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GEIPP
GLOBAL ECO-INDUSTRIAL PARKS PROGRAMME

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WASTE REUSE AND CIRCULAR ECONOMY

Alessandro Flammini, PhD

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Triple planetary crisis

Climate change

Biodiversity loss

Pollution

… caused largely by the
unsustainable use of resources

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Our world is too small for

"take-make-use-waste" practices

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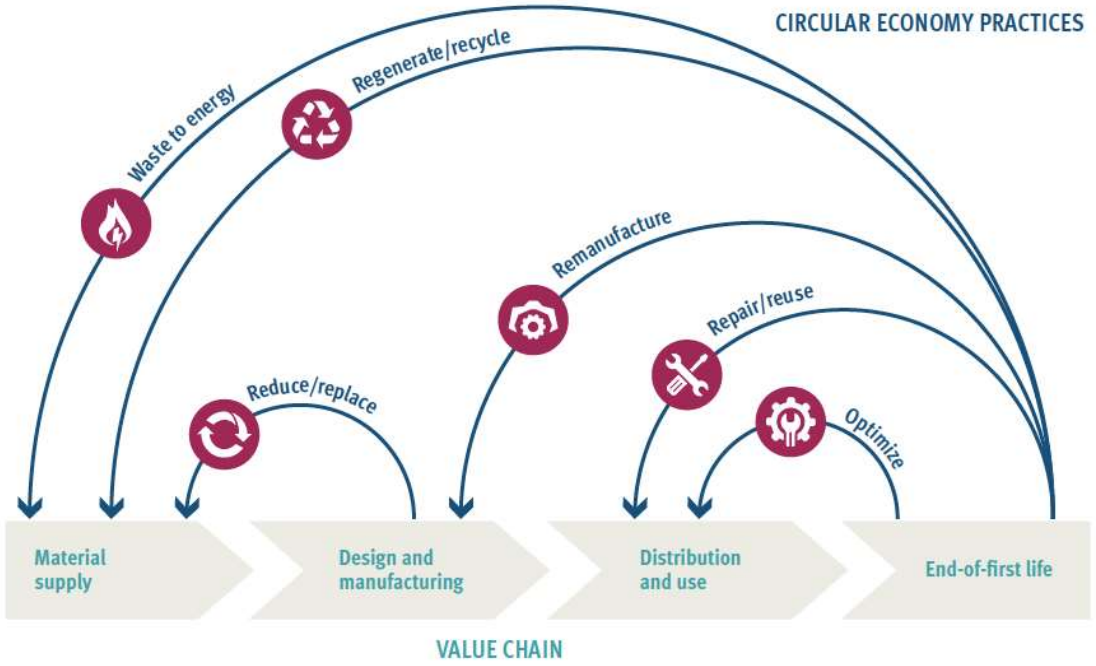
Solution: "Just transitions to circular economy"

- **Returns products, parts and materials into use several times by:**
  - **Designing** products **to last**
  - **Maintaining value** for as long as possible **in the economy**
  - **Minimizing** generation of **waste and pollution**, and
  - Using **renewable energy** along value chains



Enablers: Innovation, Digitalization, Leadership, and Collaboration between businesses, governments, and consumers

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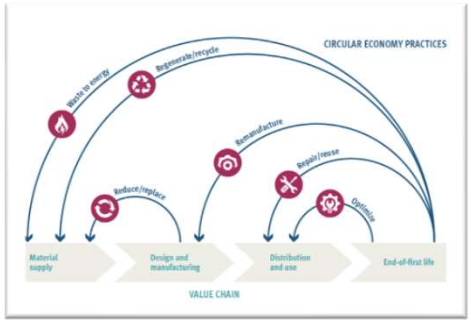
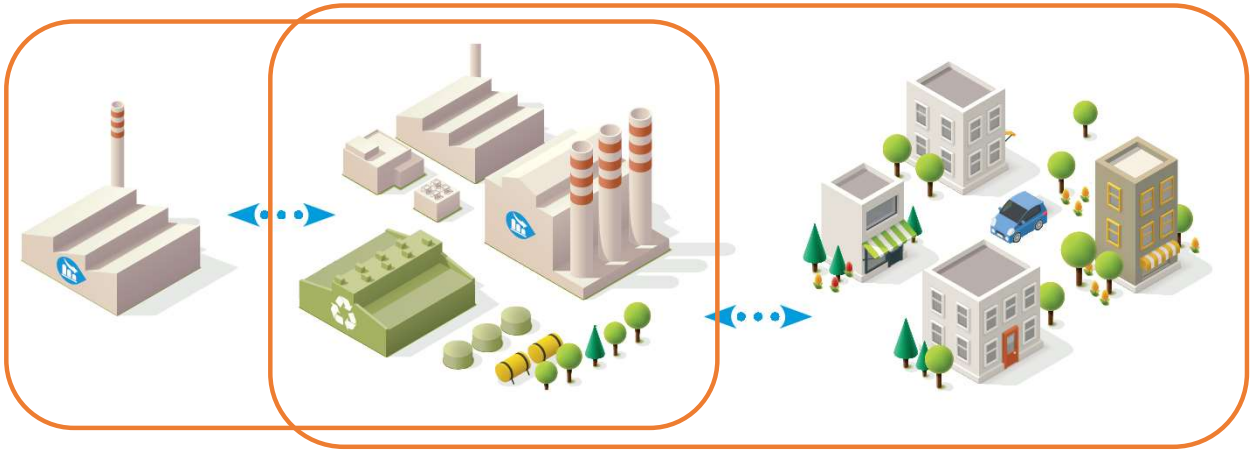
The EIP model contributes to CE in industry



