



5 GREEN INDUSTRY CONFERENCE
FOR SUSTAINABLE DEVELOPMENT

The Circular Economy – What does it mean for development and green industries A perspective from Africa

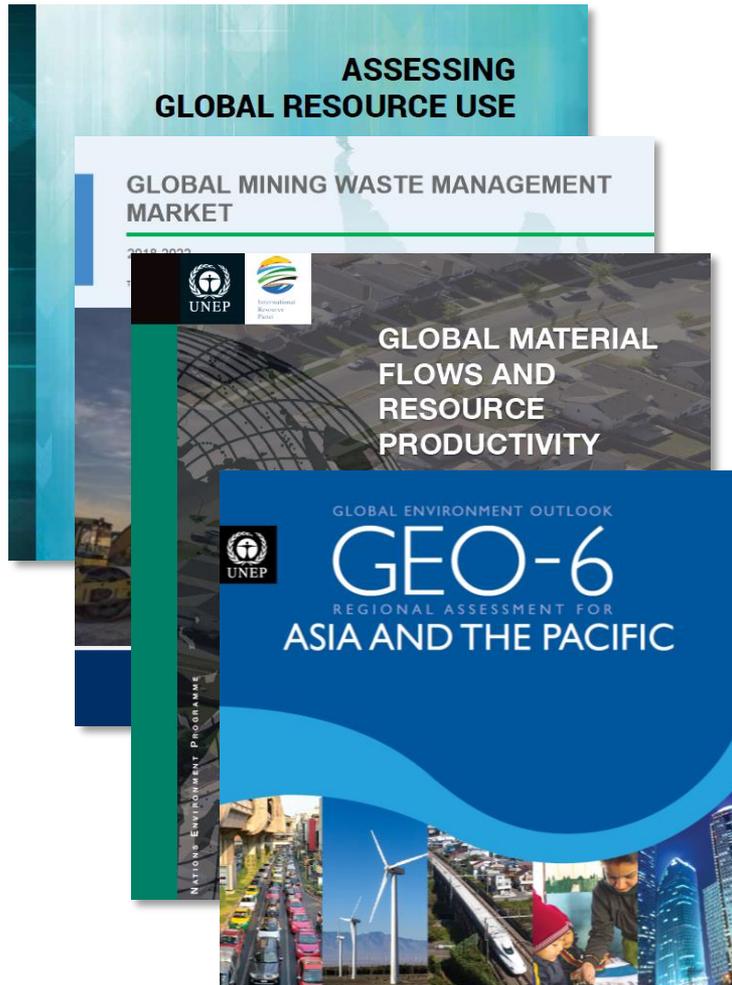
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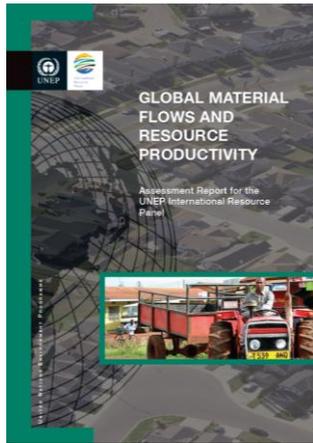
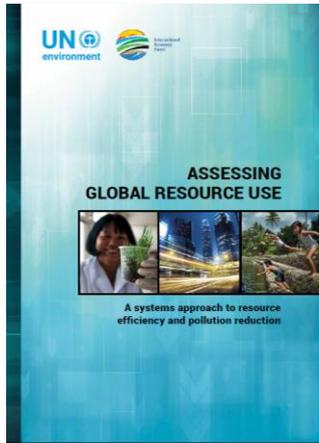


Where are we now?

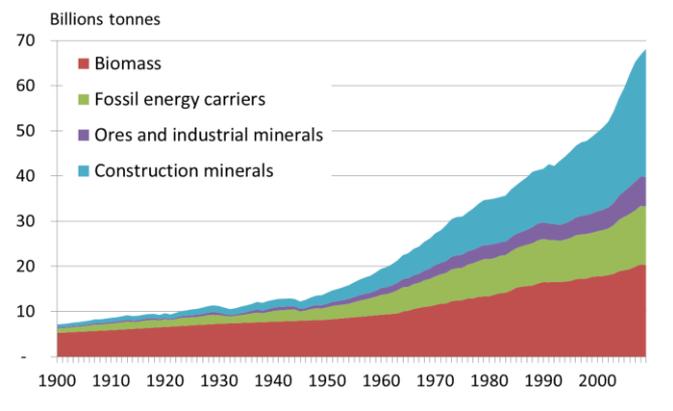


- Never before have we been presented with so much global, regional and local evidence which highlights our –
 - **Increasing demand** for natural resources and associated environmental and human health **impacts**, but also, the
 - The continued **depletion** of finite resources

