

Resource-use and Circular Economy Transitioning for Eco-Industrial Plants

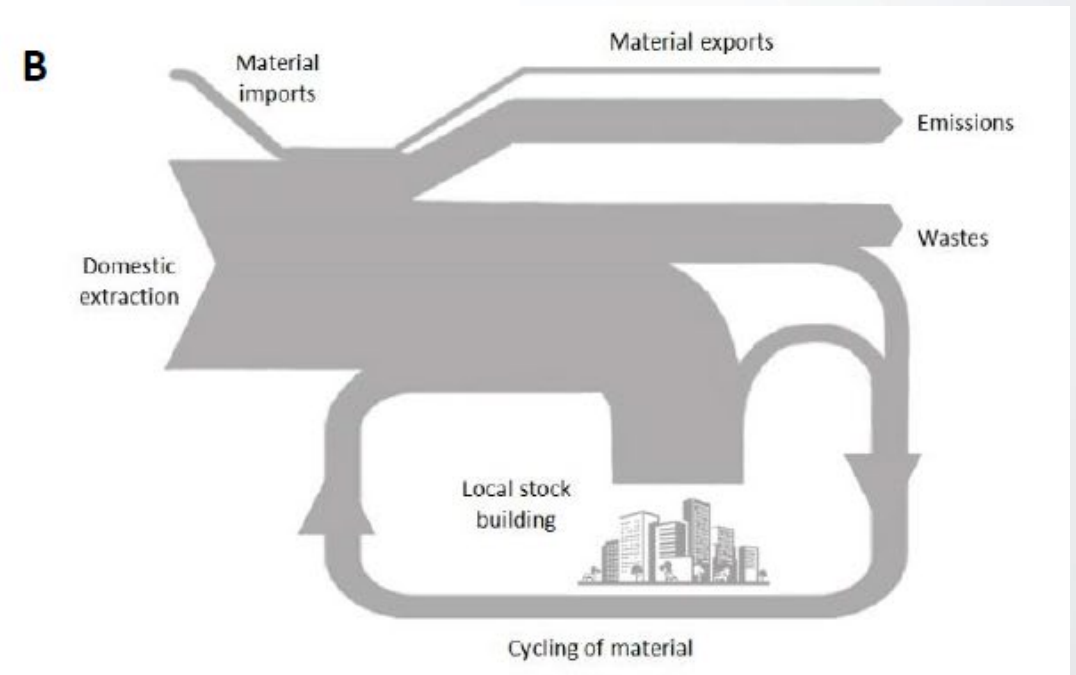
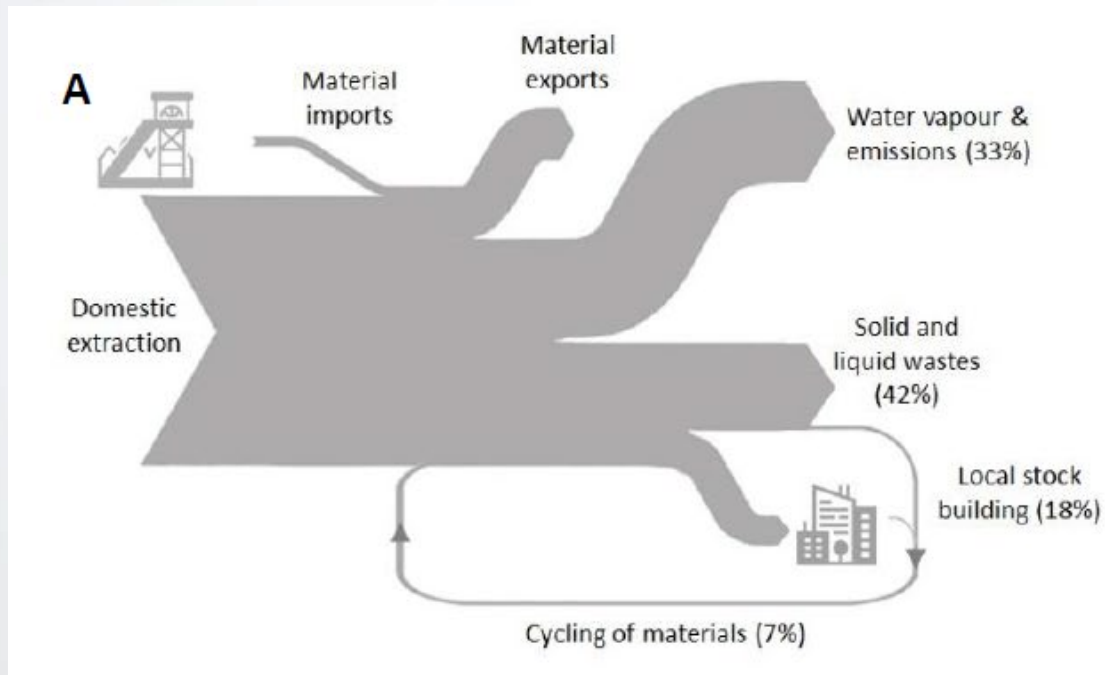
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What is meant by a Circular Economy?