The EIP Model



Many circularity approaches in within industrial parks are already captured by EIP in the form of

- Industrial synergies (and symbiosis) and
- joint or shared management services.

This includes also in-park waste exchanges.

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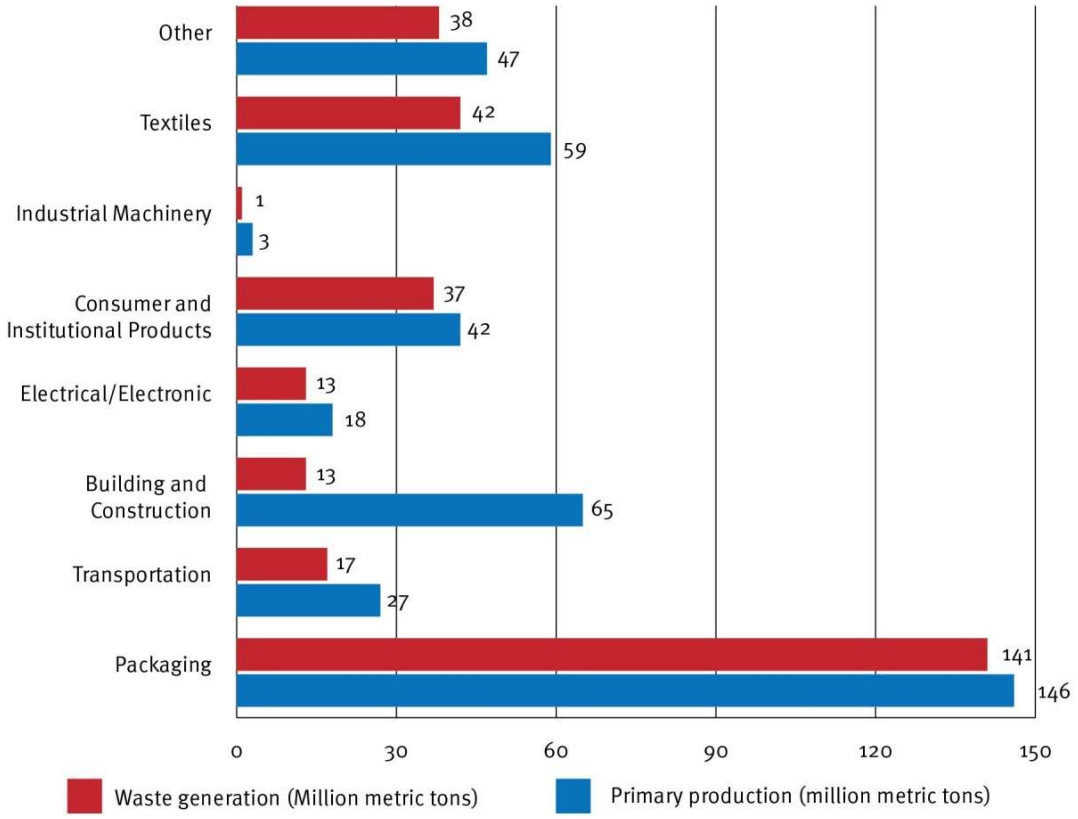
Example: Plastics

