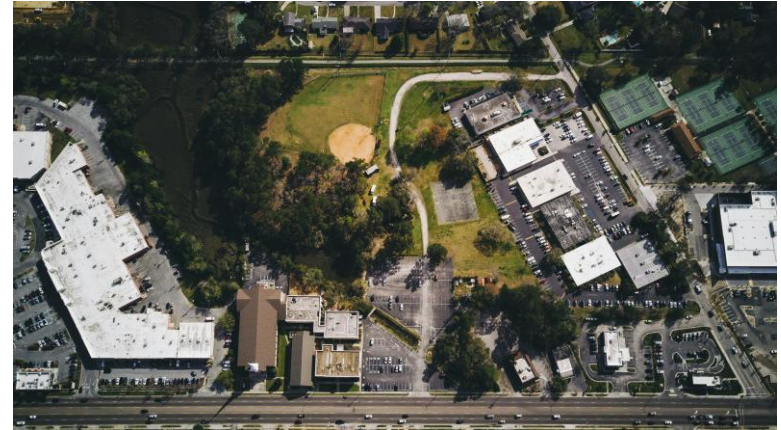
I-US within Urban Sustainability Policy Frameworks

Climate Neutrality

Through energy recovery, material efficiency, and industrial collaboration, I-US reduces emissions in sectors that are otherwise difficult to decarbonize. This supports the EU's goal of reducing emissions by at least 55% by 2030 and achieving climate neutrality by 2050.

Sustainable Industrial Strategy

The Green Deal promotes a transformation of European industry toward clean, digital, and circular production systems. Industrial symbiosis networks help companies transition toward these models by improving resource efficiency and enabling collaborative innovation.





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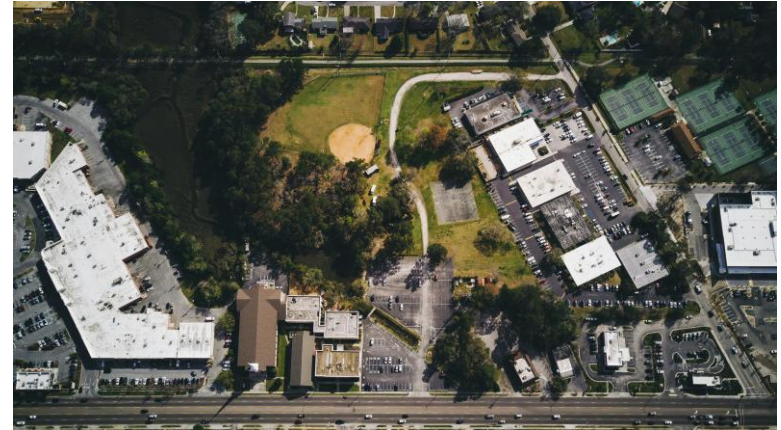
I-US within Urban Sustainability Policy Frameworks

Zero Pollution Action Plan

I-US also contributes to reducing pollution by:

- minimizing waste generation
- lowering emissions to air and water
- reducing landfill use

I-US functions as a practical bridge between climate policy and real-world implementation. By enabling resource exchanges between industries and urban infrastructure, it provides municipalities with actionable tools to meet ambitious climate and sustainability targets.





Economic Advantages of I-US

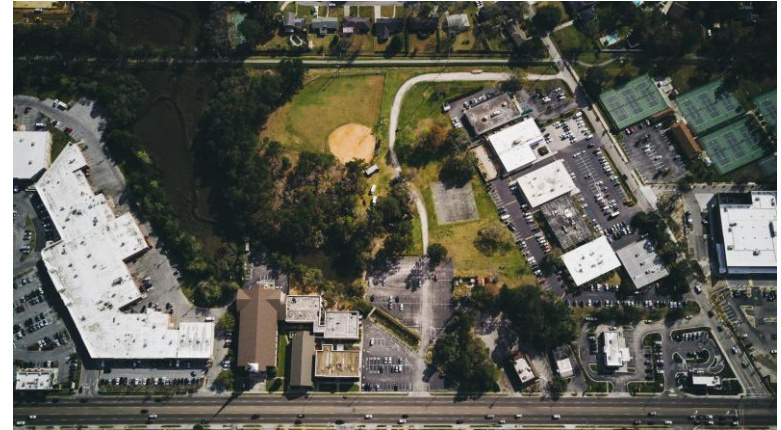
By improving resource efficiency, stimulating innovation, and creating new value chains, I-US can strengthen the competitiveness of local economies and support sustainable industrial development.

Municipalities that actively support I-US often see benefits in terms of **investment attraction, industrial resilience, and employment creation.**

Job Creation and Skill Development

Industrial-Urban Symbiosis initiatives generate employment opportunities across several sectors, including:

- recycling and resource recovery
- renewable energy production
- environmental engineering
- industrial process optimization
- logistics and materials management





Economic Advantages of I-US

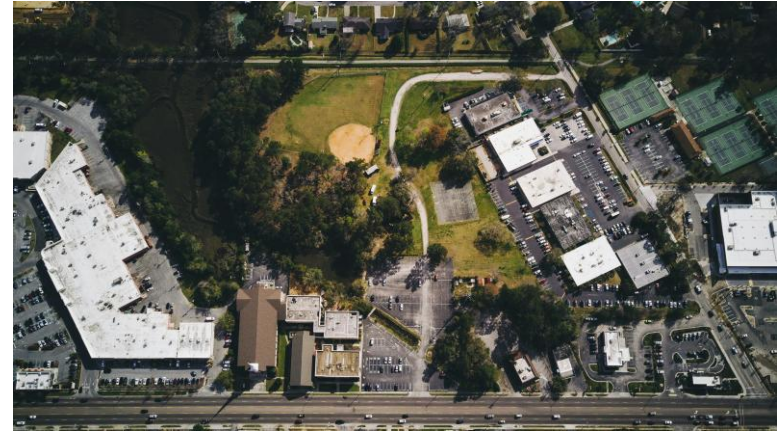
For example, establishing a circular industrial hub may involve:

- new **biogas plants**
- **material sorting and recycling facilities**
- **waste-to-energy infrastructure**
- **data and monitoring systems for resource flows**

Each of these requires technical expertise, creating demand for professionals such as:

- environmental engineers
- circular economy specialists
- energy system operators
- industrial ecologists
- logistics coordinators

Additionally, I-US projects can stimulate **new educational and training programs** in cooperation with universities and technical institutes, strengthening the regional knowledge base.





Economic Advantages of I-US

Cost Savings for Industries

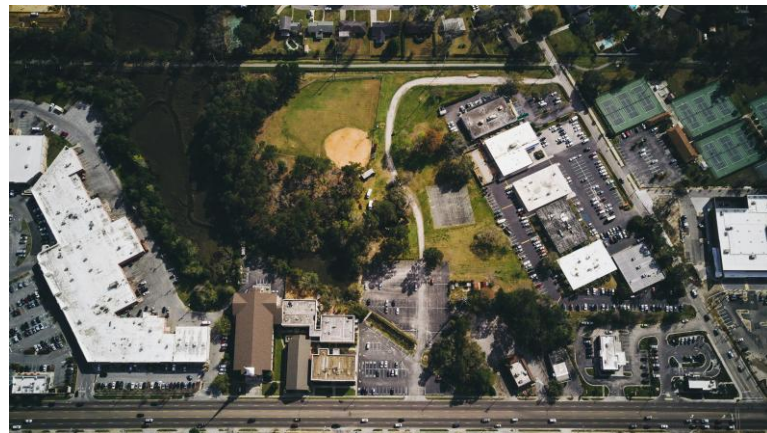
One of the most immediate incentives for businesses to participate in I-US networks is **cost reduction**.