“keeping materials and products in circulation for as long as possible through practices such as reuse of products, sharing of underused assets, repairing, recycling and remanufacturing”



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Linear Economy – limited material cycling

Circular Economy – significant material cycling

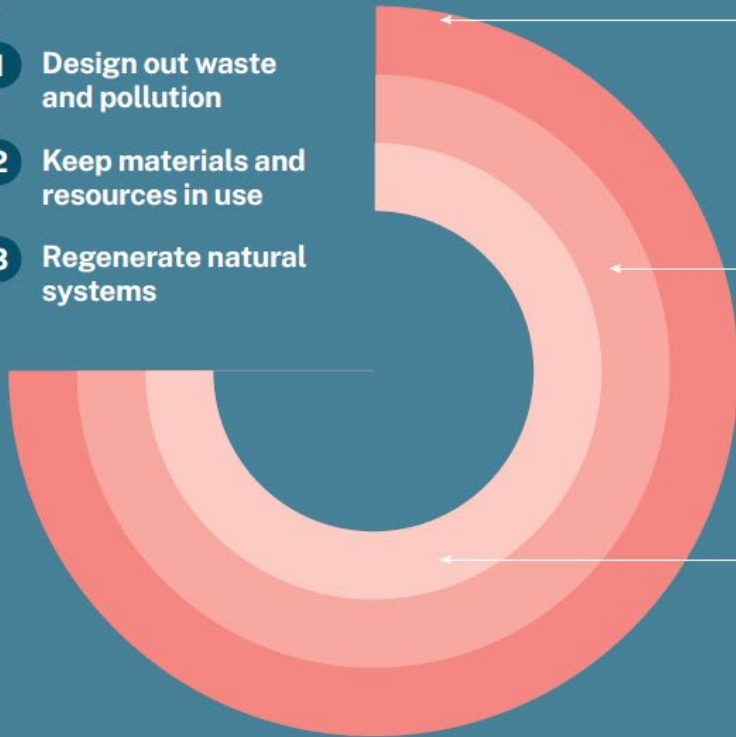
Circular Economy Strategies for Eco-industrial Parks

- Promoting higher renewable energy generation and use, and achieving carbon neutrality
- Investing in common infrastructure and service provision to optimize use of resources
 - e.g. steam networks, CO₂ recovery plants, co-generation of biogas
- Keeping materials and resources in use at the park level by encouraging tenant firms to create symbiotic networks and enabling waste and by-product exchange
- Designing out waste by encouraging tenant firms to integrate circular design and to use environmentally friendly technologies in their production facilities
- Fostering establishment of recycling enterprises and sorting facilities rendering services to tenant firms
- Rethinking business models for improved energy, water, and waste management at the park level
- Harnessing digital technologies to increase resource circularity and material exchange

CE principles applied to Eco-industrial Parks

Circular Economy Principles

- 1 Design out waste and pollution
- 2 Keep materials and resources in use
- 3 Regenerate natural systems



Economy wide

- Energy management contracts and business models
- Urban-industrial symbiosis
- Policies and standards
- Financing circular initiatives