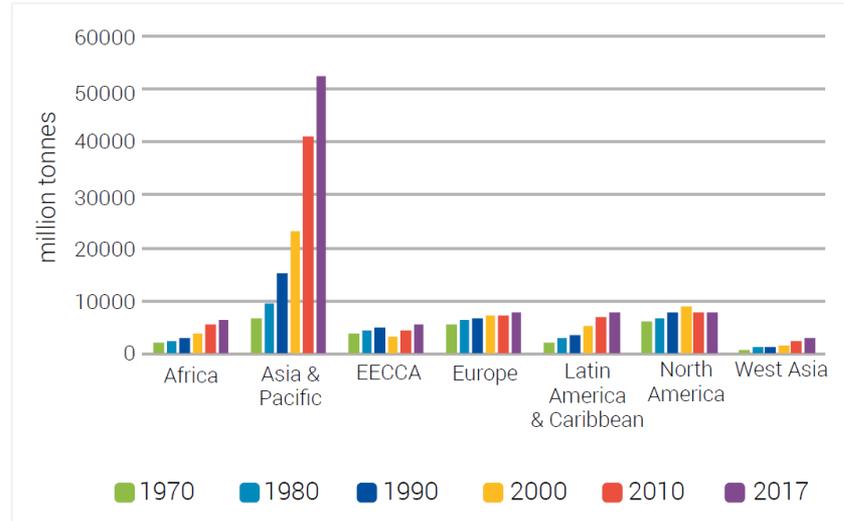
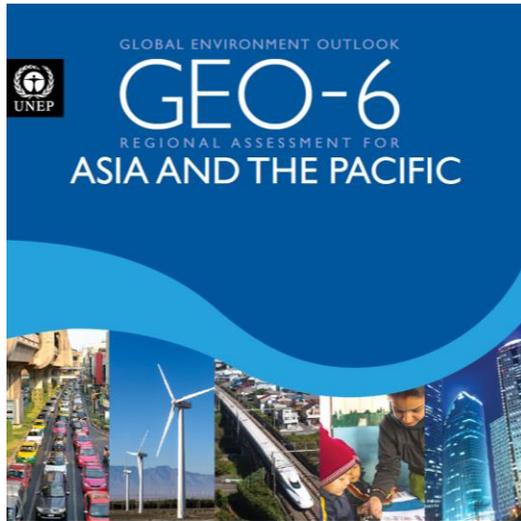
Where are we now (globally)?



- World materials use has grown 10-fold since 1900 and may double again by 2030 [EEA, 2015]
- The **dramatic increase** in the use of resources will intensify climate change, increase air pollution, reduce biodiversity and ultimately lead to the **depletion** of natural resources, causing **worrying shortages** of critical materials and heightening the risk of local **conflicts** [IRP, 2016]



Where are we now (regionally)?



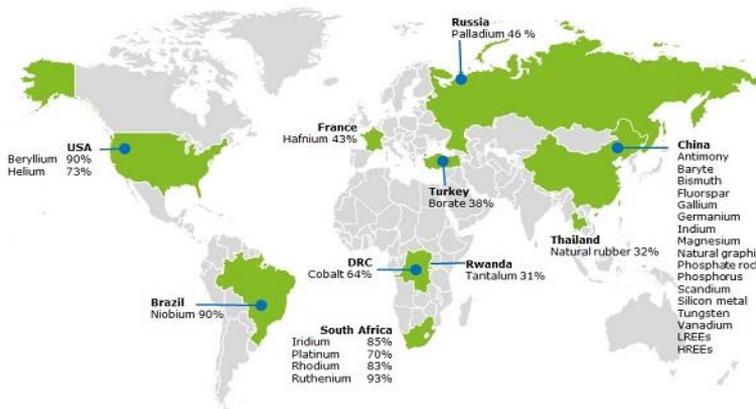
Assessing Global Resource Use
[IRP, 2017]

- Population growth, industrialization and urbanization have led to a **sharp increase in the consumption** of minerals, ores, fossil fuel and biomass in the Asia-Pacific region.
- Which is both **unsustainable** and **inefficient**, and results in pollution, declining biodiversity and the **rapid depletion** of regional resources.

Increasing risk of access to resources

2017 CRMs (27)			
Antimony	Fluorspar	LREEs	Phosphorus
Baryte	Gallium	Magnesium	Scandium
Beryllium	Germanium	Natural graphite	Silicon metal
Bismuth	Hafnium	Natural rubber	Tantalum
Borate	Helium	Niobium	Tungsten
Cobalt	HREEs	PGMs	Vanadium
Coking coal	Indium	Phosphate rock	