Industrial symbiosis reduces operational expenses by:

- lowering energy consumption through shared systems
- reducing waste disposal costs
- providing access to cheaper secondary raw materials
- optimizing logistics through localized supply chains

Example cost-saving mechanisms

- Energy: excess heat used internally or sold to neighboring facilities
- Materials: industrial by-products replacing purchased raw materials
- Waste management: reduced landfill fees through resource recovery
- Transport: shorter supply chains for secondary materials





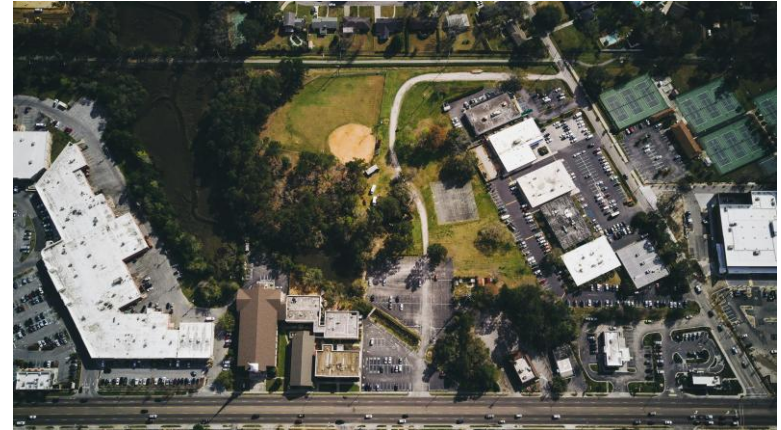
Economic Advantages of I-US

Attracting Investment

Cities and regions that demonstrate strong sustainability leadership are increasingly attractive to investors and businesses seeking **low-carbon and circular production environments**.

Industrial-Urban Symbiosis contributes to this attractiveness by providing:

- access to **shared resource infrastructure**
- stable **local supply of secondary materials**
- efficient **energy systems**
- supportive municipal governance



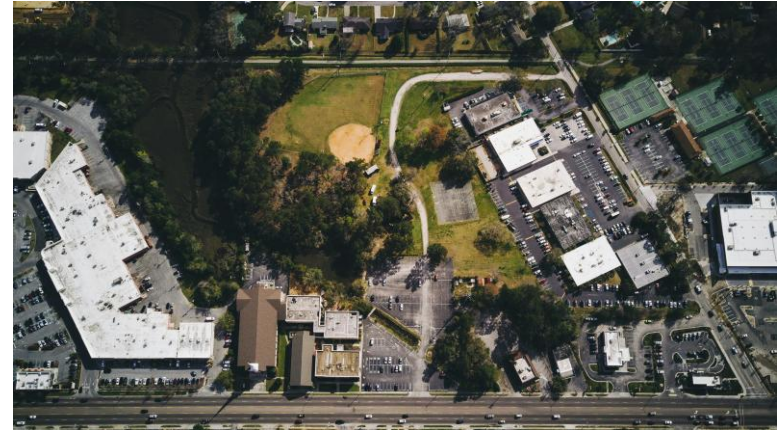


Economic Advantages of I-US

Circular industrial hubs can also attract **innovation-driven companies**, including:

- cleantech firms
- renewable energy providers
- circular manufacturing startups
- environmental technology companies

This clustering effect strengthens regional economic ecosystems and enhances the city's reputation as a **sustainable innovation hub**.





Economic Advantages of I-US

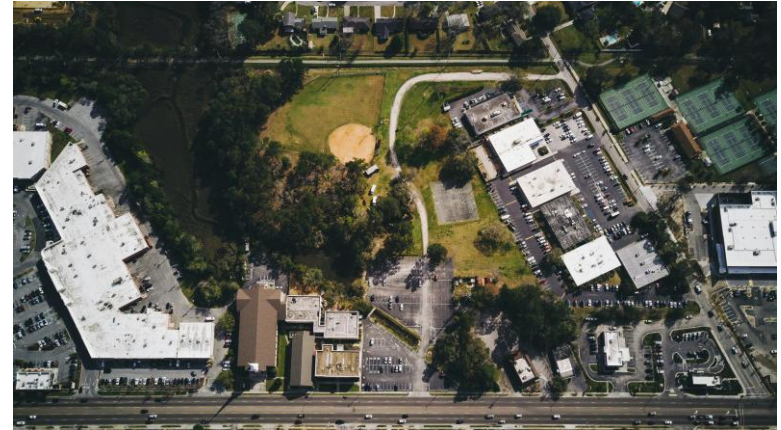
Industrial Diversification and Innovation

Industrial symbiosis encourages companies to explore new uses for their by-products, often leading to **new business models and industries**.

Examples include:

- conversion of organic waste into **biofuels**
- production of **bioplastics from agricultural by-products**
- recovery of **critical raw materials from electronic waste**
- development of **industrial service platforms for resource exchange**

These innovations can transform traditional industries into **more diversified and resilient economic sectors**.





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Chapter 3.2: Roles of Local Authorities in I-US Initiatives

Local authorities play a critical role in fostering Industrial-Urban Symbiosis (I-US) by enabling collaboration between industries, businesses, and communities. This chapter explores five key roles they can take: 1) Mobilize, 2) Educate, 3) Incentivize, 4) Manage, 5) Regulate. This chapter highlights best practices and policy tools that local governments can use to drive effective I-US initiatives.

- Target audience: Local Authorities and Municipalities
- Estimated time: 20 minutes
- Includes: Explanations Exercises

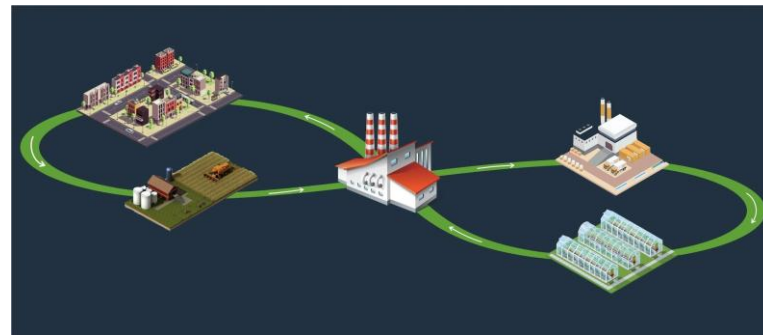




I-US within Urban Sustainability Policy Frameworks

Local and regional authorities are pivotal in fostering Industrial-Urban Symbiosis (I-US) by shaping the enabling environment for collaboration between industries and urban ecosystems. Their involvement spans multiple functions, from leadership and guidance to ensuring the long-term viability of I-US initiatives. They typically require strategic coordination, enabling policies, infrastructure planning, and stakeholder engagement, all of which fall partly within the responsibilities of local governments.

Municipalities and regional authorities are uniquely positioned to foster I-US because they operate at the intersection of **urban planning, economic development, environmental policy, and infrastructure management**. They also maintain relationships with local industries, research institutions, utilities, and civil society organizations. By leveraging these connections and governance tools, authorities can actively shape the ecosystem in which industrial symbiosis networks develop.



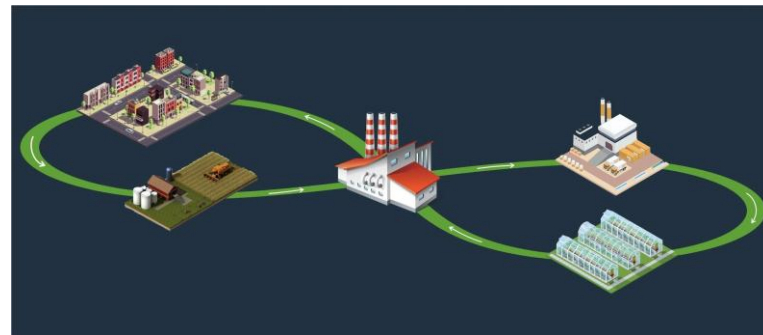


I-US within Urban Sustainability Policy Frameworks

In practice, the role of local authorities in I-US initiatives can be grouped into five key functions:

1. **Mobilising**
2. **Educating**
3. **Incentivising**
4. **Managing**
5. **Regulating**

These roles are often complementary and mutually reinforcing. Authorities may simultaneously act as facilitators, coordinators, policy makers, and infrastructure managers, depending on the maturity of the local I-US ecosystem.





