



# Introduction to Circular Economy

## *Part 2. Circular product manufacture and design, plus distribution: examples of practices and policies*

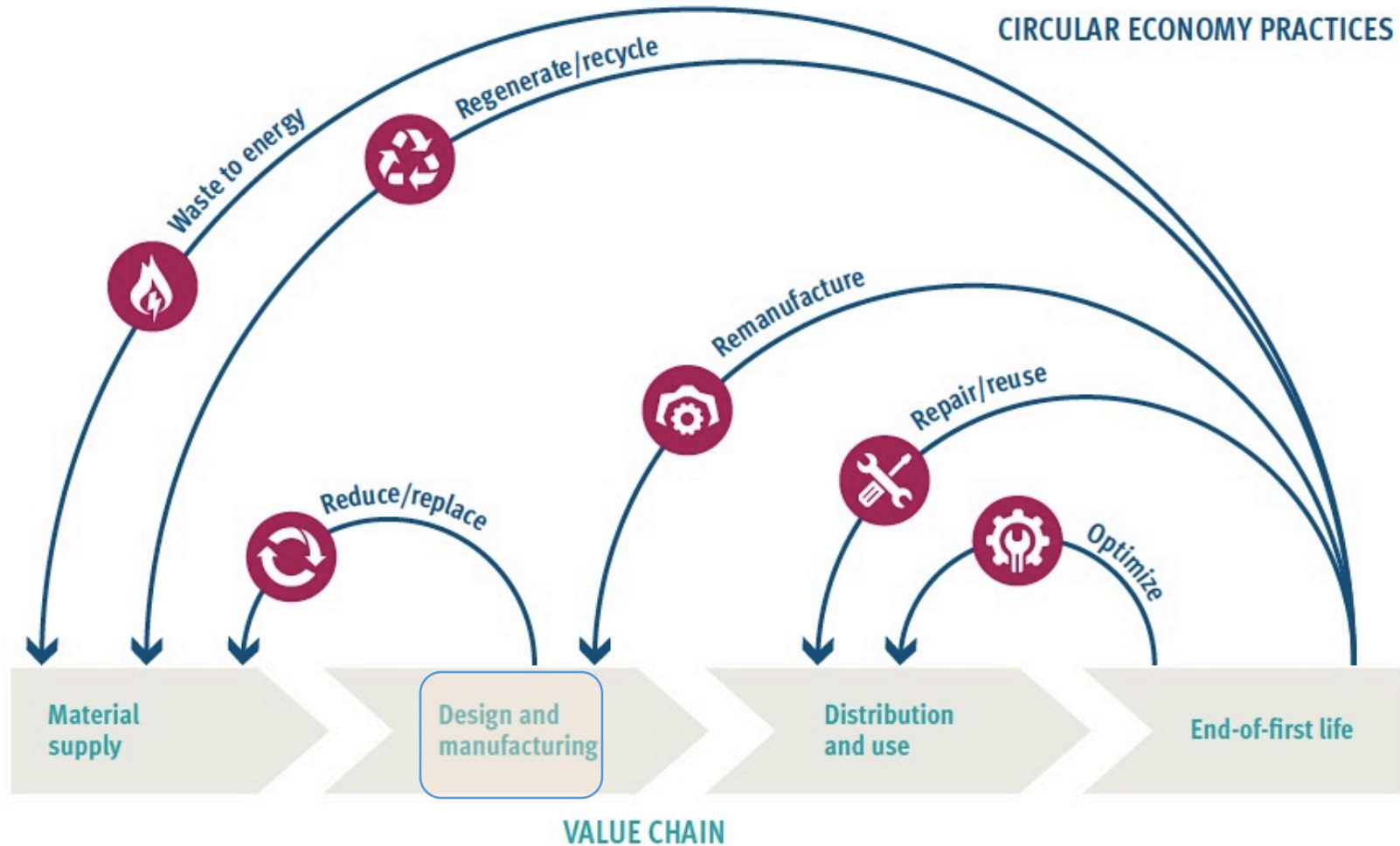


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## CE approaches in the manufacturing sector

- There are two different areas where the manufacturing sector can adopt circular economy practices:
  - In its operations (the manufacturing processes)
  - In its product design.
- Policies can be brought to bear in both areas.
- Will deal with operations first, and product design afterwards.

