



Green Industry *for* Circular Economy

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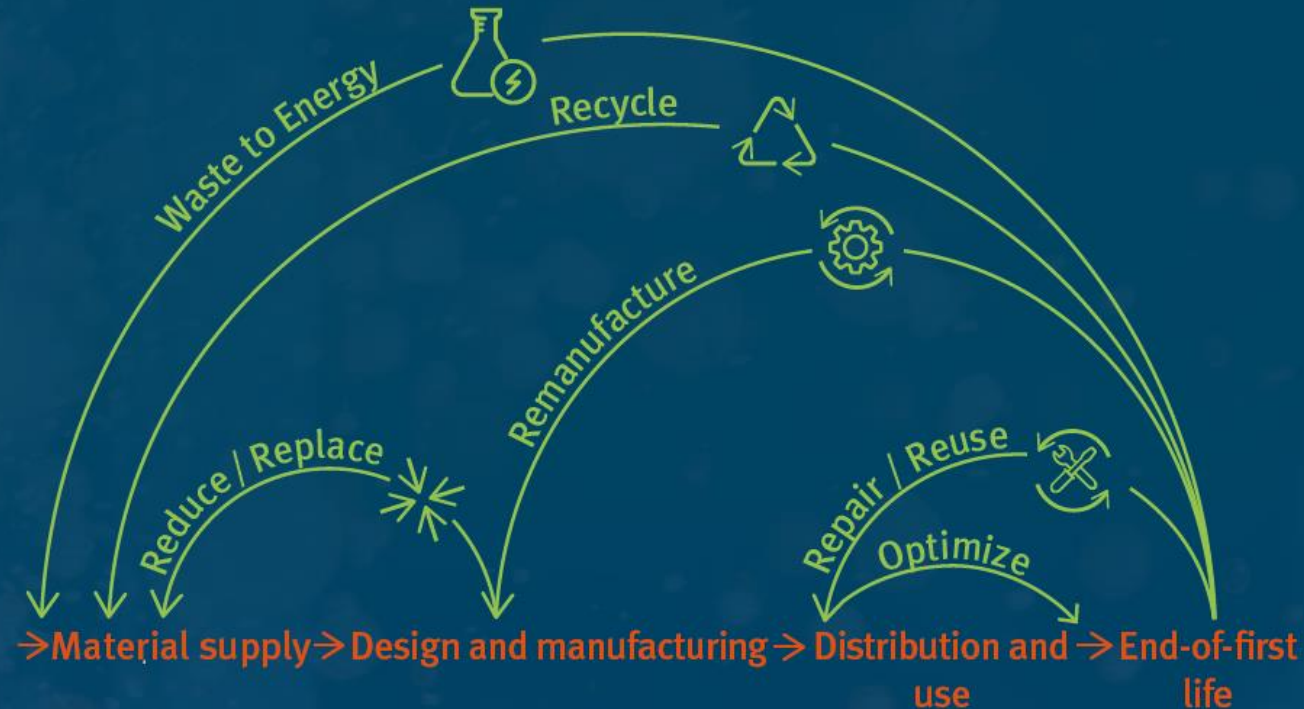
24 November 2020



UNIDO defines circular economy as an industrial economy that routes materials, parts and products back into use several times and creates more value and less waste. It is an alternative in which value is maintained for as long as possible, products are designed to last, and the generation of waste is minimized.