Mobilising

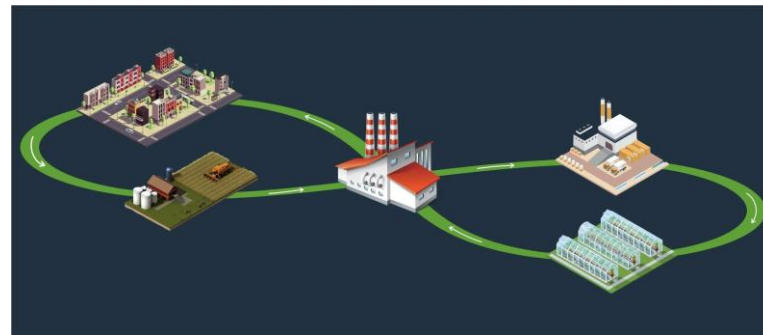
Initiating and Facilitating Symbiotic Networks

Local and regional authorities often serve as the initiators and conveners of I-US initiatives. In many cases, industries may not be aware of potential synergies with neighbouring companies or urban infrastructure. Authorities can therefore play a critical role in mobilising stakeholders and creating the strategic direction needed for collaboration.

Embedding I-US in Local Strategies

One of the most important mobilising actions is integrating I-US into long-term strategic documents, such as:

- Circular economy strategies
- Climate action plans
- Regional innovation strategies
- Industrial development plans





Mobilising

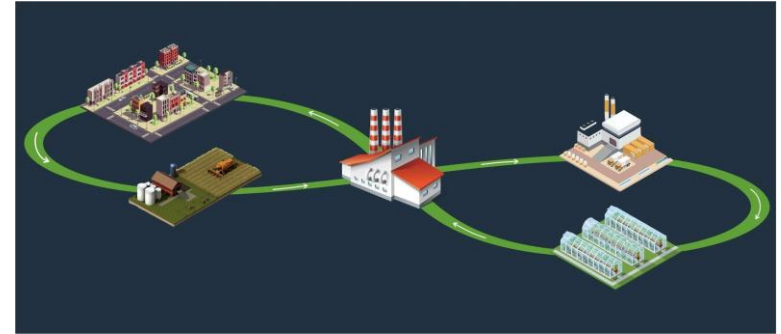
Urban masterplans

By explicitly including I-US within these strategies, municipalities signal their commitment to resource efficiency, circular economic development, and industrial collaboration. This strategic alignment helps ensure that industrial symbiosis initiatives contribute to broader sustainability and economic goals.

For example, a city circular economy strategy may identify opportunities to:

- recover industrial excess heat for district heating
- reuse construction waste in local building projects
- valorise organic waste through bioenergy production

Embedding these opportunities within policy frameworks provides long-term political support and administrative continuity.





Mobilising

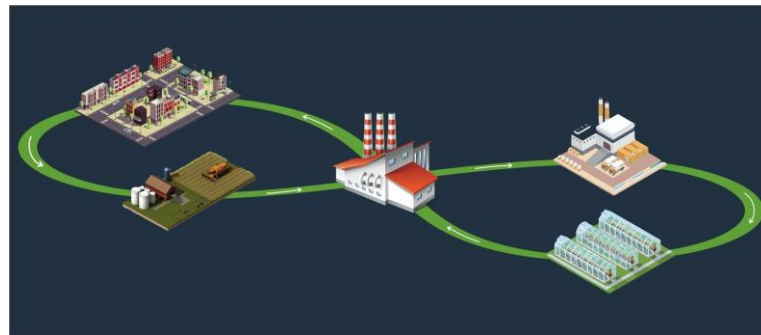
Acting as Facilitators and Connectors

Local authorities often act as neutral intermediaries between stakeholders. Their involvement can help overcome barriers related to trust, competition, and information sharing.

Facilitation activities may include:

- organizing stakeholder workshops and networking events
- coordinating cross-sector collaboration between departments
- connecting industries with research institutions
- facilitating dialogue between public and private actors

Authorities may also appoint dedicated industrial symbiosis coordinators or facilitators, either internally or through external experts.





Mobilising

Mapping Local Resource Flows

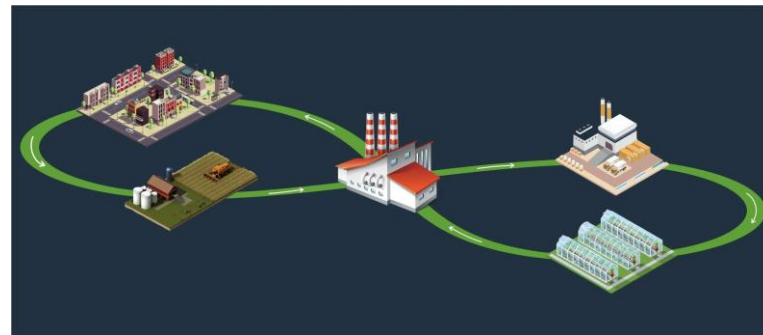
A key early step in developing I-US networks is identifying existing material and energy flows within the region. Authorities can support this process through:

- regional resource flow mapping
- industrial metabolism studies
- digital platforms for resource exchange

Partnerships with universities, research institutes, and innovation agencies can provide the technical expertise needed to conduct these analyses.

The resulting data helps identify potential synergies, such as:

- waste heat recovery
- by-product reuse
- water recycling opportunities





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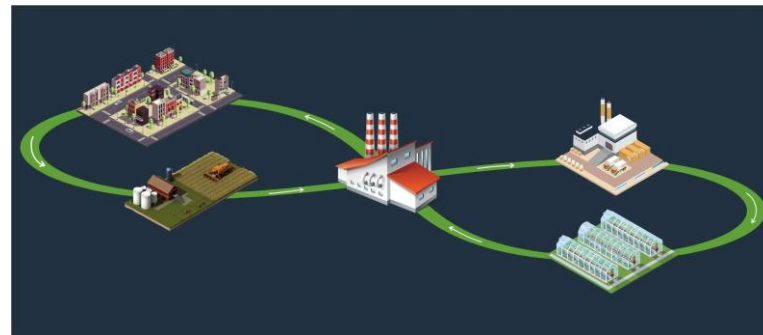
Educating

Successful Industrial-Urban Symbiosis requires **awareness, knowledge, and trust among stakeholders**. Many companies remain unfamiliar with the concept of industrial symbiosis or may perceive collaboration with other industries as risky. Local authorities therefore play an important role in **educating and informing stakeholders**.

