

## Driving economic growth in South Africa through a low carbon, sustainable and inclusive circular economy

### Circular Economy Briefing Note No. 1 in a series of 8

The intention of this short think piece is to present the CSIR's position and interpretation of the circular economy, and to initiate discussion on sector opportunities for South Africa.

The circular economy is gaining traction as a new model for sustained and resilient economic growth and job creation<sup>1</sup>. It provides the means to meet international climate commitments, and to achieve the Sustainable Development Goals. A shift to a circular economy in South Africa provides opportunities for low-carbon, sustainable and resilient economic growth; and to address the triple challenges of inequality, poverty, and unemployment.

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### From crisis to opportunity

South Africa's economy is plagued by stagnant GDP growth, significant unemployment, and persistent poverty and inequality. The COVID-19 pandemic has led to a further deepening of the economic crisis; **and highlights the urgency for a new development model to drive economic recovery**. Furthermore, there is a need to place South Africa's growth path, as outlined in the National Development Plan<sup>2</sup>, within the context of the country's resource base.

As a developing country rich in natural resources, South Africa is characterized by an extractive-based economy; with large throughputs of resources, much of which ends up as waste (solid, liquid and gaseous); and limited productive return of resources into the economy (Figure 1). A large proportion (20%) of the domestically extracted resources are exported for further beneficiation off-shore, while there is limited use of resources for building up local 'stocks' of infrastructure such as buildings, roads and rail<sup>3</sup>.

This reliance on raw material extraction and exports puts our future development prospects at risk, in terms of over-exploitation and depletion of resources, and predicted declines in demand for our exports. Further, while this model has led to economic growth in the past, the gains in prosperity have not been shared equally among the population, further entrenching social inequality. The South African economy therefore bears the environmental, social and economic burden of providing resources for the global market.

This raises the question as to whether South Africa is using its resources in the best interests of its people, and of its development priorities. The need to "build back better" following the pandemic<sup>4</sup> provides an opportunity to rethink how we are using and managing our resources.

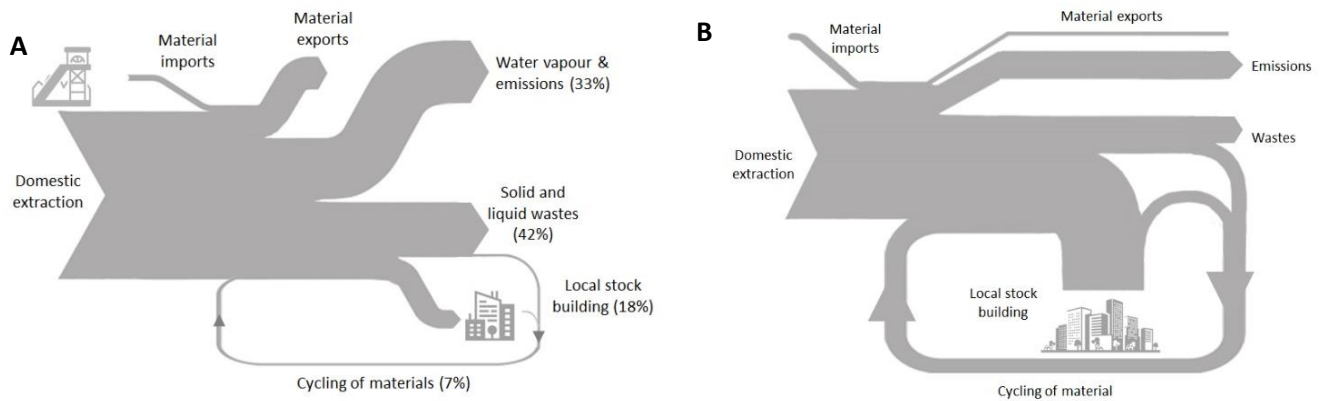
Could using our resources in a more efficient and productive way, in which they are retained in the economy for as long as possible, and with a greater emphasis on local value adding and stock building, help to unlock development and employment opportunities?

### From linear to circular

The prevailing economic development paradigm, both locally and globally, can be described as a linear 'take-make-dispose' or 'take-make-waste' economic model. Resources are extracted from the natural environment and used to make products, which are often used for only a short period of time, before being discarded back into the environment<sup>5,6</sup>. Throughout this process, vast amounts of material and energy are used; while significant emissions and waste are generated.

The linear economic model is incredibly wasteful, inefficient, and costly. In addition to significant losses in economic value in the form of wasted raw materials and energy, underutilised assets, and disposal costs<sup>5</sup>; the linear model has contributed significantly to natural resource depletion; degradation of land and soils; biodiversity loss; air and water pollution; waste; and climate change<sup>4,5</sup>. For example, according to the International Resource Panel<sup>7</sup>, resource extraction and processing is responsible for approximately 50% of climate impacts, 90% of water stress, and 90% of biodiversity loss due to land use.