# CE strategies implemented during manufacturing

- The most important CE strategies implemented in manufacturing are:
  - “Narrowing” flows, through:
    - ✓ Efficiency improvements;
    - ✓ Elimination/reduction in use of toxic/hazardous substances;
    - ✓ Use of wastes to make by-products (also a design issue).
  - “Closing loops”, by:
    - ✓ The recycling of product parts through remanufacturing, refurbishing, and;
    - ✓ The recycling of materials locked up in used products back to new use.
- Closing loop strategies will be covered in the fourth presentation.

## “Narrowing” in Enterprises: Example of efficiency improvements

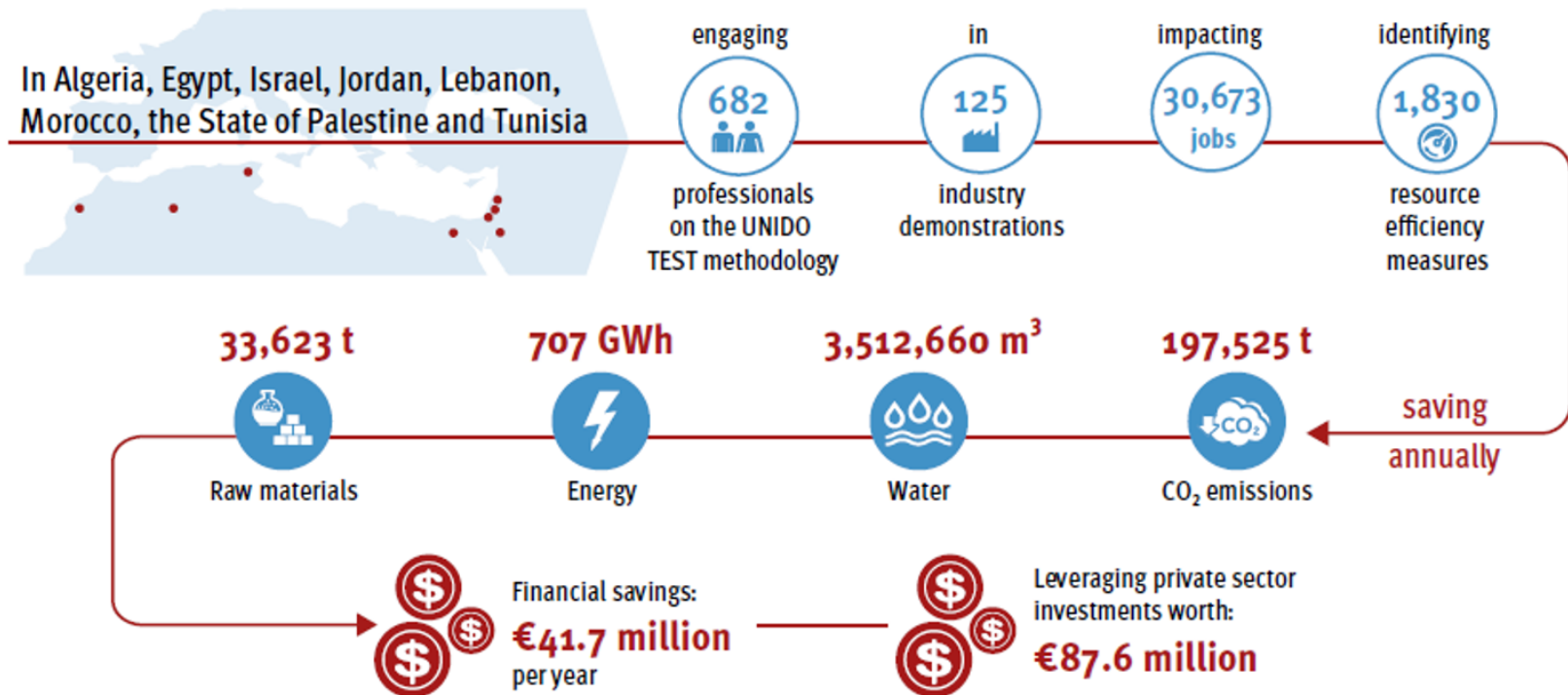
- Century Bottling Company, Uganda, made several changes to its bottling lines:
  - Installation of timers on its conveyor lines to regulate flow of conveyor lubricant, and a pump on PET bottle conveyor lines to supply and monitor usage of dry lubricant.
  - Introduction of annual bottle washer descaling.
  - Better protection in the final rinse after bottle washing.
- These changes led to reductions in chemical usage, water consumption, and energy consumption. In turn, these led to a 25% reduction in the company’s operating costs.
- These changes were brought about through a **Chemical Leasing contract** with the company’s chemicals supplier, Diversey Eastern and Central Africa Ltd.
- Chemical leasing contracts are an important example of the concept of selling services rather than products. Such contracts will play an important role in implementing circular economy.