Raising Awareness of Circular Economy Opportunities

Authorities can promote understanding of I-US through:

- workshops and seminars
- training programmes for businesses
- public awareness campaigns
- informational toolkits and guidelines





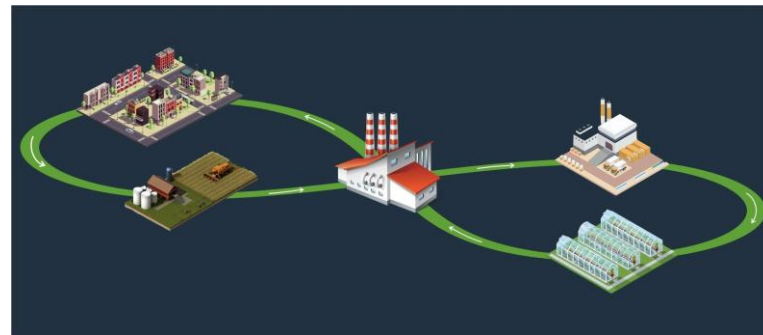
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Educating

These initiatives help stakeholders understand the **environmental, economic, and operational benefits of circular resource management.**

Educational activities may focus on:

- the transition from linear to circular production models
- successful industrial symbiosis examples
- business opportunities in secondary material markets
- environmental benefits of resource efficiency



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Educating

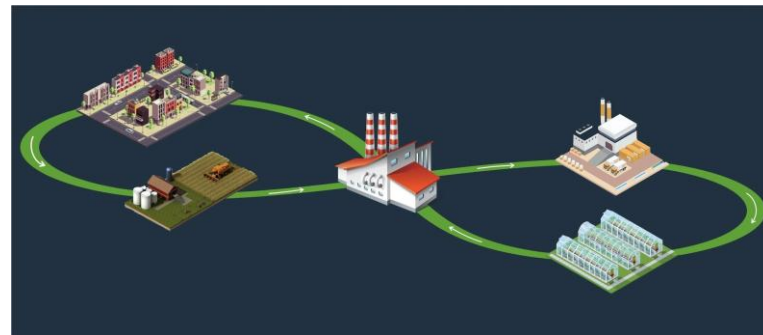
Disseminating Best Practices

Learning from successful examples can help overcome scepticism and inspire new initiatives. Local authorities can actively disseminate **case studies from other regions**, demonstrating the viability of industrial symbiosis.

This can involve:

- organizing study visits to successful eco-industrial parks
- publishing local and international case studies
- inviting experts and practitioners to share experiences

Highlighting real-world examples helps stakeholders understand that I-US is not merely a theoretical concept but a **proven strategy for sustainable industrial development**.





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Educating

Supporting Education and Research

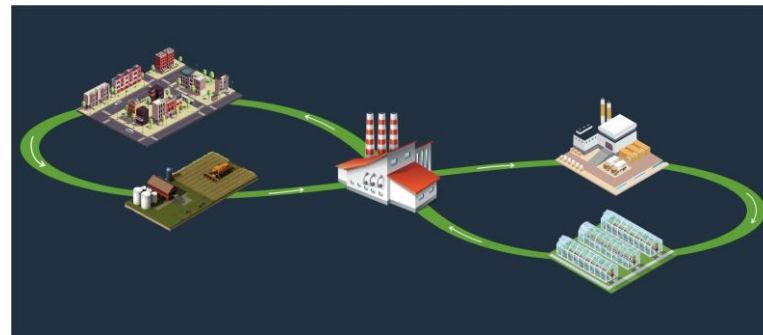
Cities and regions can further promote I-US by collaborating with educational institutions. Universities and technical schools can integrate industrial symbiosis concepts into:

- engineering programmes
- environmental science curricula
- business and innovation courses

Local authorities may also participate in **research and innovation projects**, often funded through national or European programmes.

Such collaborations can:

- develop new symbiotic technologies
- identify regional resource synergies
- train future professionals in circular economy practices



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Educating

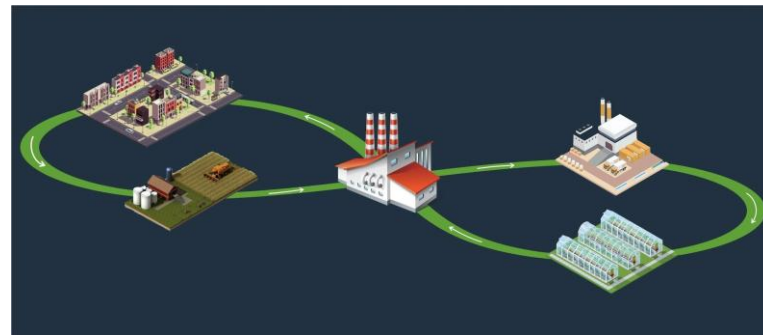
Creating Collaboration Platforms

Industrial symbiosis depends heavily on **networks and relationships** between stakeholders. Authorities can create spaces for interaction and collaboration through:

- regional circular economy platforms
- industrial symbiosis working groups
- business networking events
- innovation clusters

These forums allow stakeholders to:

- exchange knowledge
- explore collaboration opportunities
- develop joint projects



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Managing

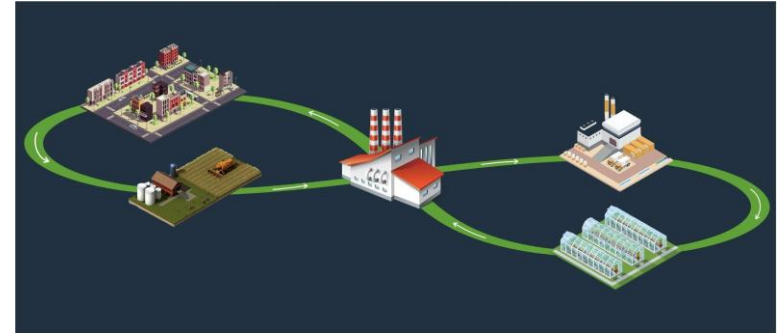
Local and regional authorities can also play a direct role in **managing the physical and material systems that underpin I-US**. Through their ownership and operation of key infrastructures, municipalities can strategically influence the way resources flow within the urban environment.

This management role enables authorities to integrate I-US principles directly into **public services and infrastructure systems**, helping create the physical backbone of circular urban ecosystems.

Managing Municipal Resource Systems

Municipal governments are often responsible for operating or overseeing several critical infrastructure systems, including:

- waste management systems
- wastewater treatment facilities
- district heating networks





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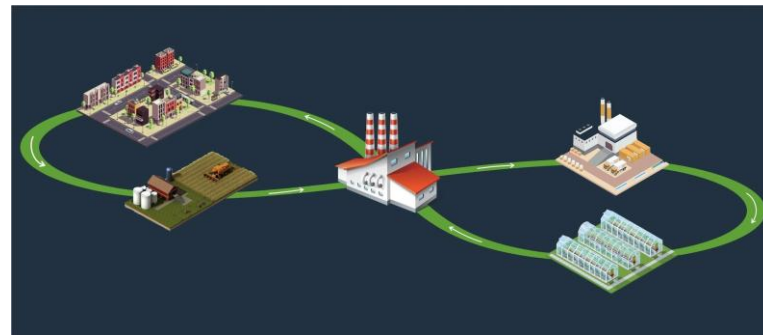
Managing

- municipal energy utilities
- urban transport systems
- stormwater and water management infrastructure

These systems represent important **nodes within potential symbiotic networks**, as they generate and process significant resource streams.

For example:

- organic municipal waste can be processed into **biogas and biofertilizers**
- wastewater treatment plants can recover **nutrients and industrial water**
- waste-to-energy plants can supply **district heating networks**
- construction and demolition waste can be reused in **local building projects**





Managing

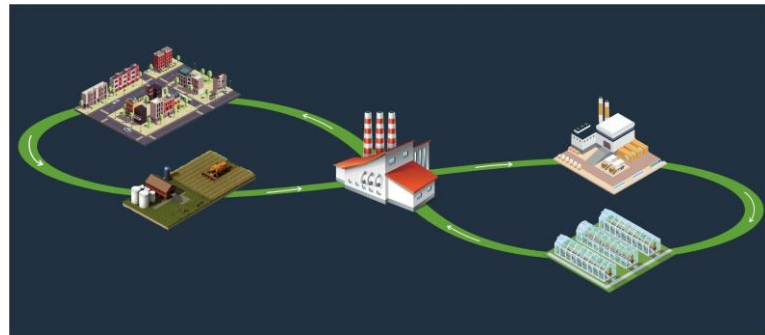
Strategic Infrastructure Planning

Local authorities can also manage I-US development through **strategic infrastructure planning**. Certain resource exchanges require dedicated infrastructure such as:

- heat transfer pipelines
- industrial water reuse systems
- shared recycling facilities
- logistics infrastructure for secondary materials

Municipal investment in such infrastructure can significantly reduce the **transaction costs associated with symbiotic exchanges**, making collaboration between industries more feasible.