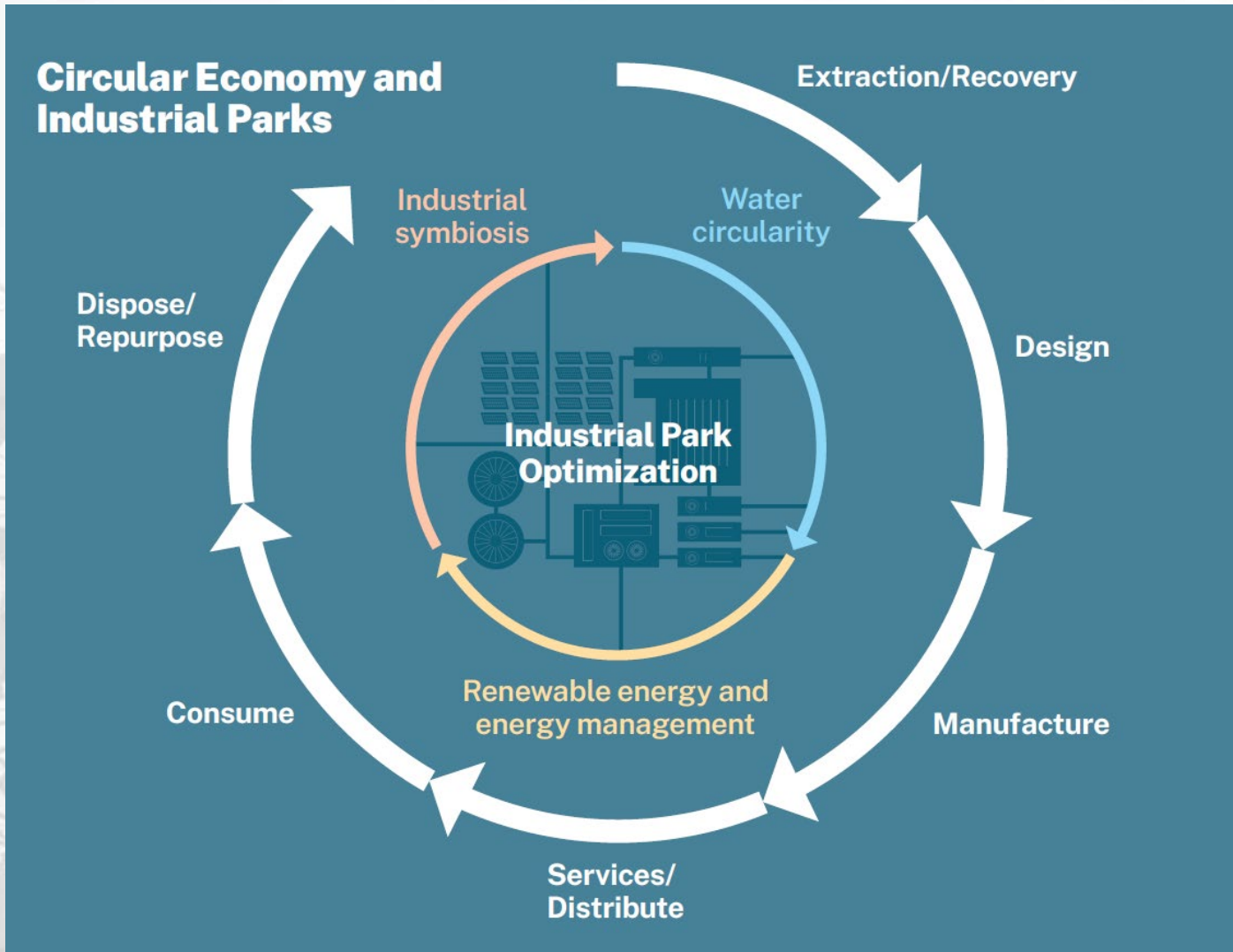
Industrial Parks

- Captive renewables (solar, wind, biogas, etc.)
- Energy management systems
- Water supply from renewable water resources
- Wastewater treatment and reuse
- Industrial symbiosis and waste and material recovery