■ Linear supply chain

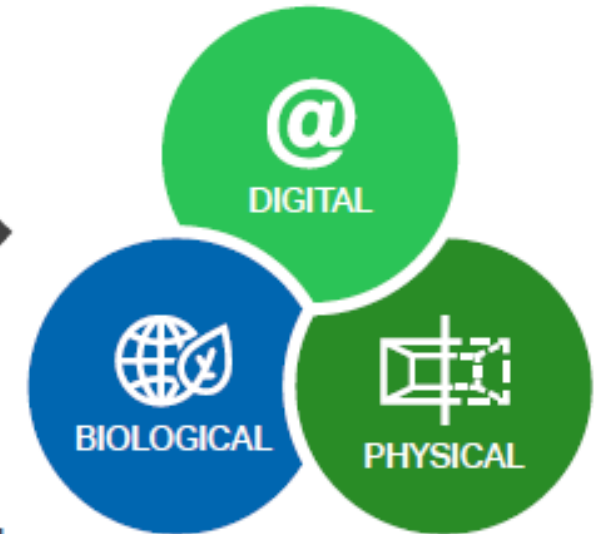
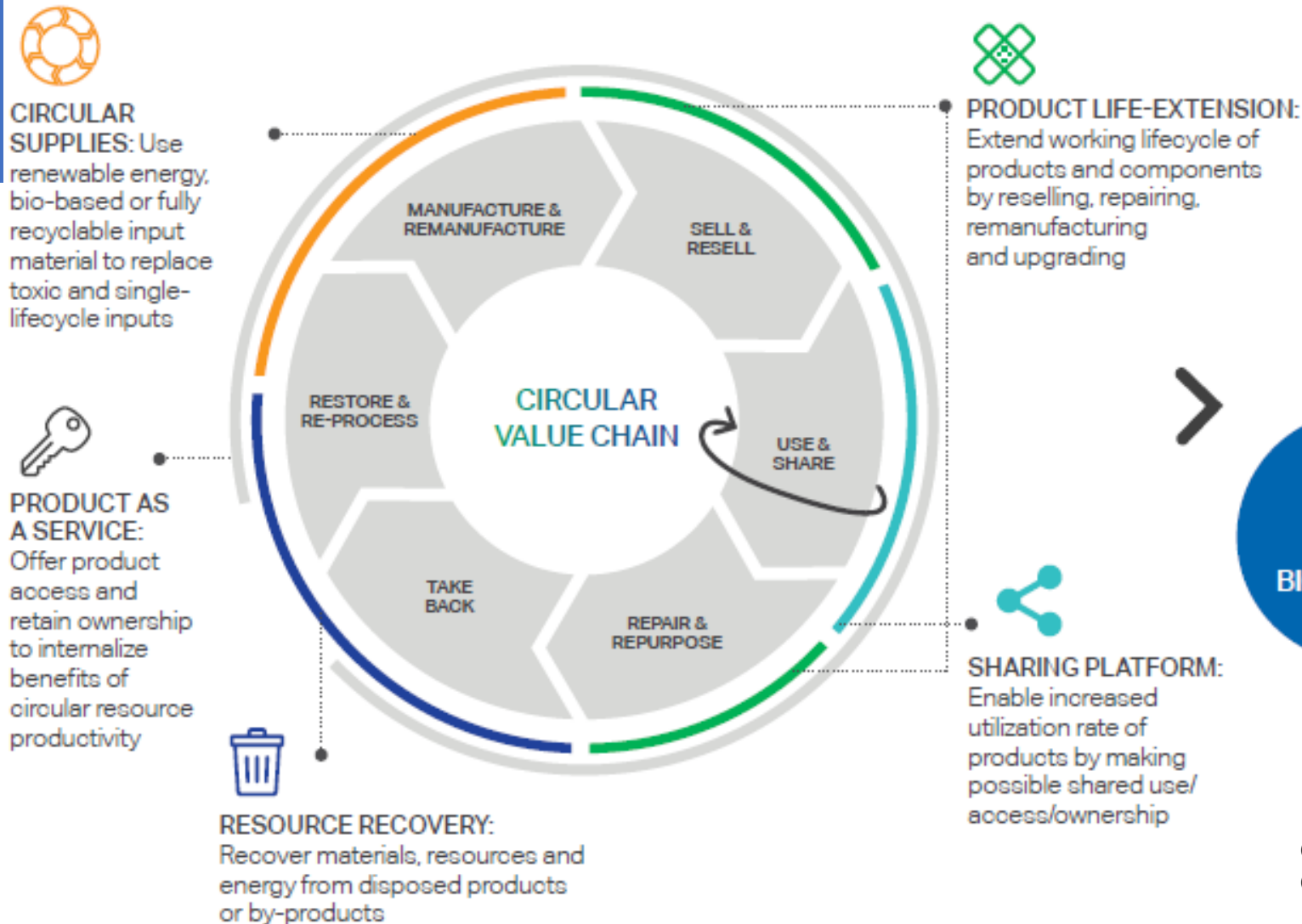
■ Circular economy practices



UNIDO, 2019

Five business models

Three disruptive technologies



CEO Guide to the Circular Economy, World Business Council for Sustainable Development, 2017

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ECONOMIC OUTCOME: increased resource productivity