For example, installing district heating pipelines between industrial zones and residential areas allows excess heat from industry to be reused at the city scale.





Managing

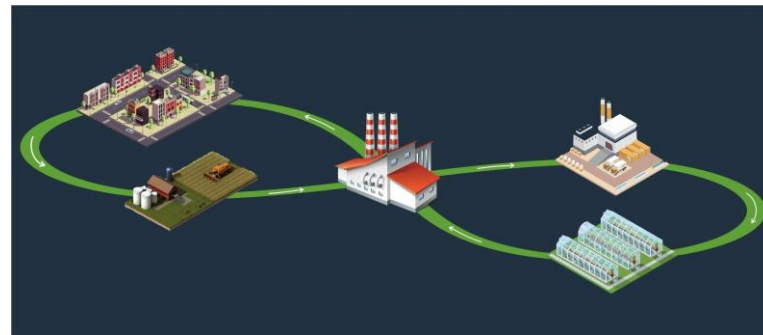
Coordinating Industrial Clusters

Authorities can further strengthen symbiosis networks by coordinating the development of **industrial clusters or eco-industrial parks**. Within these areas, infrastructure and logistics systems are designed to enable efficient resource exchange.

Key management measures include:

- coordinating industrial zoning
- providing shared infrastructure
- facilitating industrial cluster governance structures
- supporting joint services such as waste management or energy supply

These clusters often function as **innovation hubs for circular economy solutions**, attracting companies interested in resource efficiency and sustainable production.





Managing

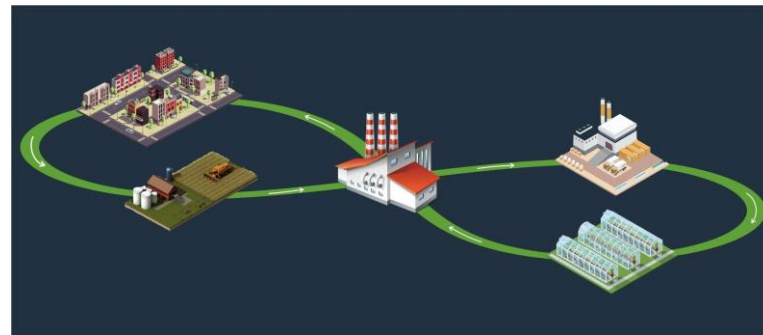
Leveraging Green Public Procurement

Local governments are also significant consumers of goods and services. Through **green public procurement (GPP)** policies, they can stimulate demand for products developed through circular or symbiotic processes.

Municipal procurement policies may prioritize:

- construction materials containing recycled industrial by-products
- energy from renewable or waste-to-energy sources
- circular products manufactured using secondary raw materials
- services that support circular resource management

By creating stable demand for such products, municipalities help **strengthen local markets for circular solutions**, making I-US business models more viable.





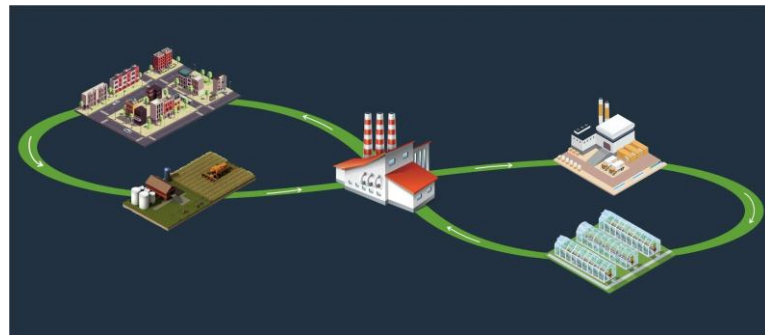
Incentivising

While I-US often generates long-term economic and environmental benefits, the initial stages of implementation frequently involve **financial risks, uncertainty, and coordination costs**. Companies may need to invest in new infrastructure, adapt production processes, or explore unfamiliar business models. As a result, local and regional authorities can play an important role in **lowering barriers to participation and signalling market support** through well-designed incentive mechanisms.

Incentives can take several forms, ranging from **direct financial support and risk-sharing instruments** to softer measures such as technical assistance and recognition programmes. These mechanisms encourage industries, municipal utilities, and entrepreneurs to explore symbiotic opportunities and develop circular value chains.

Financial Incentives and Funding Programmes

Local governments can provide financial support to stimulate the development of I-US initiatives. This may involve allocating municipal funds or facilitating access to national and European funding programmes.





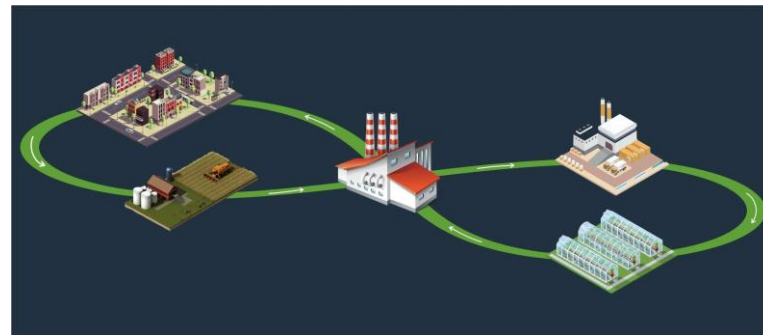
Incentivising

Financial Incentives and Funding Programmes

Local governments can provide financial support to stimulate the development of I-US initiatives. This may involve allocating municipal funds or facilitating access to national and European funding programmes.

Typical financial instruments include:

- **Grants for feasibility studies** that assess potential industrial synergies
- **Subsidies for infrastructure investments**, such as pipelines for heat transfer or material recovery facilities
- **Pilot project funding** to test innovative circular solutions
- **Low-interest loans or guarantees** for companies investing in symbiosis infrastructure

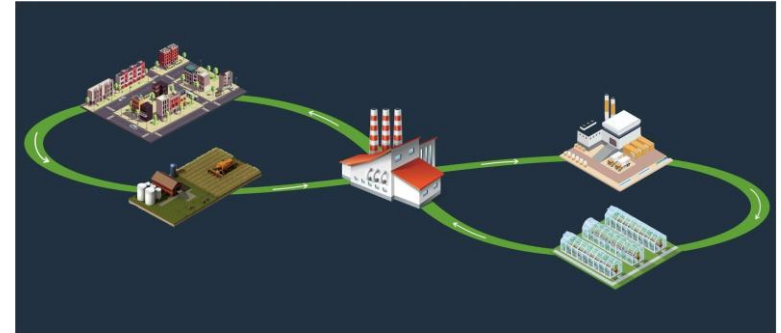




Incentivising

Such financial mechanisms can help companies overcome the **initial capital costs associated with infrastructure investments**, which often represent one of the main barriers to implementing resource exchange systems.

In some regions, municipalities also support the creation of **circular innovation funds or incubator programmes**, which provide funding and mentoring for start-ups and SMEs working on circular technologies and industrial symbiosis solutions.