## “Narrowing” in Enterprises: Example of efficiency improvements & Reductions in toxics use

- An Egyptian manufacturer of solvent-based printing inks for the home market and broader MENA region made several changes to its operations:
  - It covered its mixing vessels to prevent evaporation of solvents.
  - It installed a unit to recover waste solvents.
- These changes led to reductions in the amounts of solvents the company was using, thus also reducing its operating costs.
- The company plans to eliminate the use of solvents completely by transitioning from solvent-based inks to water-based inks, to take advantage of a growing international market in eco-friendly water-based inks.
- Product (re)design will play an important role in the implementation of circular economies.

# Resource efficiency: environmental and economic sense





## “Narrowing” in Enterprises: Example of Waste to By-product

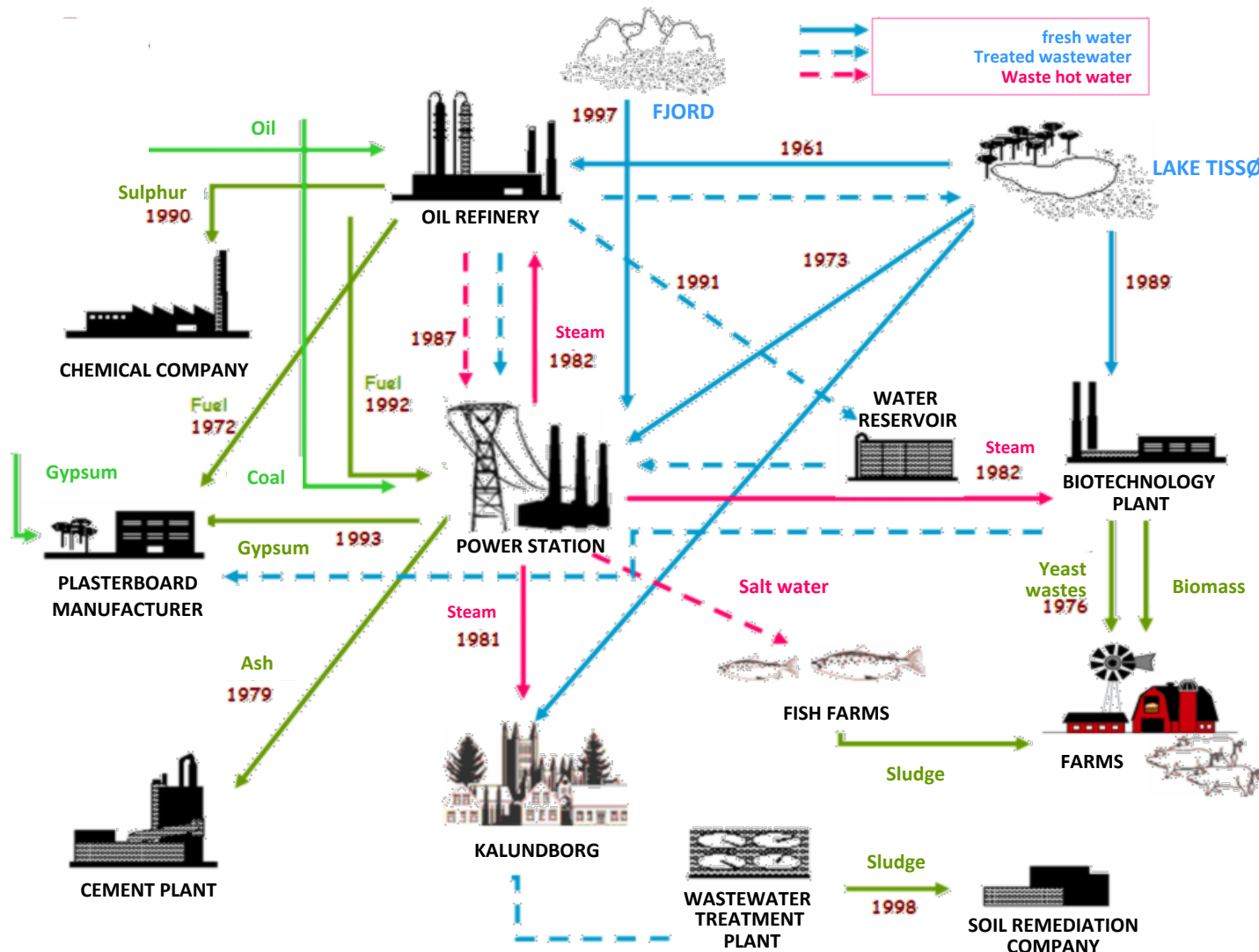
- Many countries in the world (including many African countries) grow bananas and plantains commercially. Substantial amounts of agricultural residues and agro-processing waste streams are generated in the process. Currently, these residues are either not reused or have only low-value reuse.
- Much R&D is currently ongoing in how to use / better use these residues. Possible by-products are:
  - As fibre in fibreboard and pulp.
  - As feedstock to produce bioethanol, biogas, and briquettes.
  - As feed for livestock.
  - As starting material for the extraction of pectin, starch, dietary fibre, minerals, neutraceuticals ...
- Governments will be actively promoting and supporting this kind of R&D as well as R&D in many other aspects of circular economies.