Firms

- Resource efficiency contracts
- Circular product design
- Policies and standards
- Green industrial buildings

International Eco-industrial Parks Survey (Worldbank 2021)



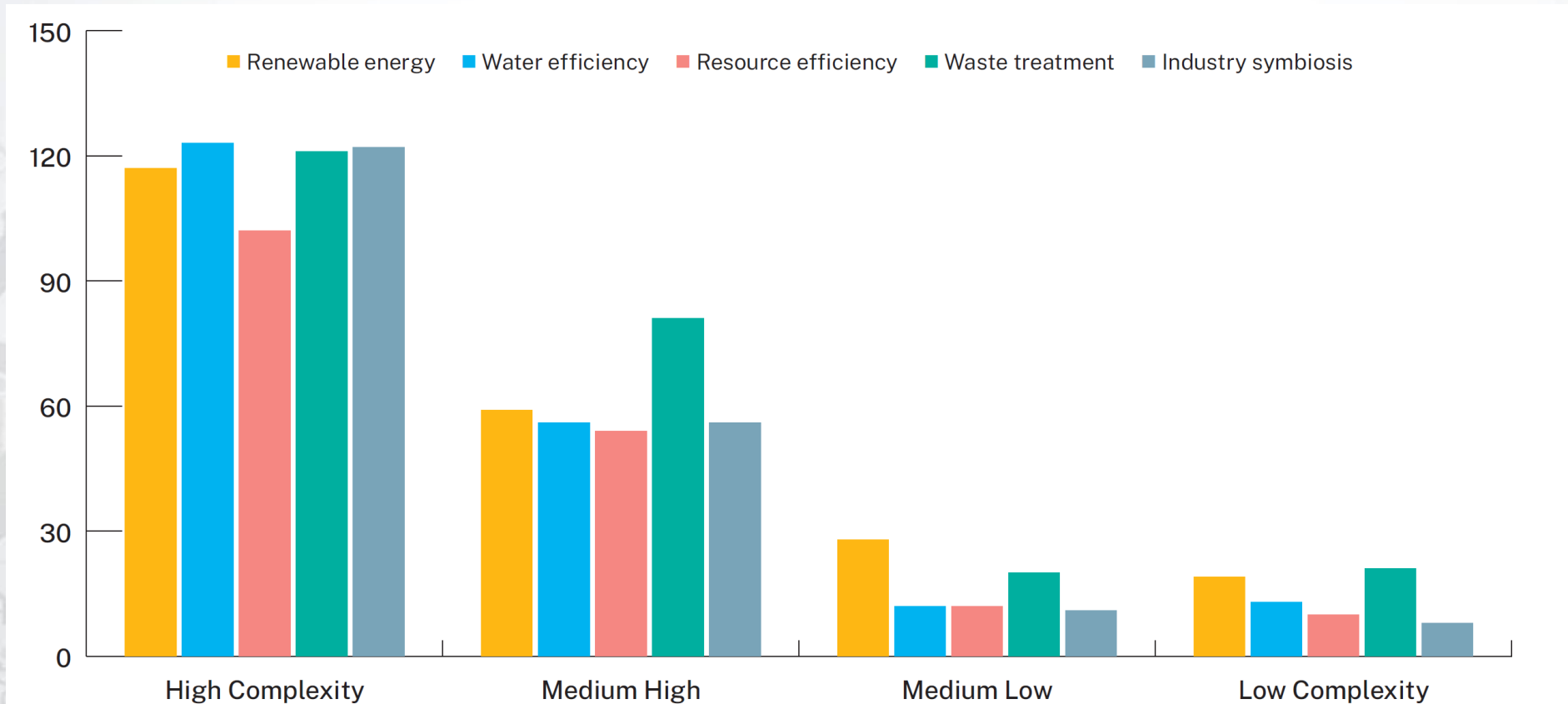
Key observations from international Eco-industrial Parks

- Adoption of EIP technologies has increased in non-OECD countries since 2001
 - Renewable energy
 - Waste treatment
 - Industrial symbiosis
- Significant gap remain between developed and developing economies in adopting:
 - Innovative infrastructure
 - Service systems
 - Technologies
 - Business models that enhance resource circularity