Incentivising

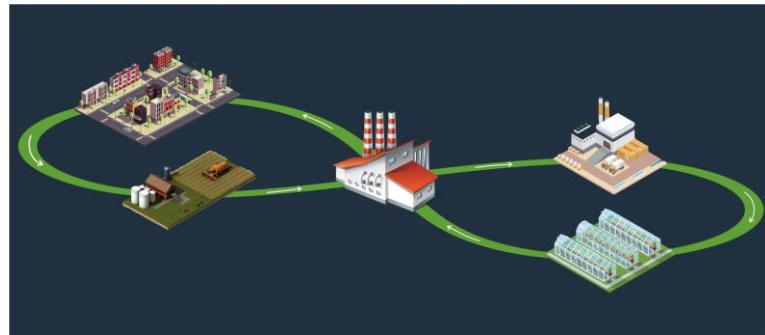
Supporting Business Development and Innovation

Beyond financial support, authorities can provide **business support services** that help companies identify and implement symbiotic opportunities. Examples include:

- technical advisory services on circular technologies
- matchmaking services connecting potential industrial partners
- support for business model development
- assistance in accessing national or EU funding programmes

These services are particularly important for **small and medium-sized enterprises (SMEs)**, which may lack the internal resources needed to explore industrial symbiosis opportunities independently.

Municipal innovation hubs, economic development agencies, or regional circular economy centres can play an important role in delivering such services.





Incentivising

Facilitating Resource Exchange Platforms

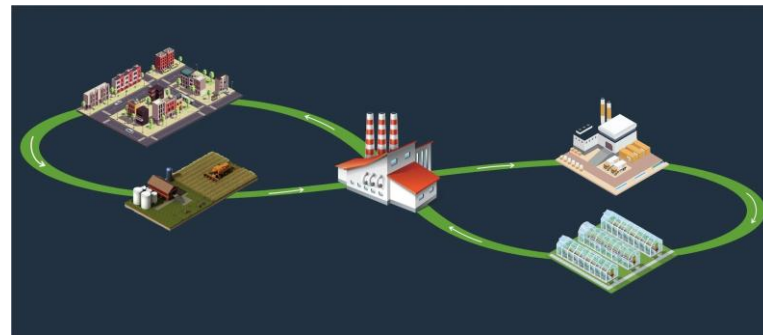
Another important incentive mechanism is the development of **digital or physical resource exchange platforms** that connect companies with potential partners interested in their by-products or waste streams.

These platforms may provide information on:

- available industrial by-products
- potential secondary raw materials
- excess heat sources
- waste streams suitable for valorisation

Authorities may initially fund these platforms and associated facilitation services, gradually transitioning them toward **self-sustaining business models**, such as membership-based networks or service fees.

However, such transitions should be implemented carefully and in dialogue with industry stakeholders to ensure **long-term participation and trust**.





Incentivising

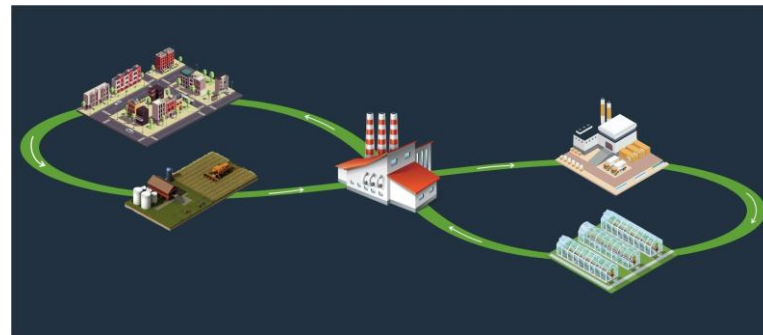
Recognition and Reputation Incentives

In addition to financial incentives, local authorities can also encourage participation in I-US through **recognition programmes and public visibility**.

Examples include:

- sustainability awards for participating companies
- public recognition programmes for circular economy leaders
- certification schemes for circular industrial parks
- promotional campaigns highlighting successful symbiosis initiatives

These initiatives can strengthen a company's **corporate reputation, sustainability credentials, and market positioning**, providing additional motivation to participate in symbiotic networks.



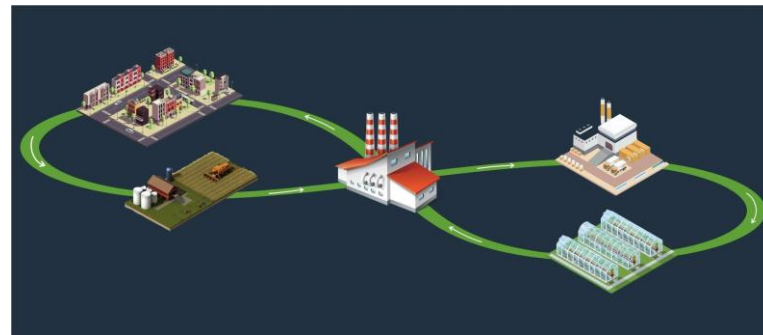


Regulating

Regulation is another powerful tool through which local and regional authorities can influence the development of Industrial-Urban Symbiosis. Regulations can either **enable or constrain symbiotic exchanges**, depending on how they are designed and implemented.

Many industrial symbiosis opportunities involve the reuse of industrial by-products or waste streams. However, existing environmental and waste regulations can sometimes create **administrative barriers or legal uncertainty**, discouraging companies from pursuing these opportunities.

Local authorities can therefore play a key role in developing **regulatory frameworks that facilitate circular resource flows while maintaining environmental and safety standards**.





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Regulating

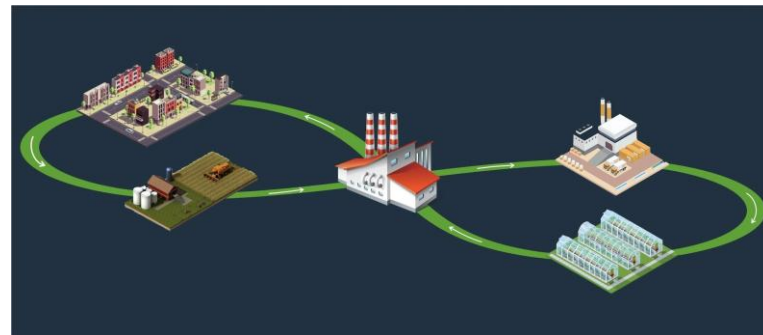
Establishing Resource Efficiency Policies

Municipalities can design policies that encourage industries to reduce waste and explore symbiotic exchanges.

Examples include:

- local waste reduction targets
- mandatory recycling requirements
- landfill taxes or restrictions
- incentives for waste valorisation

Such policies increase the **economic attractiveness of resource recovery and reuse**, encouraging companies to seek symbiotic partnerships.





Regulating

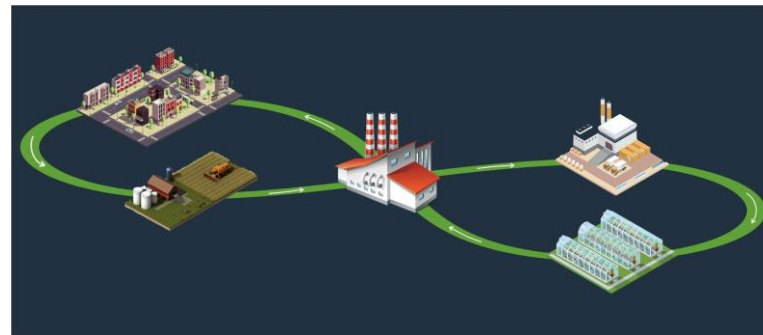
Supporting Secondary Raw Material Markets

One major barrier to industrial symbiosis is the classification of materials as **waste rather than secondary raw materials**. Once classified as waste, materials are often subject to strict regulations that make their reuse more difficult.

Local authorities can support the development of secondary raw material markets by:

- promoting **end-of-waste criteria**
- supporting material quality standards
- providing regulatory guidance to businesses
- facilitating dialogue between regulators and industry

These actions help create **legal certainty for companies wishing to reuse industrial by-products**.