# “Narrowing” through industrial symbiosis: Example of Kalundborg, DK

- Originally, there was a power station and a pharmaceutical company.
- An oil refinery was planned but initially could not be established due to a lack of an adequate water source.
- The oil company and existing industries developed a new joint water supply to enable oil refinery investment in late 1960s.
- Since then, the original industries have expanded gradually and new ones have opened (gypsum, waste recovery), based on expanding resource sharing.
- Local farms have become involved, and so has the municipality.





# Policies to promote CE approaches in manufacturing

- Remove subsidies from virgin raw materials (e.g., on fossil fuels)
- Place taxes on virgin raw materials (e.g., carbon tax)
- Make special loan programmes available for clean / green technologies
- Fund / co-fund:
  - demonstration programmes
  - R&D into clean / green technologies
  - R&D into upcycling of residues into new and higher value products
- Lower tariffs on imported clean / green technologies



- Require the bigger material & energy users to report publicly on the amounts they use and waste



- Make information, training, expert support available to companies – free or at a subsidized cost. Purpose: to build awareness, knowledge, skills:
  - ✓ Awareness-raising courses.
  - ✓ Information dissemination (e.g., case studies, info on technologies, guidelines, manuals).
  - ✓ Training courses.
  - ✓ Offer audits /assessments.

- Link voluntary actions to regulatory instruments:
  - ✓ “Implement an EMS to get an operating license”
  - ✓ “Do a Cleaner Production assessment to get more time to fix a non-compliance”

- Establish PPPs to transform existing industrial parks into eco-industrial parks (EIPs), and to set up new EIPs