(Refer to graph on slide 7)

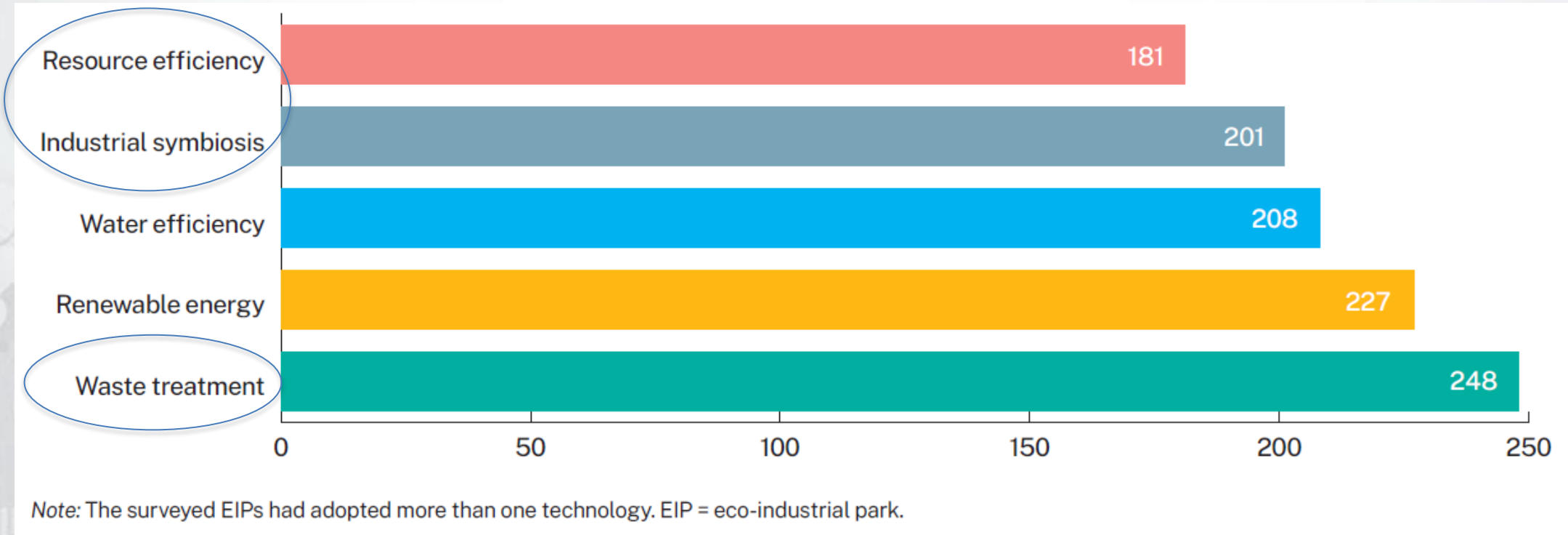
Key observations from international Eco-industrial Parks

Number of EIPs with technologies promoting a CE by their rank in the Economic Complexity Index



Note: The Economic Complexity Index (ECI) consolidates a measure of the diversity of a country's export basket and its sophistication. When countries expand their productive capacities, they can produce more diverse and less common products. The graph classifies countries with EIPs by their ECI country ranking for 2017. Countries were divided into quartiles according to the ECI (high, medium-high, medium-low, and low complexity). EIP = eco-industrial park.