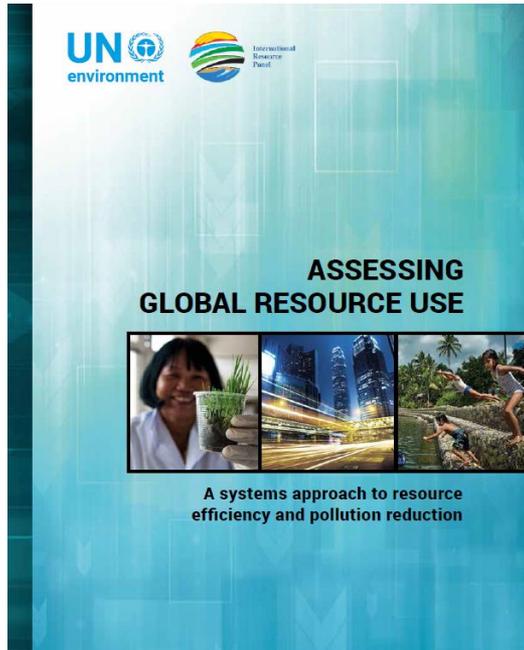
*HREEs=heavy rare earth elements, LREEs=light rare earth elements, PGMs=platinum group metals



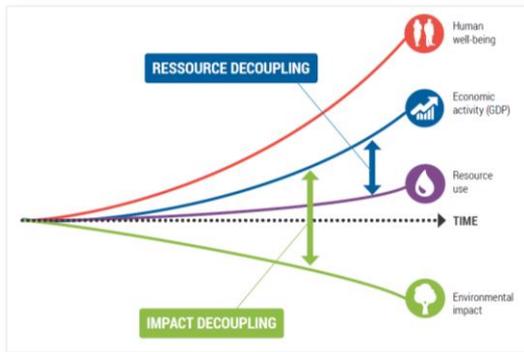
http://ec.europa.eu/growth/sectors/raw-materials/specific-interest/critical_en

- The risk of **access** to secure, sustainable and affordable resources has become some important, that businesses and countries are putting steps in place to mitigate impacts
- The European Commission identified **14 Critical Raw Materials (CRM)** in 2011 which were considered a **constraint** to European industry and value chains
- Updated to **20 CRMs** in 2014
- Updated again to **27 CRMs** in 2017

The need to decouple development and resource use



- The reality is that our economy is embedded within the **finite limits** of our planet
- There is an urgency and imperative to **decouple** economic activity and human well-being from resource use; and to provide **innovative solutions** based on cutting-edge **data** to support the **transformation** of our linear production and consumption systems towards **efficiency and circularity** [IRP, 2017]



The Circular Economy as a model to achieve this

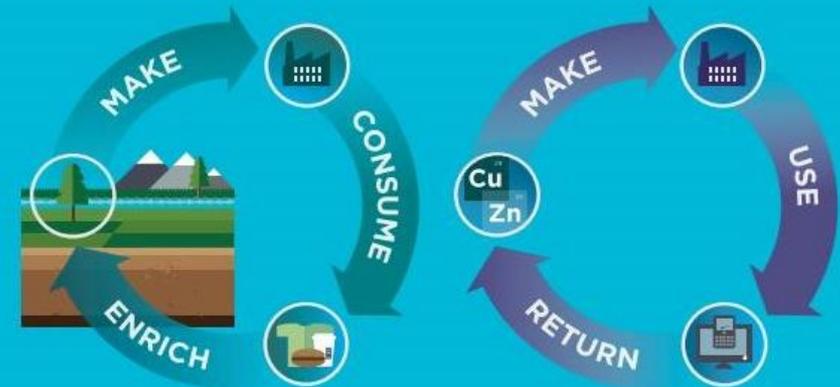
LINEAR ECONOMY

It's **NOT** about doing this just more sustainably.....



TECHNICAL & BIOLOGICAL MATERIALS MIXED UP

CIRCULAR ECONOMY



BIOLOGICAL MATERIALS

TECHNICAL MATERIALS

It's about sustainable “materials management”, about using resources more efficiently, about how we design products

It aims to **decouple economic growth** from the **use of natural resources** by using resources more **effectively”**

A “Circular Economy” is about **keeping resources in flow...** for as long as possible... at their **maximum value**

The Circular Economy and Developing Countries

- The Circular Economy is a hot topic right now – driving changes in policy, innovation, business models, etc.
- But as we **domesticate** the CE in our respective countries and explore the **unique value proposition** that the CE provides, there are questions that I keep getting asked –
 1. Is the CE relevant for **developing countries**?
 2. Is the CE relevant for **resource-rich countries** with e.g. strong mining-based economies, where resource scarcity is not the immediate driver?
 3. Does the CE provide an **opportunity** to address our waste management challenges? – i.e. Can we mitigate **environmental impacts** while also harnessing **economic value** from waste?
 4. Does the CE provide an opportunity to **leapfrog** linear models and technologies adopted by developed countries
 5. How do we integrate the **informal sector** into the circular economy?