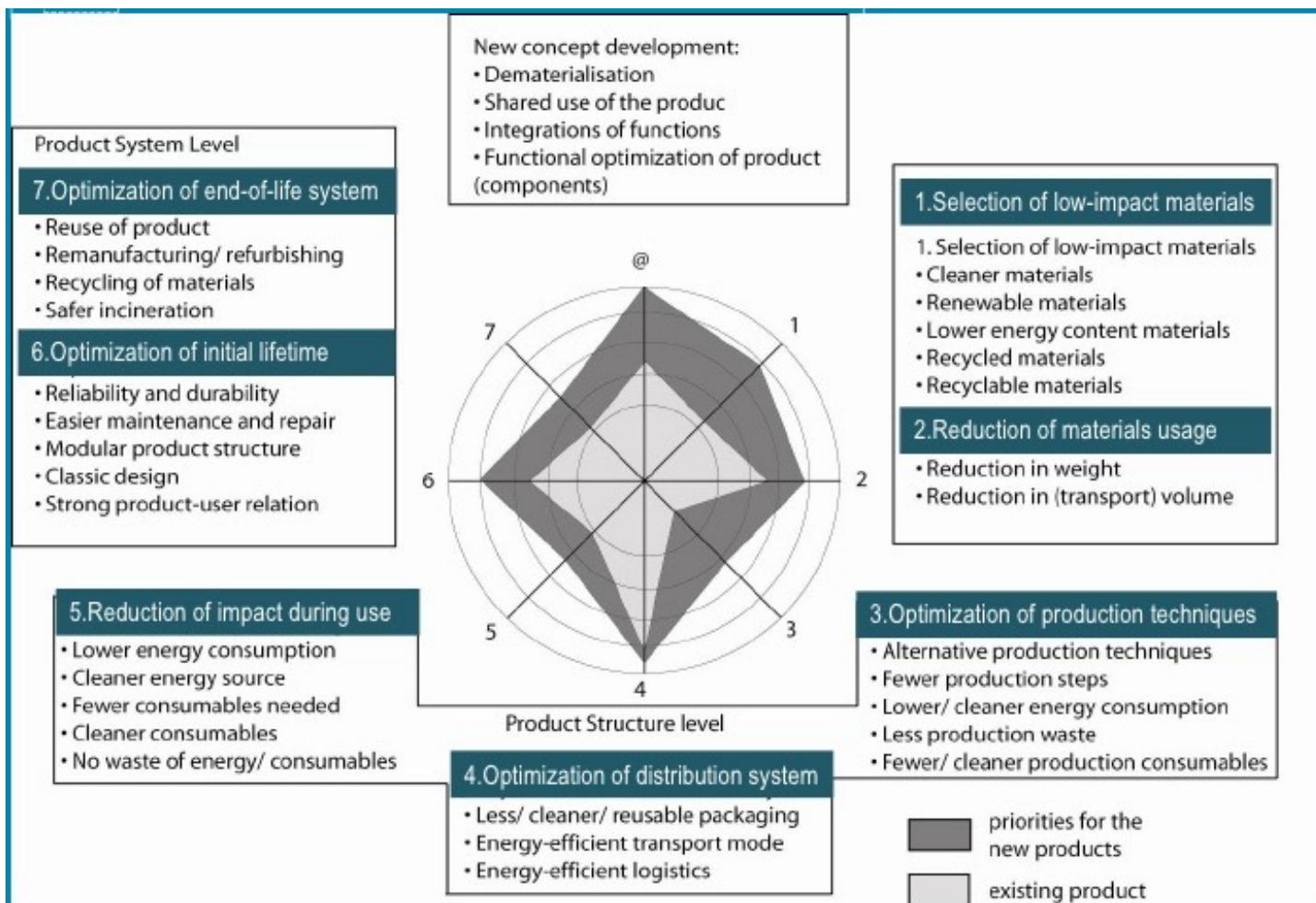
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## Circular Economy and Product Design