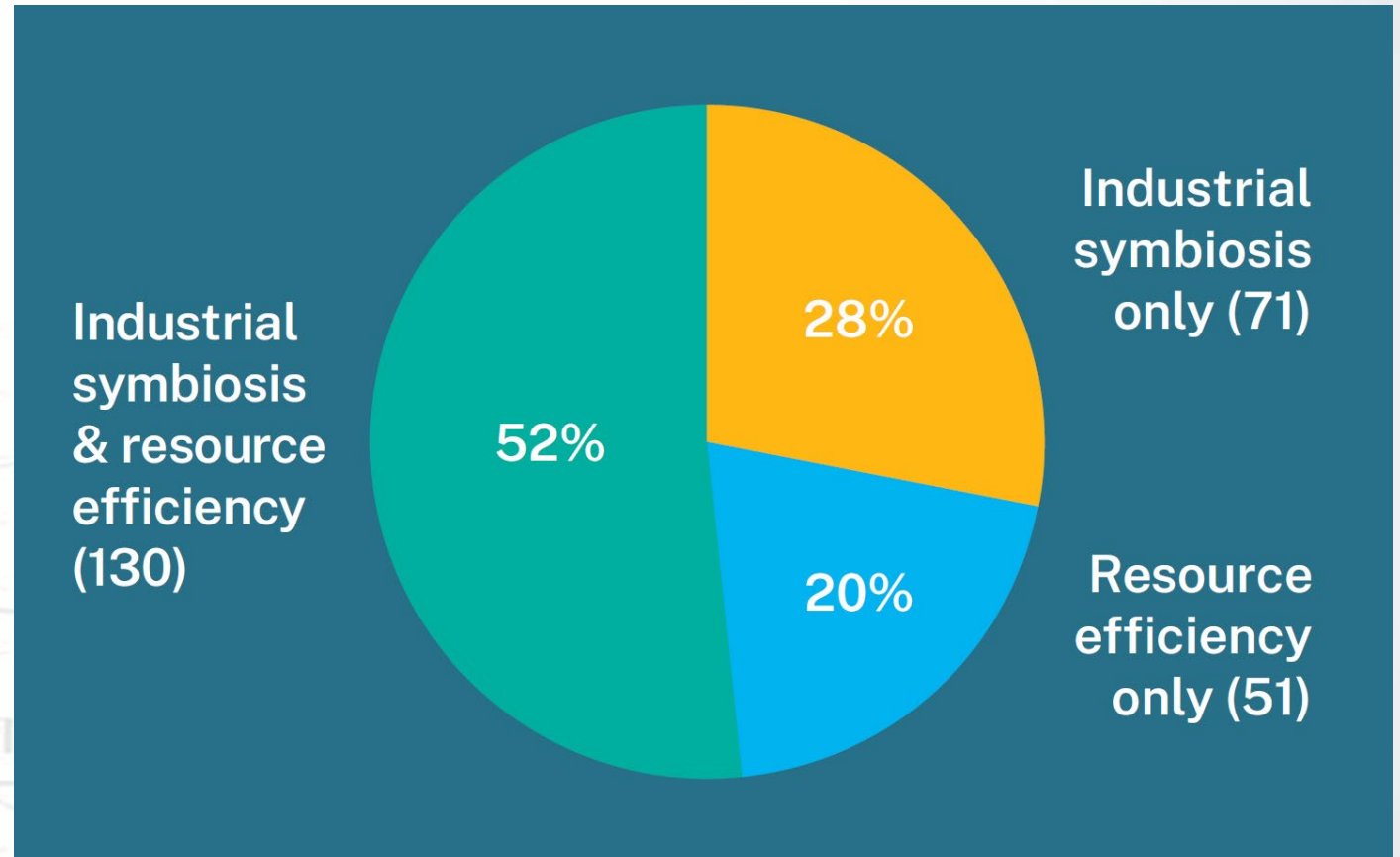
Key observations from international Eco-industrial Parks