The Circular Economy and Green Industries

- Within this context, explore three opportunity areas within the Circular Economy –
 1. Greening **existing industries** – improving their efficiency, competitiveness and sustainability (at varying scales from individual business to countries)
 2. Unlocking opportunities for **new businesses**
 3. Creating entirely **new business models**

1. Improving performance of existing businesses

- A “Circular Economy” is about

KEEPING RESOURCES IN FLOW

for as long as possible, at their maximum value”



creates opportunities to **improve resource efficiency** and **competitiveness**, **reduce resource dependency** and **resource use**

Resource efficient and cleaner production (RECP) tools applied by National Cleaner Production Centres to assist companies:

- In-plant **RECP assessments** (energy, water, materials)
- Industrial systems optimisation
- Energy and water management
- **Industrial symbiosis**
- Life-cycle management
- Eco-innovation



- **Industrial Symbiosis** is a useful tool for harnessing opportunities for circularity –
 - keeping **resources in flow**, **designing out waste** and achieving **material cost savings**
- The South African **Industrial Symbiosis Programme** after only 3 years of implementation is creating over US\$6 million of economic value (incl. externalities) per annum
- Improving industry efficiency and freeing resources back up into the local economy



	Waste to landfill diversion	111,502 tonnes
	GHG Reduction (CO ₂ e)	57,435 tonnes
	Virgin resource use reduction	107,000 tonnes
	Industrial water saved	1,030,500 m ³
	Total benefit to SA p.a. (incl. externalities)	\$6 269 050



2. Creating new industries

- A “Circular Economy” is about

KEEPING RESOURCES IN FLOW for as long as possible,

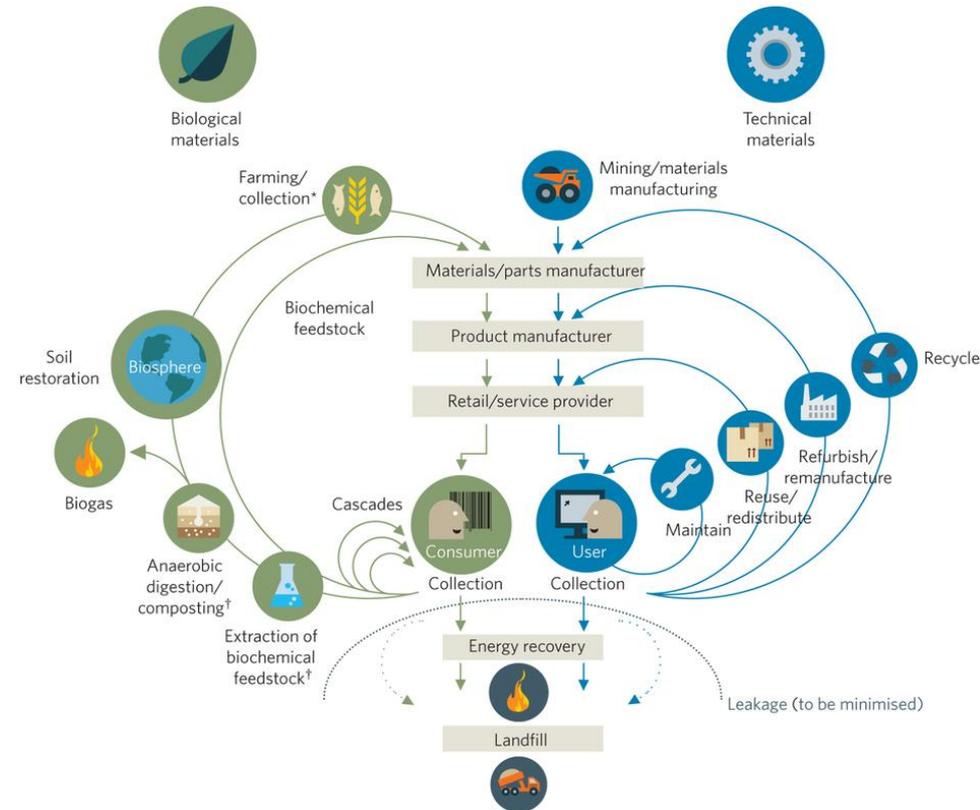
AT THEIR MAXIMUM VALUE



creates opportunities for **innovation** and
new enterprise development in the
improved management of resources

2. Creating new industries – Identifying Opportunities

- There are various approaches to identifying opportunities for **circularity** within the economy
 - Opportunity **waste streams**
 - Opportunity **sectors** (material demand)
 - Opportunity **activities**
- Explore **3 waste streams** which are a problem for Africa (and many developing countries)



2. Creating new industries – opportunity streams



- SA is a **net importer** of virgin plastic / polymer
- Yet, 58.2% of plastic lost to economy post-use in 2016 (to landfill or leakage to environment)
- Creating opportunities for increasing the retention of plastics (polymers) in the economy – if we can get the economics right (role for policy instruments)



- SA is a **net importer** of electrical and electronic equipment
- Yet, 89% of WEEE was lost to the economy post-use in 2011 (storage or disposal to landfill)
- What we do collect is exported for processing
- Refurbishment is more profitable than recycling for small businesses