- by sector



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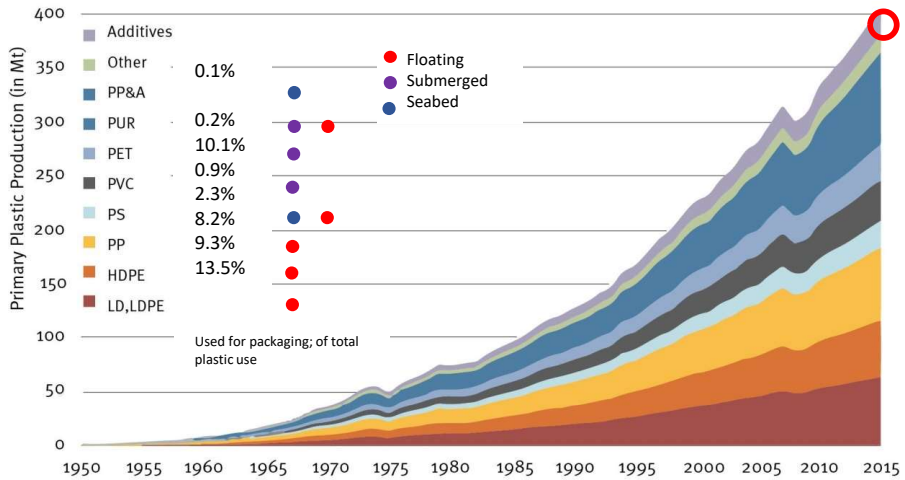
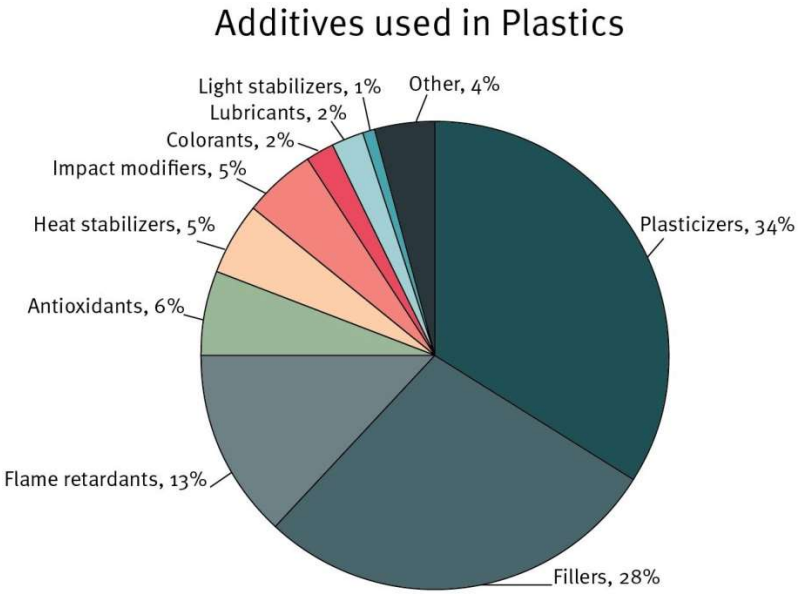
Example: Plastics