Distribution of technologies promoting CE in surveyed EIPs

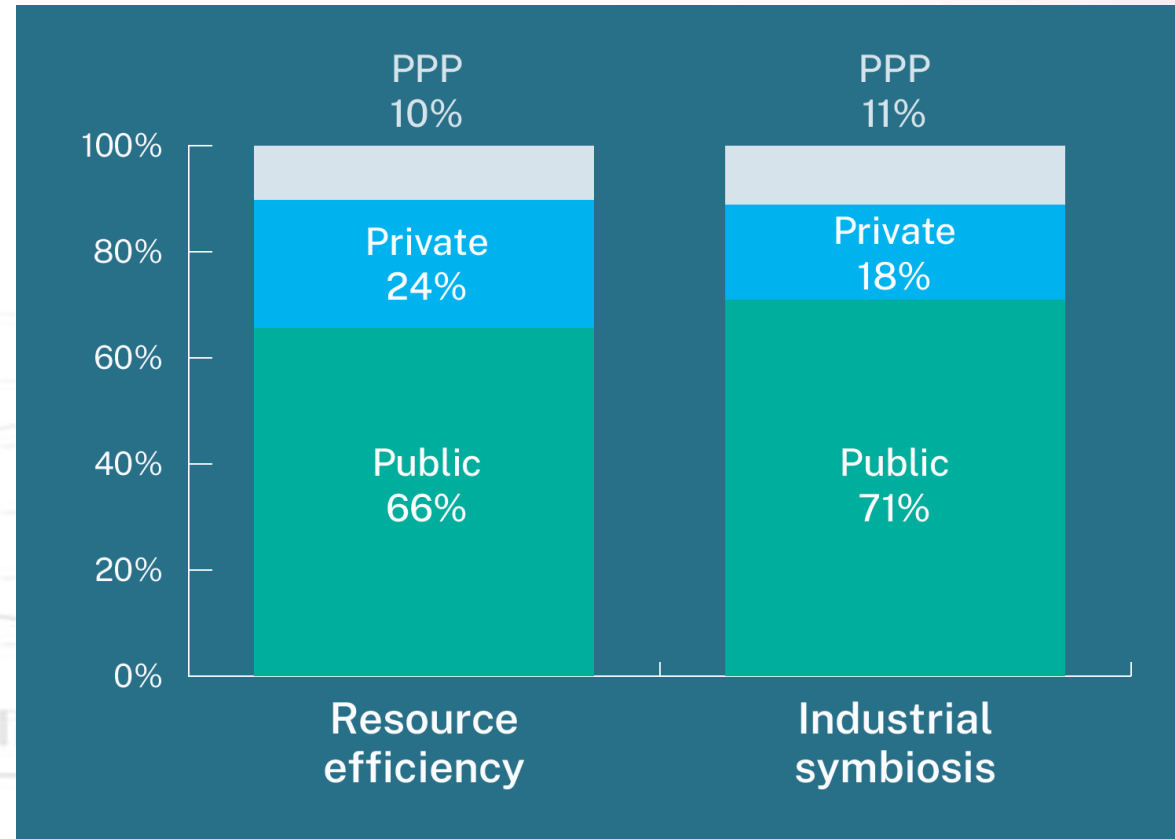
Key observations from international Eco-industrial Parks