- Reduced production costs and improved competitiveness
- New business activities and models
- New markets and investment opportunities
- Enhanced consumer loyalty
- Increased long-term availability of supply

ENVIRONMENTAL OUTCOME: reduced environmental impact

- Reduced emissions of greenhouse gases
- Reduced emissions of pollutants and end-of-life waste
- Quality of ecosystem services ensured
- Natural resources (water, land and materials) preserved
- Biodiversity safeguarded

SOCIAL OUTCOME: improved well-being

- New jobs and incomes
- Improved health and working conditions
- New partnerships and collaborations
- Innovations and technologies that make life easier

Circular \neq Recycling

3R

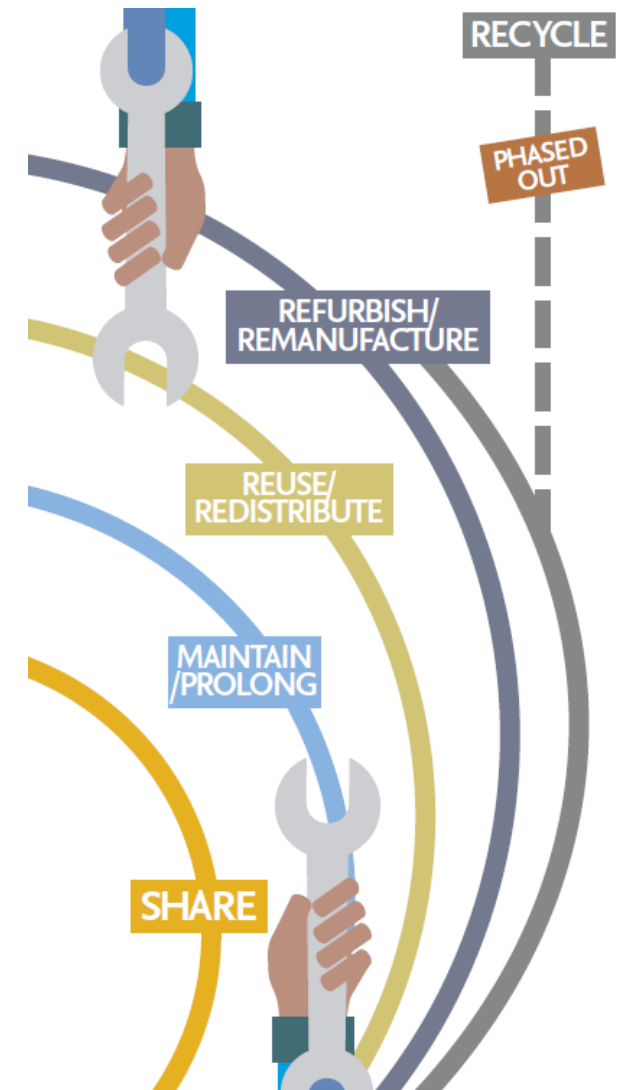
Reduce
Reuse
Recycle

6R

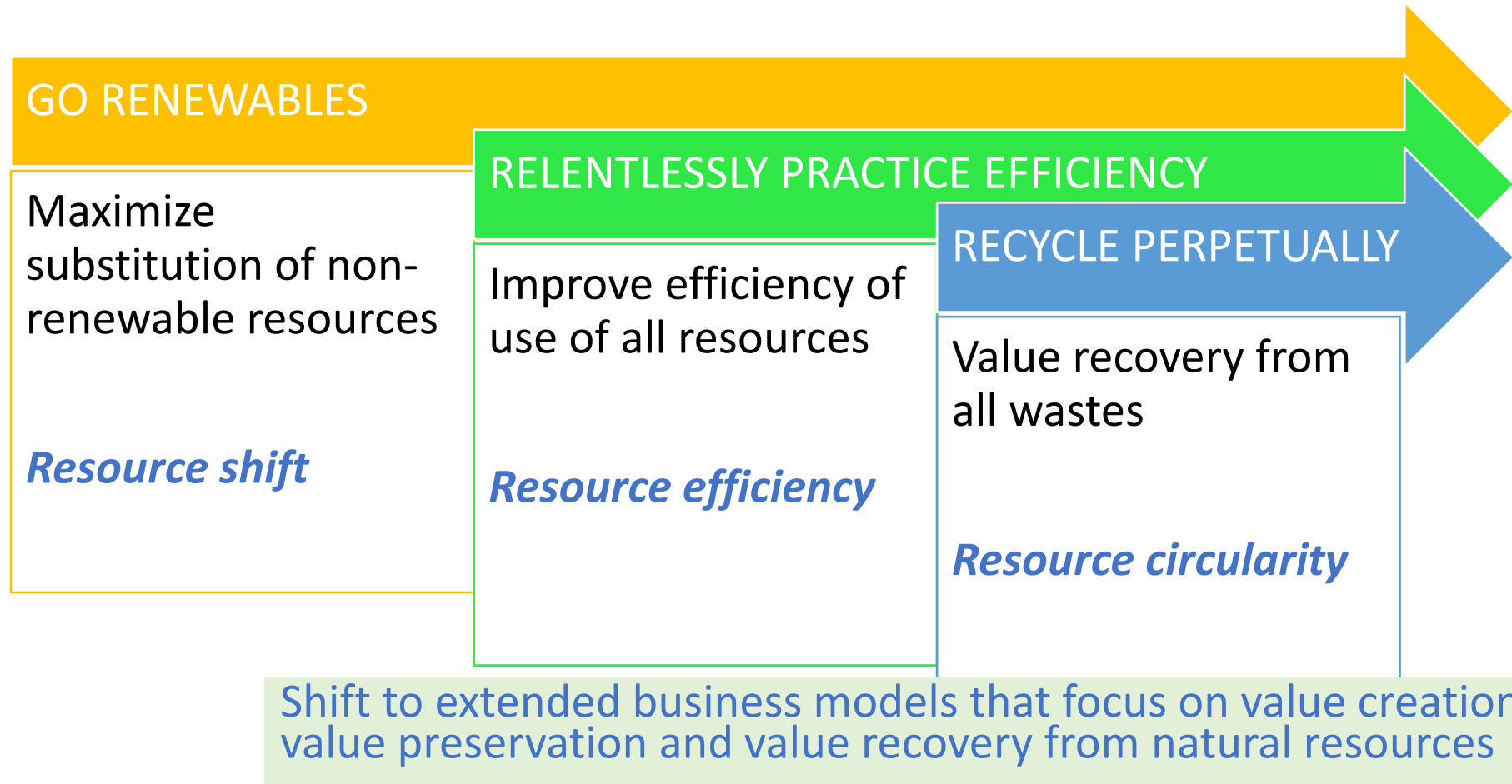
Rethink
Refuse
Reduce
Reuse
Repair
Recycle

12R

Reduce
Reuse
Recycle/reclaim
Repair
Refurbish/recondition
Remanufacture
Repurpose
Redesign
Research/develop
Reskill
Reverse (logistics)
Re-vision (production)



Industry Agenda for Circular Economy

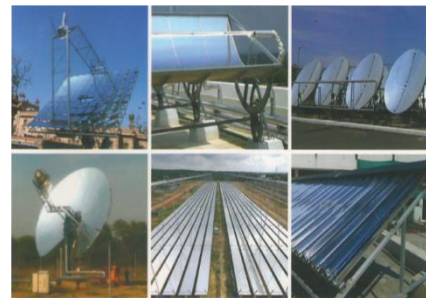


Van Berkel & Fadeeva, 2020

1. Go Renewable

Resource Man Made Systems up to Nature's Capability

- Solar Heating of Industrial Process
Advanced dehydration unit based on conduction, convection and radiation



Concentrating Solar Thermal proven up to ~400°C, covering ~52% of industrial heat use



- Process & Product Innovation



Water purification without chemicals or energy



Enzymes as biocatalyst for production of antibiotics, at room temperature, without solvents and higher efficiency