- Organic waste and industrial biomass is single largest general waste stream generated in SA
- 65% of OFMSW, and nearly 100% of industrial biomass, is still disposed of to land
- Significant opportunity for SA to retain these nutrients within the local economy through various technology options

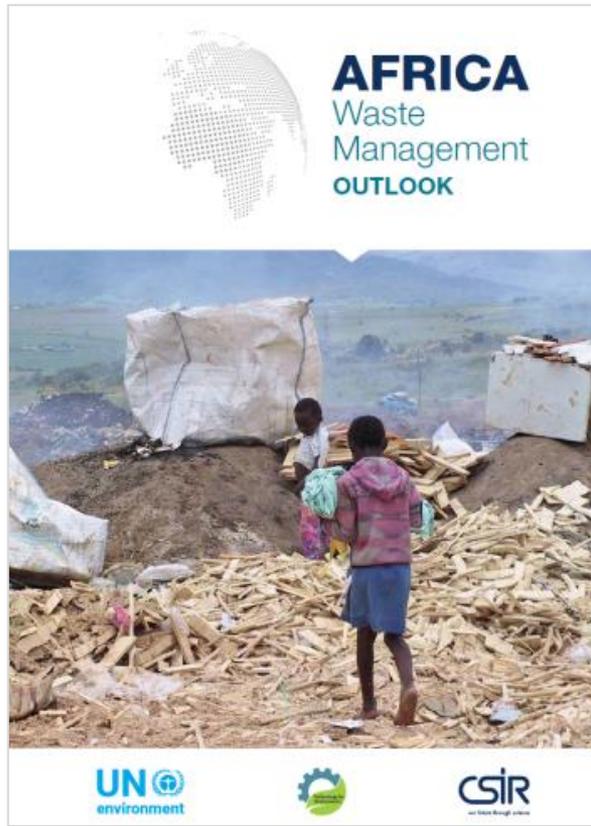
Only 4% of the waste generated in Africa is recycled, often by informal actors (as with reuse)



Every year, South Africa loses US\$1.2 billion worth of resources to the economy through disposal as waste to landfill



2. Creating new industries – opportunities streams



- Diverting just **6 waste streams** away from dumpsites towards reuse, recycling and recovery could inject an additional **US\$8 billion per year** (conservative) into the African economy
- Changing the way we think about “waste” as a “resource”, can create significant **socio-economic opportunities**, and if done responsibly, address environmental issues

Increasing impact of single-use plastics, including risks of disease, flooding and environmental pollution