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Regulating

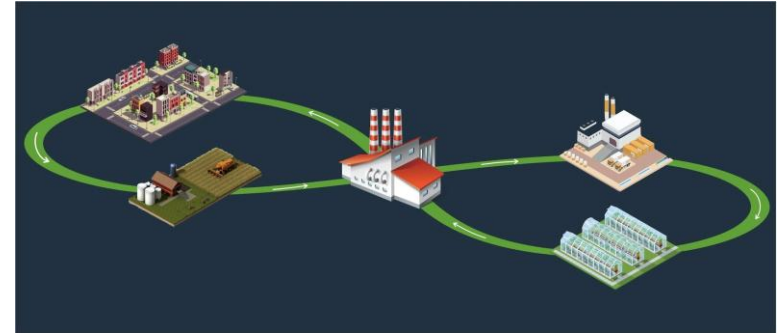
Streamlining Administrative Processes

Complex licensing and permitting procedures can slow down the development of symbiotic projects. Authorities can therefore work to simplify and streamline administrative processes.

Possible measures include:

- creating **one-stop administrative services** for circular economy projects
- simplifying licensing procedures for resource reuse
- harmonising environmental permits across departments
- developing clear guidelines for industrial symbiosis projects

Such measures reduce bureaucratic burdens and encourage companies to pursue innovative circular solutions.





Regulating

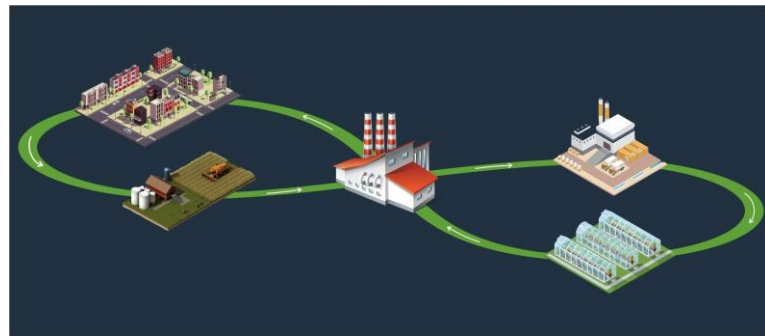
Coordinating with Regional and National Authorities

Many regulatory frameworks affecting industrial symbiosis—such as waste classification, environmental standards, and industrial permitting—are determined at **national or European levels**. Local authorities may therefore need to collaborate with higher levels of government to address regulatory barriers.

They can do this by:

- advocating regulatory reforms based on local experience
- participating in national circular economy initiatives
- contributing to policy consultations
- facilitating dialogue between industry and regulators

Through these actions, municipalities help ensure that regulatory frameworks **support innovation and circular resource management** rather than unintentionally hindering them.





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Exercise – Reflection:

Instructions:

What can your city or region do to support Industrial-Urban Symbiosis Uptake?

For each role, think briefly about what your authority already does or could do. Write down 1–2 ideas per role.

- | | |
|----------------------|---|
| <u>Mobilising</u> | How could your authority initiate collaborations or integrate I-US into strategies? |
| <u>Educating</u> | How could you raise awareness and share knowledge with local companies or schools? |
| <u>Incentivising</u> | What funding, grants, or support mechanisms could encourage participation? |
| <u>Managing</u> | Could your authority leverage municipal infrastructure or procurement to support symbiosis? |
| <u>Regulating</u> | Are there policies or regulations that could enable or encourage resource reuse? |





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Exercise – Reflection:

Instructions:

Action Focus

Pick one role where your authority could have the biggest impact.

- Write down 1 concrete action you could take in the next 6-12 months.
- Identify potential partners to involve for taking this action.





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Chapter 3.3: I-US examples across Europe – experiences from local authorities and municipalities

This chapter presents real-world examples of European cities and regions that have successfully implemented Industrial-Urban Symbiosis. Through case studies from the West Midlands (UK), Fécamp & Tréport (France), Bornholm (Denmark), Arnsberg (Germany), and Helsingborg (Sweden) it examines different models and success factors, illustrating how local authorities have initiated, facilitated or promoted the emergence of circular hubs in their area.

- Target audience: Local Authorities and Municipalities
- Estimated time: 10 minutes
- Includes: [Case Studies](#)





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West Midlands, UK

Incorporating I-US Into Local Strategies

As part of the West Midlands' Circular Economy Routemap published in 2021, the West Midlands Combined Authority (WMCA) sets out plans to implement an Industrial Symbiosis Delivery Programme to support cross-sectoral resource reuse in the region's vast manufacturing industry, urban food waste and construction sectors. I(-U)S is also considered a lever towards achieving the region's target of net-zero emissions by 2041.

As well as setting the direction for this programme, the role of WMCA includes engaging key stakeholders through its connections, and contract managing the subsequently-established *West Midlands Resource Reuse Network*.





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SYMSITES Training Materials on
Industrial-Urban Symbiosis

← [Module 3: The role of local authorities and municipalities in I-US](#)

West Midlands, UK

Incorporating I-US Into Local Strategies

Most essential to the continuation of this IS programme, the WMCA self-advocated and negotiated with the national government to secure the landmark Trailblazer devolution deal and single settlement, which according to Jordan Gerrard, WMCA Circular Economy Project Delivery Officer, *"provides the policy framework moving forwards for us in the West Midlands to agree priorities and directly allocate funding including around net zero policy and IS."*

Want to learn more?

- Read this: [West Midland's Circular Economy Routemap](#)
- Watch this: [WMCA - Deeper Devolution - Introduction](#)



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Fécamp And Tréport Industrial Harbour, France

Initiating Exchanges

The Seine-Maritime Department has strong maritime roots and a very active and busy port. Among the various ports located along this 130 km coastline, the Department manages the Normandy ports of Fécamp and Le Tréport.

In 2018, they launched a study exploring the possibility of developing an I-US initiative to become engaged in the ecological transition. An information meeting was firstly held at the end of 2019, gathering companies, local authorities and consular chambers. Eventually the *ANCRE 76* I-US initiative was born. In 2021, the Department hired a I-US project manager to play a facilitatory role and subsequently regular workshops were held to engage local companies and stakeholders, as well as to facilitate synergies in flows and services between them, enabling environmental advances while reducing costs for operators.





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Fécamp And Tréport Industrial Harbour, France

Initiating Exchanges

So far, around 20 companies are involved, and diagnoses have been carried out to identify synergies. Based on those results, regular workshops are organised for the companies to prioritise the synergies they want to focus on. Synergies selected include the creation of a heating network using industrial waste heat, shared use of energy from the installation of solar panels on port roofs, installation of rainwater recovery infrastructure to supply a shared machinery washing station at the port, and pooled port management of bio-waste.

In October 2023, the Joint Syndicate of Seine-Maritime Ports, a joint venture between several local authorities, was created. Building on the success of ANCRE 76, the Syndicate is now leading the initiative, as part of its sustainable development strategy.





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Fécamp And Tréport Industrial Harbour, France

Initiating Exchanges

According to Marie-Lou Urosevic, the I-US project manager: *"Feedback showed the importance of public initiative in launching such a collective approach. The aim of the Seine-Maritime department and now of the Joint Syndicate of Seine-Maritime Ports is to provide ideas and to support the kick-off of the first synergies, but it is not to carry out the projects or support this approach on a long-term basis. The local stakeholders must take ownership of the approach and think collectively about how to make it sustainable."*

Want to learn more?

- Read this: [Ronan Kerbiriou, Alain Bazille, Yann Alix \(Dir.\), Les Ports Territoriaux : ambition, action, anticipation, EMS, IX, 2025, Les Océanides, Yann Alix, 978-2-38630-318-0, ffhaf-05318409](#)



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Bornholm, Denmark

Educating Students and Raising Awareness among Citizens and Local Businesses

BOFA, the public waste management utility in Bornholm (Denmark), is working to foster I(-U)S in the region through a number of initiatives, notably via their participation in 3 Horizon Europe projects, including SYMSITES, which pilots the innovative combined treatment of organic food waste and wastewater to produce biogas and water for irrigation, and **REDOL**, which is replicating the results of technologies upgrading the collection, sorting and recycling of solid urban waste in five value chains that are currently being tested in Zaragoza, Spain.