- Universally used
- Very differentiated group of materials





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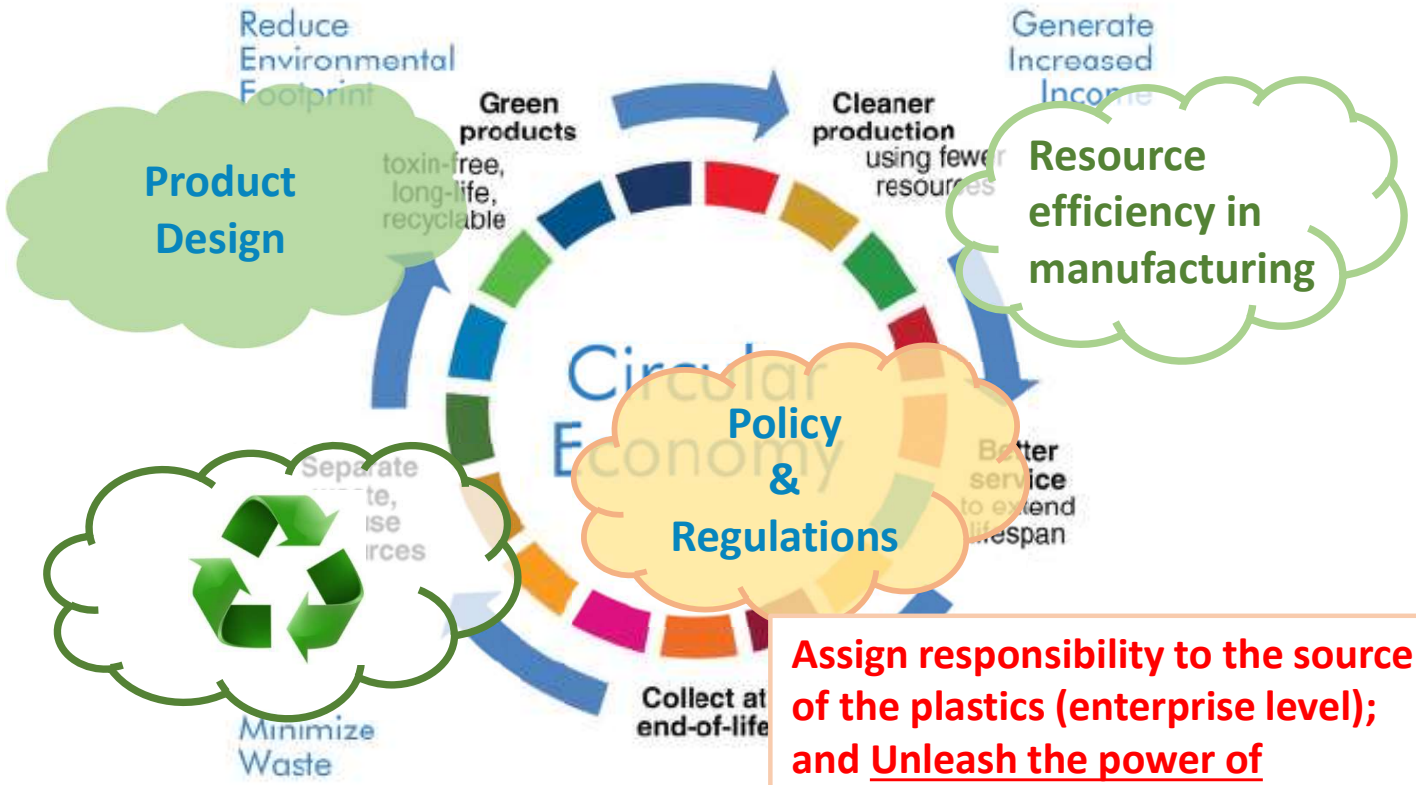
Unleash the power of economics



Assign responsibility to the source of the plastics (enterprise level); and Unleash the power of economics

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By-products to new products: saw dust to sweetener, fibers,..

Traditional, low value

Innovative, high value

- Valorization of **saw dust** to obtain a variety of high-value marketable chemicals
- New value chains for high value products –
  - **Xylose** for conversion to **Xylitol** (artificial sweetener)
  - Pine oil
  - Nanocrystalline cellulose fibres

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South Africa

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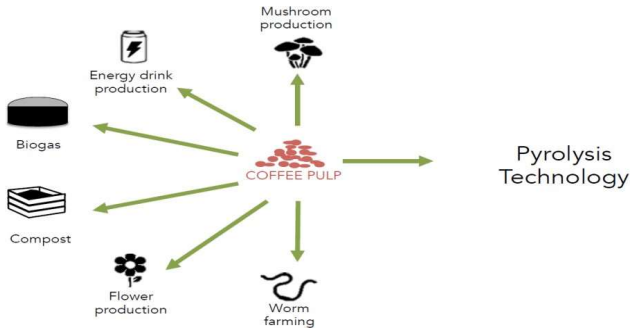
By-products to energy : coffee husks (in Dak Lak)

Coffee sector generates large amount of by-products, mainly coffee pulp

large volumes of "waste" biomass, rich in nutrients



Pyrolysis Technology

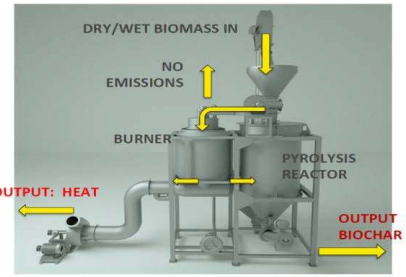
Current pyrolysis systems…

Traditional Production (Charcoal)

Industrial Production

… are not appropriate and/or too expensive for tropical farming

New pyrolysis technology, a climate positive Technology



- is affordable
- is compliant with international quality standards
- is scalable for big producers & small farmers
- can be integrated in existing drying systems

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Promoting waste reuse in industrial parks