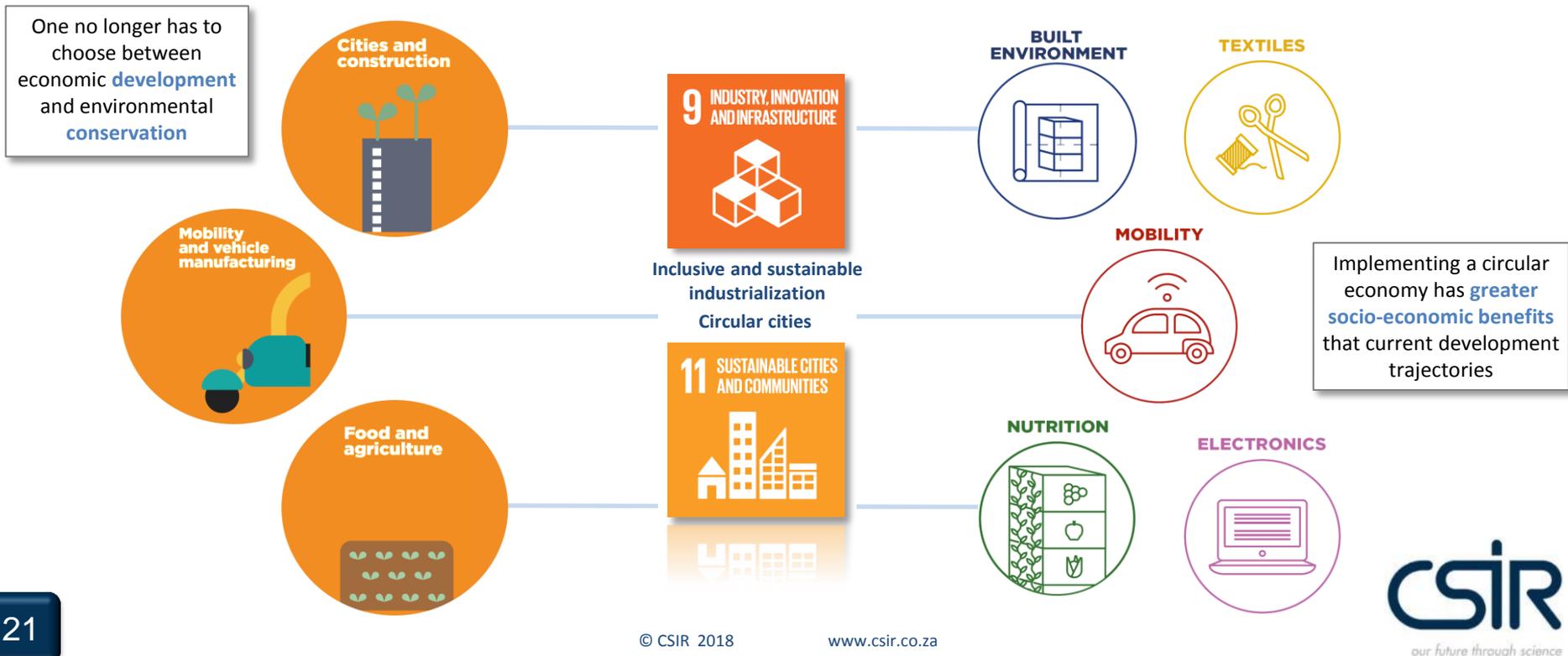


Informal dismantling of WEEE, driven by poverty, causes significant environmental and human health impacts



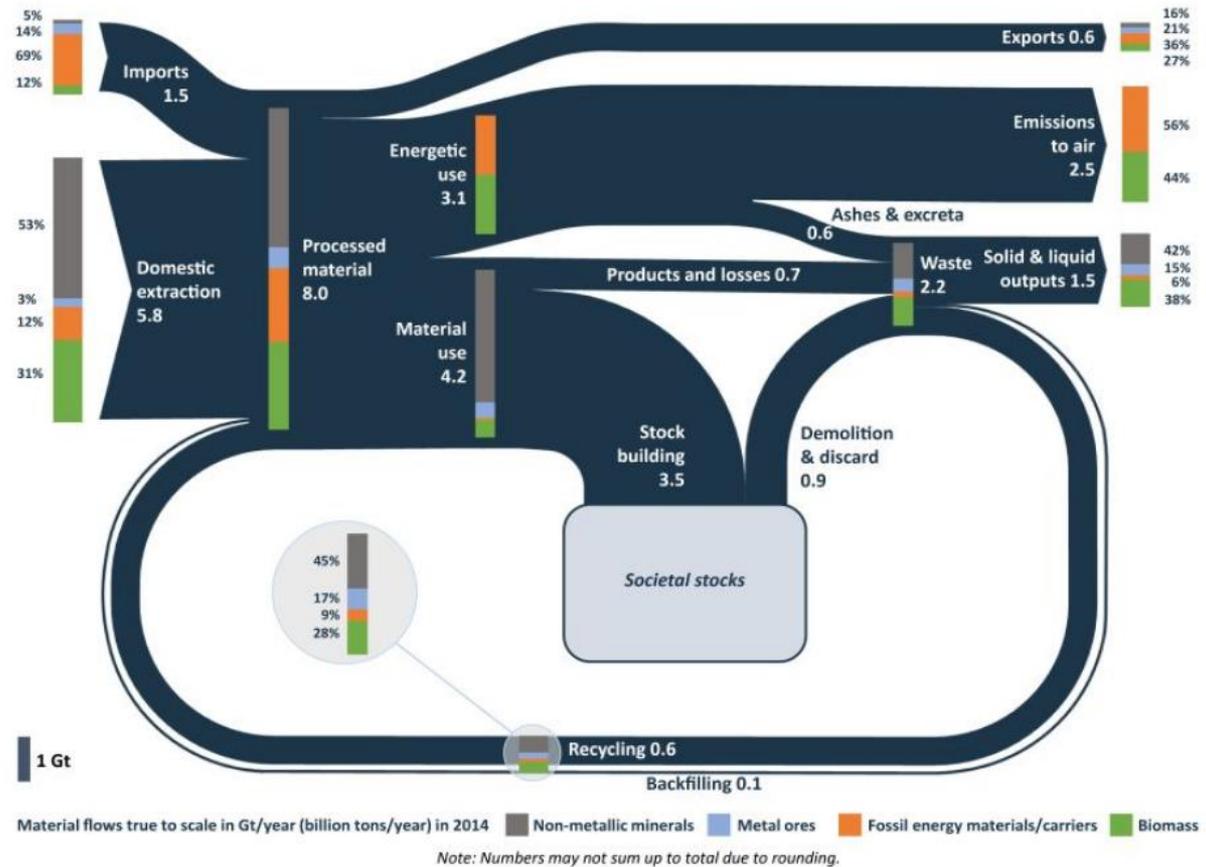
2. Creating new industries – opportunity sectors

- Taking a sector (**materials demand**) approach to identifying opportunities
 - Analyses of a circular economy vision for India (2016) and China (2018), are not focussed on “waste” but about **where** in their development paths the greatest **demand** for resources are (*and often associated impacts*)



2. Creating new industries – opportunity sectors

- A material flow analysis (MFA) of the EU28 economy
- Highlights the still very **linear flow** of materials through the EU economy
- Which creates opportunities for identifying areas of **intervention**