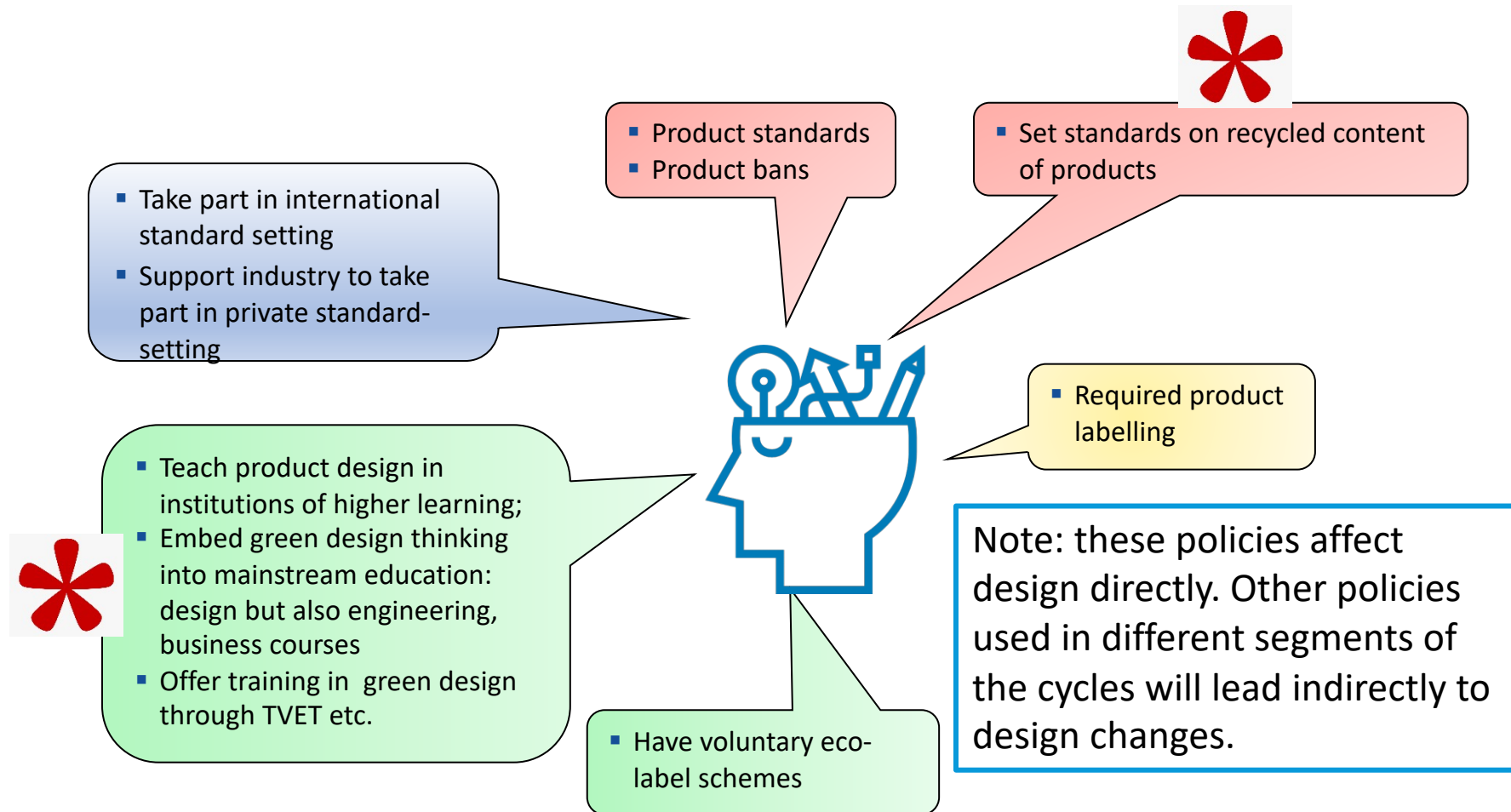
- Product design is **key** to making a circular economy happen. Products cannot be:
  - Produced efficiently
  - Used efficiently
  - Repaired economically
  - Used properly in the shared economy
  - Remanufactured / refurbished economically
  - Actually recycled (rather than just be “recyclable”)
  - Composted or anaerobically digested safely and economicallyunless they are designed for that purpose.
- Part of the pressure to redesign will come from companies reacting to the policies implemented in the various phases of the circular economy. Part will come from policy pressures on the design process itself. Part will come from company management choosing business models for circularity.