- Industrial parks are key business infrastructures; their sustainability and inclusiveness matter
- Industrial parks are ideal to implement circular economy practices
- Countries and industrial park stakeholders are increasingly requesting "standards" or "benchmarks" to ensure that industrial development is inclusive and sustainable

- Voluntary Standards
- National Regulations
- Regulatory barriers

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Example: Barriers to the reuse of solid waste (non-hazardous)

In Colombia, the rules establishing the Free Trade Zones (FTZs) are a barrier to implementing industrial symbiosis projects where the waste is generated in the zone and is being sent to a reuser located outside the zone, or vice versa. FTZs are parks where raw materials or parts are imported from another jurisdiction. These raw materials or parts are used to manufacture a product, which is then re-exported to another jurisdiction. All this taking place under specific customs regulations where neither the imported materials/parts nor the final products are subject to customs duties.

It may be impossible to allow the entry of a waste from the rest of the economy into the FTZ, but possible to allow a waste to exit the FTZ and to enter the rest of the economy.
The rules establishing FTZs would need to create a process whereby a generator of a waste in the FTZ can request special permission to send the waste to a reuser outside the FTZ, with the provison that the generator would need to pay customs duties on that transaction.

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Some ISO standards related to recycling, reuse of industrial solid waste

ISO 18604:2013 Packaging and the environment — Material recycling
ISO 18606:2013 Packaging and the environment — Organic recycling
ISO 15270:2008 Plastics — Guidelines for the recovery and recycling of plastics waste
ISO 20819:2018 Plastics — Wood-plastic recycled composites (WPRC) — Specification
ISO 12418-1:2012 Plastics — Post-consumer poly(ethylene terephthalate) (PET) bottle recyclates
ISO 18263-2:2015 Plastics — Mixtures of polypropylene (PP) and polyethylene (PE) recyclate derived from PP and PE used for flexible and rigid consumer packaging
ISO 14021:2016 Environmental labels and declarations
ISO 14025:2006 Environmental labels and declarations
ISO/CD 12843 Plain bearings — Reuse, recycling and disposal of plain bearing materials
ISO 22450:2020 Recycling of rare earth elements — Requirements for providing information on industrial waste and end-of-life products
ISO/TS 22451:2021 Recycling of rare earth elements — Methods for the measurement of rare earth elements in industrial waste and end-of-life products
ISO 22453:2021 Exchange of information on rare earth elements in industrial wastes and end-of-life cycled products
ISO/TR 23891:2020 Plastics — Recycling and recovery — Necessity of standards

Example: Regulations in EU

- Waste Framework Directive 2008/98/EC (WFD): introduces an order of preference for waste management called the “waste hierarchy”. It is a programmatic legal instrument setting the agenda for sustainable production and consumption.
- According to Art. 6 WFD End of waste, waste can achieve, after undergoing a recovery operation, a non-waste status. Criteria must comply with the following cumulative conditions:
  1. The substance or object is commonly used for specific purposes;
  2. A market or demand exists for such a substance or object;
  3. The substance or object fulfils the technical requirements for the specific purpose and meets the existing legislation and standards applicable to products;
  4. The use of the substance or object will not lead to overall adverse environmental or human-health impacts.
- Certain categories of waste require specific approaches. Therefore, as well as the overarching legal framework, the EU has many laws to address different types of waste:

  Batteries and accumulators; Biodegradable waste; Construction and demolition waste; End-of-life vehicles; Landfill waste; Mining waste; Packaging waste; Polychlorinated biphenyls and polychlorinated terphenyls (PCBs/PCTs); Restriction of Hazardous Substances in Electrical and Electronic Equipment (RoHS); Sewage sludge; Ships; Waste containing POPs; Waste oil; Waste from Electrical and Electronic Equipment (WEEE)

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Example: Regulations in EU

EU also issued mandatory regulations implementing Extended Producer Responsibility (EPR) to control four types of waste, namely

- batteries and accumulators (B&A);
- electrical and electronic waste (WEEE);
- end-of-life vehicles (ELV) and
- packaging.

In general, EPR programs are implemented through national regulations or voluntary programs, including programs to control wastes such as:

tyres, waste oil, graphic paper, agricultural plastics, drugs and health products, plastic bags, photographic chemicals and chemicals, newspapers, refrigerants, pesticides and herbicides, lamps, bulbs and accessories, textiles, building materials, etc

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Regulations in Vietnam ?

- Industrial waste is an untapped RESOURCE in Vietnam, but…
- You can manage what you can measure (..and report ..and verify)

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