<http://ec.europa.eu/eurostat/web/circular-economy/material-flow-diagram>

2. Creating new industries – technological innovation



- Research by the CSIR Biorefinery Industry Development Facility (BIDF) on the valorisation 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

2. Creating new industries – technological innovation



- Research by the CSIR BIDF on the valorisation of **chicken feather waste** to obtain a variety of high-value marketable products
- New value chains for high value products –
 - **Keratin** powder (protein) (tissue-engineering scaffolds, health care)
 - **Biocomposites**, textiles, electronics, cosmetics

2. Creating new industries – technological innovation



- Waste-to-nutrient company, **AgriProtein's** commercial-scale facility recovers protein from organic waste, replacing traditional land-based grains or marine-captured fishmeal (nutrient recycling)
- New value chains for high value products –
 - an **insect-based protein** (MagMeal™), an **extracted fat** (MagOil™) and a **residual soil conditioner** (MagSoil)

2. Creating new industries – social innovation



- Where products may have been dismantled and recycled at end of life, new businesses have emerged in **resource recovery**, **refurbishment** and **repair** of goods, creating greater, local socio-economic opportunities
- Supporting and developing **social entrepreneurs**
- Creating job opportunities and improved livelihoods
- Includes various sectors – automotive, ICT, appliances

Creating new job opportunities, up- and re-skilling, in areas of remanufacturing, refurbishment, repair, reuse

Ri-Generation, Turin



3. Creating new business models

- A “Circular Economy” is about

KEEPING RESOURCES IN FLOW for as long as possible,

AT THEIR MAXIMUM VALUE



creates opportunities for **innovation** and **new enterprise development** in the improved management of resources

3. Creating new business models

- A “**Sharing Economy**”, a complete paradigm shift, creates opportunities for entirely new business models of **resource efficiency** through “resource sharing”, “product as service”, and “access over ownership”
- But has highlighted the need to rethink regulation, financial instruments, labour



ACCESS OVER OWNERSHIP

PRODUCT AS SERVICE

RESOURCE SHARING

3. Creating new business models – Circular Enterprises



- **Startups** such as “Ycloset”
- A women’s clothing rental platform
- Users enrol for a monthly fee of about \$72 and rent clothes and accessories free of charge
- Founded in 2015, the Beijing-based online platform operates in about 40 cities in China
- Changing the way we think about fashion, clothing, textiles

<http://www.ycloset.com>

The business case for the Circular Economy



- There is a **strong business case** to be made for a circular economy, with a number of large companies having made commitments



- Business & Sustainable Development Commission (2017) identified “Resource recovery” and “Circular models” within the 60 **biggest market opportunities** related to delivering the SDGs
- “Circular economy manufacturing” listed #6 in **12 largest business themes** in a world economy heading for the Global Goals

<http://report.businesscommission.org/report>

The business case for the Circular Economy

Job creation for reuse, recycling and conventional disposal of waste in the USA

Type of Operation	Jobs per 1000 T
Product Reuse	
- Computer reuse	296
- Textile reclamation	85
- Misc. durables reuse	62
- Wooden pallet repair	28
Recycling-based manufacturers (average)	25
- Plastic product manufacturers	93
- Glass product manufacturers	26
- Paper mills	18
Conventional Materials Recovery Facility	10
Composting	4
Landfilling and incineration	1

Source: (CASCADIA, 2009) citing (Seldman, 2006)

- The evidence suggests that the Circular Economy can unlock socio-economic opportunities –
 - **Job creation** in new economic sectors
 - Improving **livelihoods** of informal sector workers
 - Addressing the **triple burden** of poverty, inequality and unemployment through **social inclusion**
 - Building new circular **skills** and **competitive advantage**

Constraints to a CE – developing countries context



- There are some aspects of a Circular Economy that developing countries have little to no control over, e.g. **product design** of **imported goods**
 - In Nigeria, 95% of cars are second-hand
 - In Ghana 80% of electronic products are second-hand
 - There is **increasing demand** for processing used products in developing countries
- If products are not designed for recyclability, developing countries have no choice but to dump as waste (transferring burden and risk)
- Product design and **designing for circularity** is a key issue for green industries

http://learn.tearfund.org/~media/files/tilz/circular_economy/2017-tearfund-europe-ecodesign-measures-en.pdf?la=en

Impacts of a CE – developing countries context

- A more circular economy in Europe could impact developing countries that rely on the export of raw materials (*reduced revenues for resource-exporting developing countries*) [Centre of Expertise on Resources, 2016]
- Netherlands aims to halve its use of primary raw materials by 2030, with the goal of a fully circular economy by 2050 (UNIDO, 2017)
- The EU moving to a Circular Economy could threaten mineral exports from countries

Highest contributions of raw material exports (Total value) to EU as a share of GDP