SYMSITES

Bornholm, Denmark

Educating Students and Raising Awareness among Citizens and Local Businesses

Within the **SYMSITES** project, BOFA is developing educational material on I(-U)S and the benefits of resource efficiency, which will be disseminated at awareness raising activities in local schools. Students aged 12-15 years old will first learn how different types of waste streams are treated, before participating in a co-creation workshop to generate ideas on potential local synergies. These workshops will serve to immediately apply the learnings from the I(-U)S educational materials, as well as to gather innovative and out-of-the-box thinking from young minds. In addition, students have been invited to visit the SYMSITES pilot site to learn about the practical application of the symbiosis technologies.





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Bornholm, Denmark

Educating Students and Raising Awareness among Citizens and Local Businesses

When speaking on the drive behind BOFA'S I(-U)S educational work, Mathias Kjærgaard Knudsen, BOFA Environmental Technologist comments that *"We are investing in teaching the youth of Svaneke about Industrial-Urban Symbiosis now to empower them to take an active role in shaping the sustainable development of our region. They will live and work here for years to come, and their innovative thinking and understanding of circular practices will be key to ensuring that our island thrives both economically and environmentally."*





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Bornholm, Denmark

Educating Students and Raising Awareness among Citizens and Local Businesses

In order to raise awareness of the potential for symbiotic exchanges in the region past the project pilot, in the city of Svaneke - after mapping local actors and generated waste streams - BOFA is reaching out to local businesses and citizens with the aim of designing together symbiotic exchanges and raising awareness on the potential economic and environmental benefits these would bring, while supporting them in the implementation of the potential symbiosis.



Want to learn more?

- Read this: [SYMSITES D5.1 - Spin-off establishment and its actions plan](#)



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Bornholm, Denmark

Subsidising Private and Public Actors for the Use of Waste Heat in Heating Networks

The district government of Arnsberg, North Rhine-Westphalia (NRW) is offering the manufacturing industry, as well as public and private heat network operators, subsidies to support the use of waste heat in heating networks.

There is great potential for reuse of unavoidable waste heat from the state's vast manufacturing and processing industries. Therefore, the NRW government is promoting the investment in waste heat symbiosis as a building block for decarbonising the state's most energy-intensive sector. There are two main state-funded programmes - the first is directed at manufacturing industries, they can avail of a maximum funding amount of 50% of eligible expenditure to provide or integrate external waste heat into processes, with a maximum limit of 45,000 euros.





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Bornholm, Denmark

Subsidising Private and Public Actors for the Use of Waste Heat in Heating Networks

For large public or private companies to invest in using full or partial waste heat, a maximum of 45% of eligible expenditure is available.

According to the state-founded agency NRW.Energy4Climate - the central NRW contact for municipalities and companies regarding climate and circular economy, "*Industrial waste heat utilisation is explicitly mentioned in both programmes because NRW, as an industrial state, sees high potential for industrial waste heat in the heat supply*".



Want to learn more?

- Read this: [NRW.Energy4Climate – About us](#)



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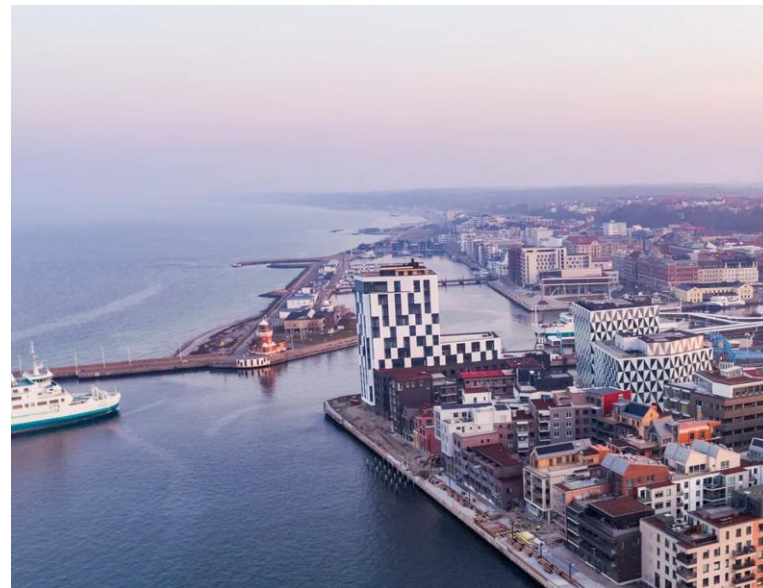
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Helsingborg, Sweden

LOCAL OWNED COMPANIES AT THE HEART OF AN I-US NETWORK

In the Helsingborg area there is a mature and operational I-US network. At its core are local companies Öresundskraft AB (publicly owned energy utility company) and Nordvästra Skånes Renhållnings (NSR) AB (publicly owned waste management company), together with Kemira Kemi AB (a chemical plant producing sulphuric acid), which owns and manages the Industry Park of Sweden (IPOS).

The local waste company NSR receives well-sorted waste that the company further processes and subsequently exports for recycling/upcycling (paper, plastics and other recycled materials) in Europe. Residual waste is sent to Öresundskraft's combined heat and power (CHP) plants for energy production. In addition, NSR landfill gas is sold to Öresundskraft, which can produce heating by burning biogas and natural gas.





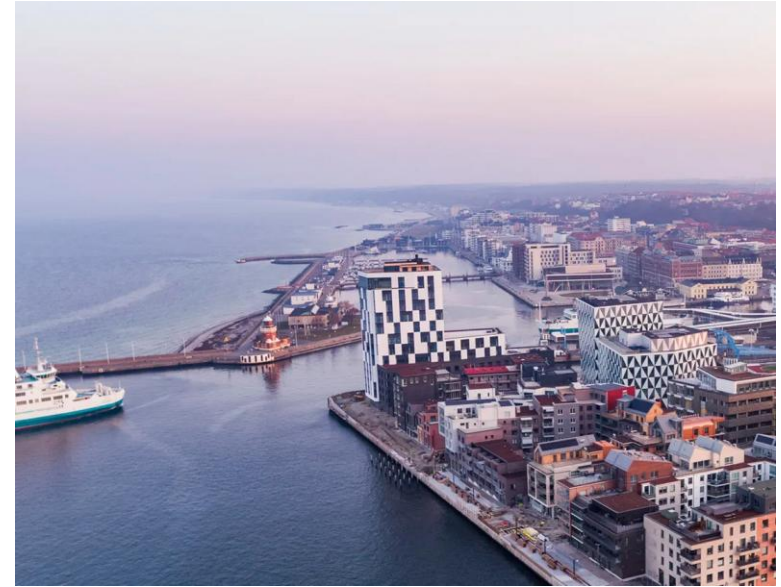
Helsingborg, Sweden

LOCAL OWNED COMPANIES AT THE HEART OF AN I-US NETWORK

In addition, Öresundskraft also uses waste heat from sewage water and from the industries in Helsingborg (e.g. large amounts of waste heat from Kemira Kemi AB). Through conversion the symbiosis is also able to produce cooling, which is used by the hospital of Helsingborg and a company named McNeil AB which needs large amounts of cooling.

The scheme estimates that it avoids emitting around 120,000 tons of CO₂ per year, and that the nearby city has avoided emitting 1.6 million tons of CO₂ since 2007.

Speaking on a key success factor of this symbiosis, Christina Zoric Persson, Urban planner, Helsingborg City, states that *"Good communication has been one of the biggest enablers for the development of the symbiotic network that exists today. This is through both formal and informal meeting places for them in the Helsingborg area."*





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CONSORTIUM MAP