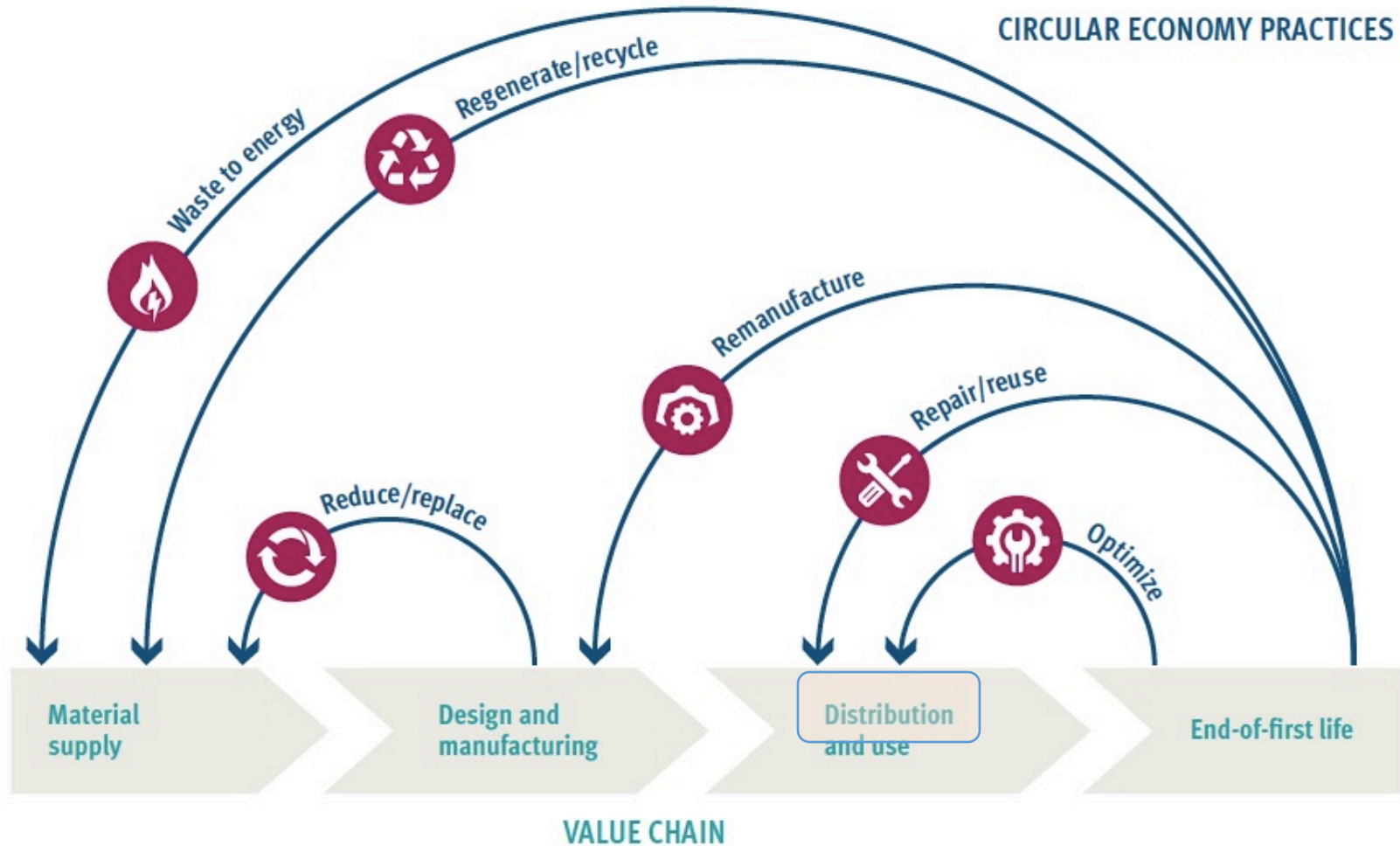


# Circular design strategies



# Policies to promote CE approaches in product design





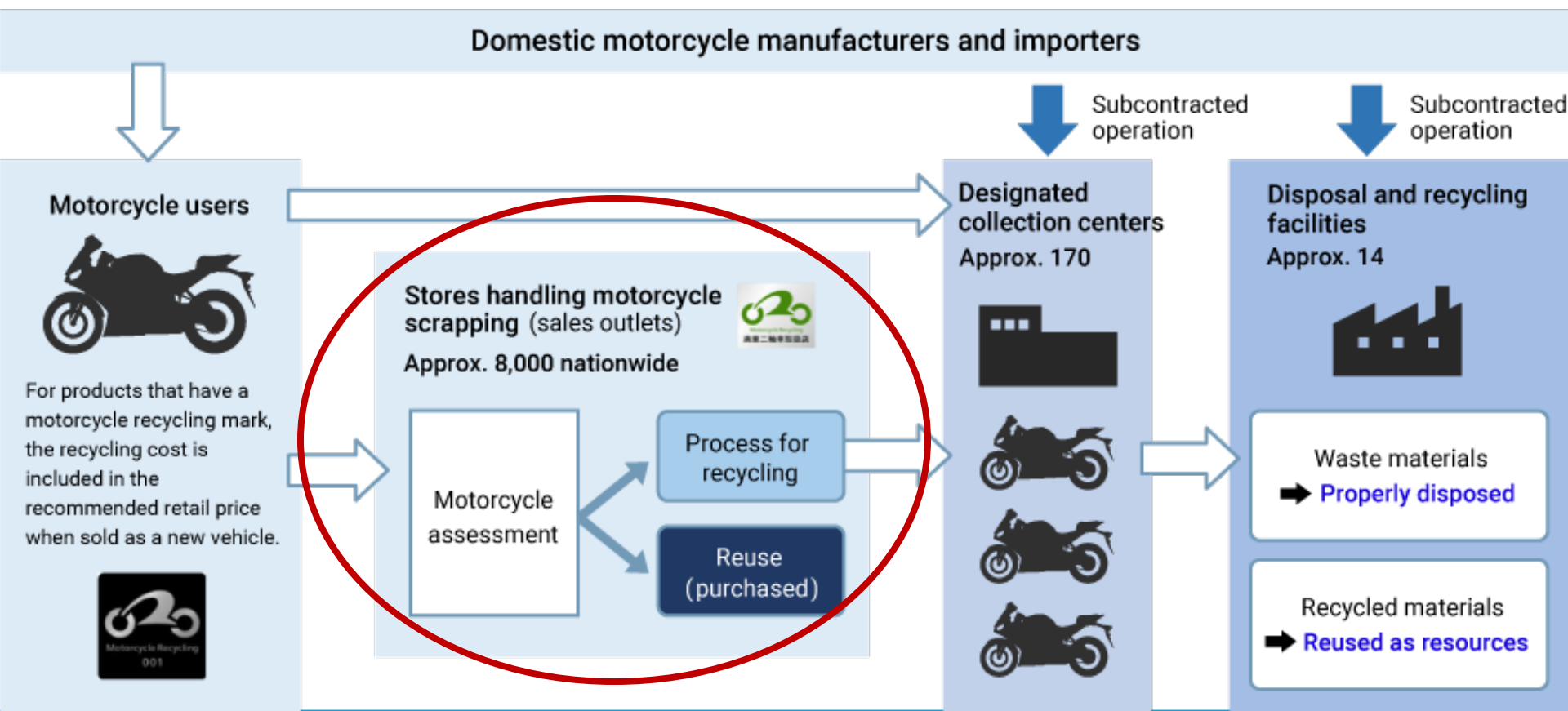


## CE Strategies in the Distribution Chain

- Entities in the distribution chain can **optimize** their delivery of products so as to:
  - Prevent the loss of products through spoilage (esp. food products);
  - Minimize the use of tertiary packaging used in shipping and distributing goods: slip sheets, pallets, stretch wrap, strapping labels, ...;
  - Minimize transportation distances.
- They can also offer **maintenance / repair** services to users, to help them extend the lifetime of products.
- They can also distribute used products for **reuse** as second-hand products, to help extend the lifetime of products in the economy.
- They are also becoming key players in the “reverse logistics” that are part of the new business strategies which companies are adopting to bring used products to **remanufacturers / refurbishers** and **recyclers** (often driven by Extended Producer Regulations).

# Example of the Role of the Distribution Chain

## Motorcycle Recycling System, Japan





# Questions?