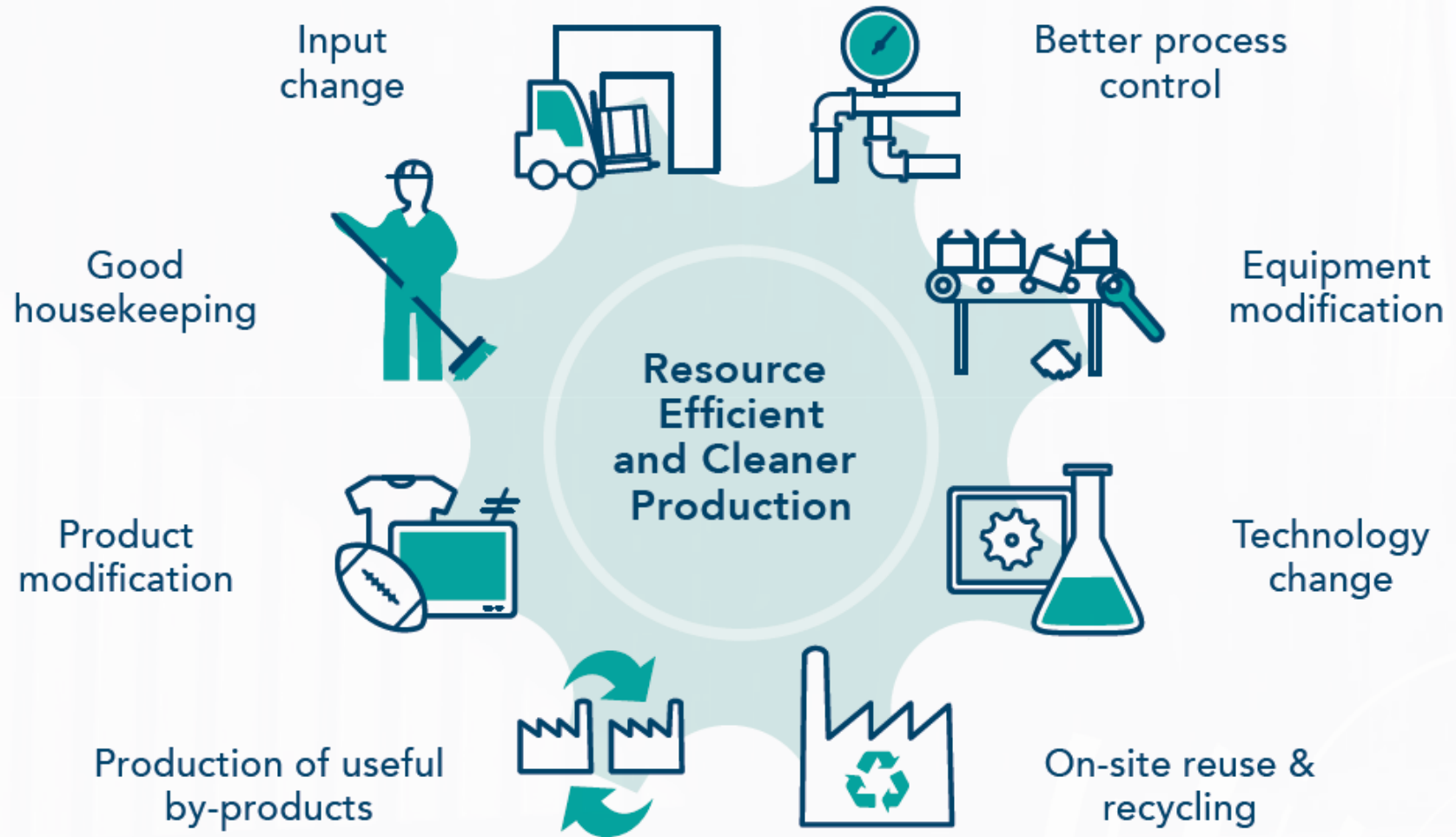


Horizontal flame for radiant heat transfer as in charcoal to save 30% fuel



UNIDO, 2018

2. Practice Efficiency



UNIDO, 2015

2. Practice
Efficiency

Resource Efficient and Cleaner Production

Clean Leather Technologies

Reducing salinity and effluent load by over 30% through hair save un-hairing



Up to 20% water conservation through measurement and reuse



10% energy savings with solar air drying of leather



UNIDO, 2018

3. Recycle Perpetually

Embed Man-Made Products in Natural Ecosystems

• Closing the Loop

Circularity in denim processing

- 70% water use
- 50% fuels
- 20% recycled fibre
- Salt recovery



Circular Product

- 100% post consumer recycled knitwear



• Wealth from Waste



Biodegradable sanitary pads from waste banana fibre