COUNTRY	VALUE (IN €)	% OF GDP
Iceland	€ 1,683,036,160	11.01%
Guinea	€ 478,323,897	8.05%
Liberia	€ 143,865,200	7.97%
Mozambique	€ 1,117,401,430	7.81%
Mauritania	€ 289,343,558	6.38%
Niger	€ 453,972,403	6.20%
Namibia	€ 600,824,516	5.16%
Rep. of Congo	€ 446,276,620	3.51%
Suriname	€ 163,451,735	3.50%
Dem. Rep. of the Congo	€ 830,202,923	2.80%

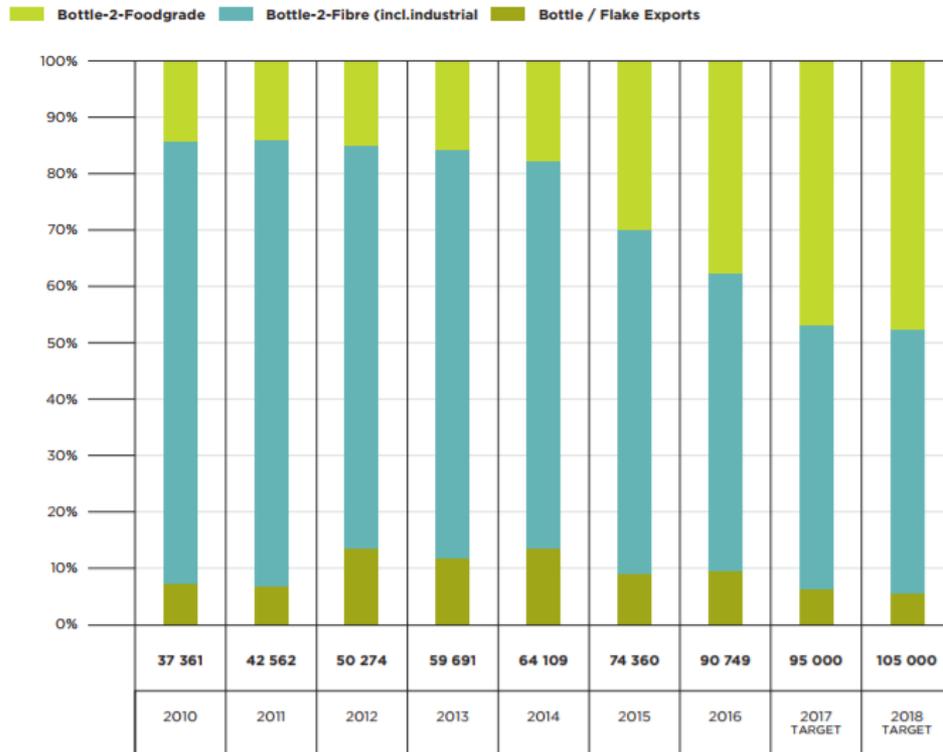
https://hcsc.nl/sites/default/files/files/reports/CEO_The%20Circular%20Economy.pdf

Developing resilience within a Circular Economy



PET bottle collections by end-use market

PET Bottle Recycling Tonnage by End-Use: Recycled tonnages by end-use for the past 6 years, showing exports, B2B and B2F (including industrial fibre, fibre exports, etc.). This clearly shows the growth in the B2B and food grade sector as an end-use market.



- A sustainable Circular Economy requires building **resilience** to shocks (natural or economic)
- Developing and strengthening **local end-use markets** is one way of creating this resilience - “the principle of proximity”
- Example of South Africa where only 2.6% of collected paper and packaging was **exported** from South Africa
- Creating local opportunities for job creation and green industries

Domesticating the Circular Economy

- Finally, it's critical that we evidence the transition to a Circular Economy through **sound evidence**, R&D, data collection –
 - What resources **do we have**?
 - Current and economically viable future reserves? (*status quo*)
 - What resources **do we need** to achieve our growth path?
 - Where in the economy do we **currently** have the greatest demand for materials? (*opportunity*)
 - Which materials have the greatest **import** demand (*opportunity*)
 - Where do we expect the **greatest demand** for future economic growth, to be? (*opportunity*)
 - What is our **strategy to close the gap** on current and future needs?
 - What are the **impacts** of transitioning on other economic sectors?

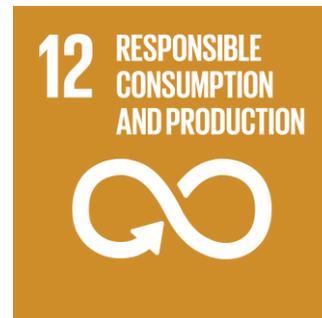
In conclusion, how we utilise resources has a significant impact on achieving the SDGs

SOCIETY + ECONOMY

PLANET + RESOURCES



- The challenge for developing regions – staged to undergo radical growth and transformation over the coming decades
- Is to **find the balance** between socio-economic **development** and resource **conservation** and protection – hinged around how we utilise our resources
- The “Circular Economy” provides us with a **clear strategy** to achieve this





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Thank you

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