57.5% of EIPs have industrial symbiosis or resource efficiency measures in place



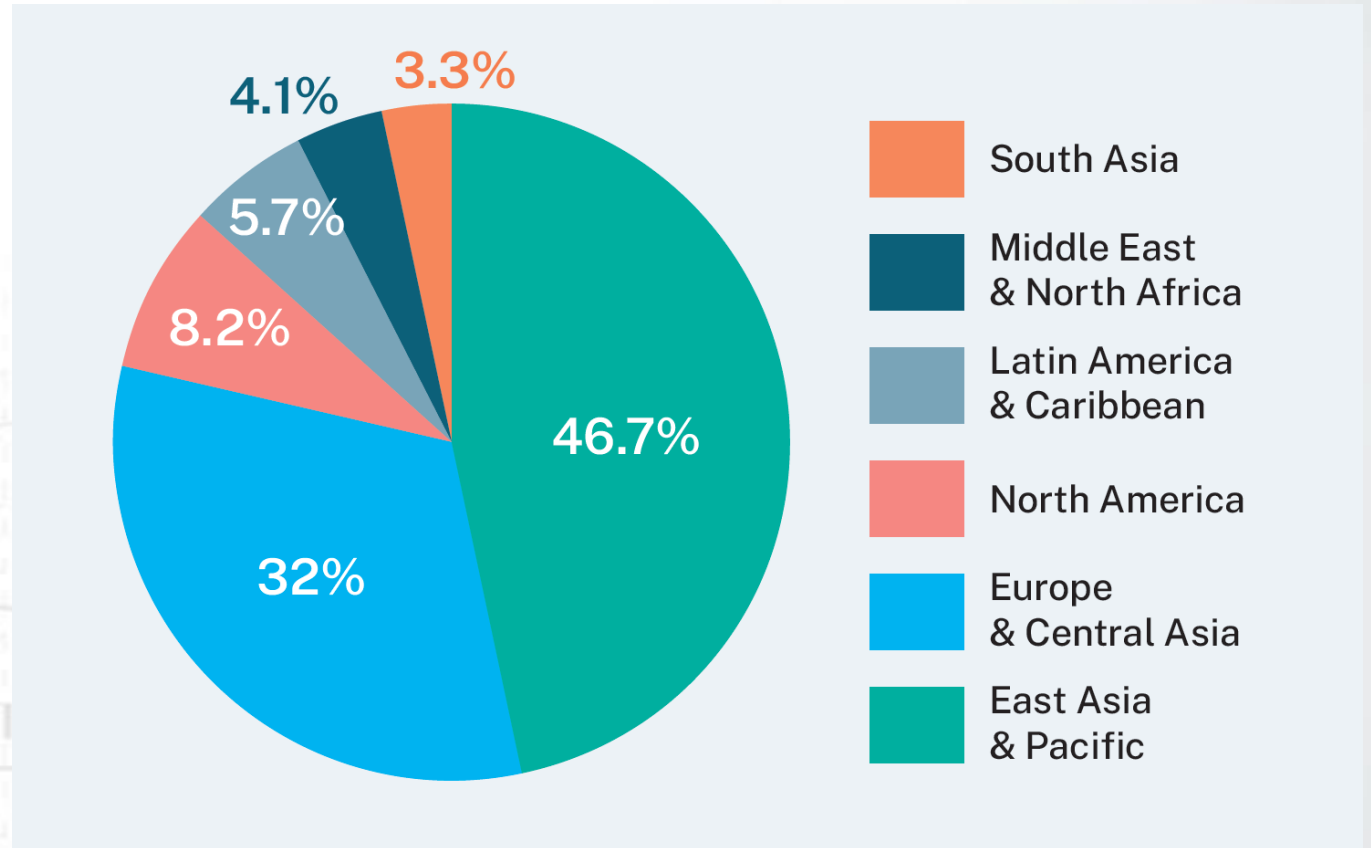
Key observations from international Eco-industrial Parks

Public support for investment in resource efficiency is prevalent



Key observations from international Eco-industrial Parks

Geographic distribution of surveyed EIPs investing in industrial symbiosis



Eco-industrial parks are building blocks of a Circular Economy

- They enhance circularity of resources by reducing the dependence on non-renewable resources
- Promote recycling and reuse of resources and waste including through industrial symbiosis and renewable/bio-based inputs
- Tenant firms can achieve more cost-efficient production that is resilient to price fluctuations and resource scarcity
- EIPs through focused circular economy interventions can support:
 - the greening and decarbonization of value chains
 - Improve resource management and conservation

Conclusions

- Eco-industrial parks are considered key building blocks for a circular economy
- Countries with complex economies are doing better implementing Circular Economy technologies in industrial parks
- Waste treatment strategies are the most widely implemented strategies in EIPs across the world which is an indication that Circular Economy is still widely viewed as improved waste management
- Resource efficiency strategies are least implemented, whereas a move towards a circular economy calls for increased resource efficiencies.
- Industrial symbiosis and waste exchange is gaining momentum in South Africa
- Rethinking business models and designing out waste is where the focus should be if want to transition to a circular economy which reduce waste and increased resource efficiencies

References

- CSIR 2021, Driving economic growth in South Africa through a low carbon, sustainable and inclusive circular economy. Briefing Note 2021/001
- Worldbank 2021, Circular Economy in Industrial Parks: Technologies for Competitiveness

The background features a complex, layered design. On the left side, there are several interlocking gears of various sizes, some rendered in a lighter blue and others in a darker blue. These gears are set against a background of overlapping, semi-transparent geometric shapes, primarily triangles and polygons, in shades of blue. The overall effect is a technical and industrial aesthetic.

END

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