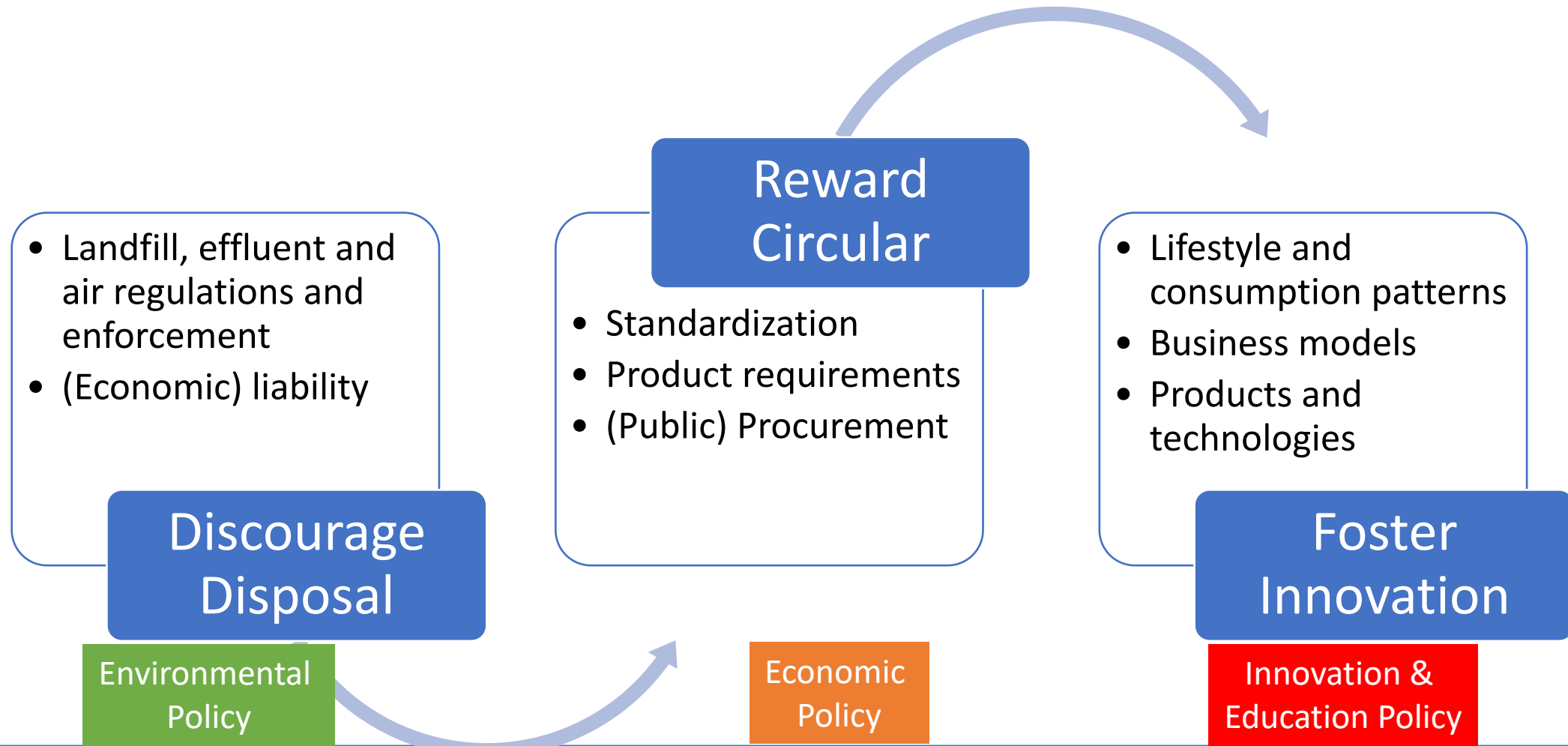


Omega-3 fatty acids from silk worm pupae



Silica additive from rice husk ash to reduce tyre rolling resistance

Getting Ahead of the Curve



UN India, 2018



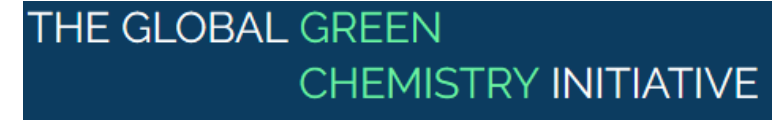
In Closing

• Circular economy



- Can mean different things to different people, yet goes much beyond recycling
 - Circular – physical products and value chains with perpetual materials and resource flows
 - Economy – business models that create and retain value
- Is designed in and provides a new lens for business, product and process innovation
- Is achievable through
- *Industrialization of*
 - Resource switch
 - Resource efficiency
 - Resource circularity

Want to know more?



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