South Africa is characterized by a particularly linear economy. Material cycling in South Africa is estimated at 7% (Figure 1)<sup>3</sup>, of which 5% is the result of ecological cycling of biomass and organic waste. The socio-economic cycling rate (recycling and reuse of materials within the economy) is only 2%. There is increasing evidence that this linear model is no longer sustainable, and presents a risk to South Africa's future growth.



**Figure 1. (A):** Flows of materials through the South Africa economy in 2017 (adapted from von Blottnitz *et al.*<sup>3</sup>); compared to material flows in a more circular economy **(B)**

### What is a circular economy?

The circular economy is recognized globally as an opportunity to reframe economic development and unlock new opportunities for growth and employment; while achieving global commitments relating to climate change and sustainable development, and reducing the negative impacts associated with both resource extraction and waste.

In contrast to the linear economic model, **a circular economy “entails 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”<sup>8</sup>.**

A circular economy therefore minimises the need for extraction of primary resources, while also reducing waste. It provides opportunities for improved resource efficiency and resource security, reduced energy and materials consumption, and reduced climate impacts; while offering new sources of economic growth and job creation. In short, it supports improved socio-economic development and well-being, while reducing associated environmental and human health impacts.

The circular economy is based on **three principles: Design out waste and pollution; keep products and materials in use; and regenerate natural systems**<sup>9</sup>.

Contrary to how the concept is often perceived, a circular economy is about far more than simply improved waste management and recycling. It instead involves a systemic shift away from the traditional linear ‘take-make-waste’ economy; and encompasses a radical transformation of the ways in which resources are used and products are designed, and of the relationship between producers and consumers.

It therefore challenges us to change the way we think about product ownership, with a greater emphasis on product sharing, renting, repair, refurbishment, upgrading, recycling and reuse. It calls for a complete paradigm shift, creating opportunities for entirely new business models based on resource sharing, product-as-service, and access-over-ownership; facilitated through advances in digital technology.

### Benefits of a circular economy for developing countries

International studies show that a transition to a more circular economy can create direct socio-economic benefits, including GDP growth; new sources of job creation; more robust employment; increased profits (through both cost savings and increased revenue from new business services); reduced reliance on increasingly scarce raw materials; increased disposable income for individuals; enhanced utility and convenience; and improved living conditions and health<sup>5,9</sup>. In addition, a circular economy creates direct environmental benefits, including reduced use of virgin resources; reduced waste and pollution; the regeneration of natural systems; and a significant contribution to meeting climate targets<sup>4,5</sup>.

The circular economy is increasingly recognized as a key driver of a post-pandemic economic recovery, and a new source of more sustained and resilient economic growth, particularly in developing countries. Other BRICS countries, particularly China and India, have taken the lead in exploring the significant opportunities associated with the transition to a more circular economy<sup>10,11</sup>. It provides an opportunity for emerging economies to “leapfrog” the development models of the Global North, through innovation and early adoption of more sustainable and inclusive growth paths. It also provides an opportunity to build more resilient, sustainable economies that are better able to withstand future shocks – not only pandemics; but climate-induced natural disasters such as droughts and floods, and resource shortages, all of which are predicted to increase in both frequency and intensity in future.

South Africa has already felt the impact of resource constraints, particularly relating to water and energy. Decoupling growth from resource use, e.g. through enhanced circularity, creates an opportunity to better manage risks in terms of future resource constraints, and to build resilience. In addition, the current heavy reliance on raw material exports puts the economy at risk – as other countries transition toward circularity, their demand for our resources will decline. South Africa stands to lose €8.4 billion in raw material exports (equivalent to 2.7% of GDP) if the European Union moves to a fully circular economy<sup>12</sup>. It is therefore essential that we rethink the way in which we utilize our resources, in order to safeguard our future development.

### The policy context for a circular economy in South Africa

The transition to a circular economy is well aligned with South Africa's developmental priorities as articulated in the National Development Plan<sup>2</sup> and the Sustainable Development Goals (SDGs); and with the country's climate commitments as outlined in our Nationally Determined Contribution (NDC) (as updated). The circular economy is also seen as a key driver of a post-COVID economic recovery, and is enjoying growing political support<sup>13,14</sup>. An important focus is on the need for a 'just transition'; and for an *inclusive* circular economy, that is, a circular economy that benefits the economically marginalized members of society, through employment creation and small business development<sup>15</sup>.

While the South African policy landscape in relation to the circular economy is currently very fragmented, cutting across many line departments (including DMRE, the dtic, DFFE, DWS, DALRRD, DHS, DoT, DSI); a policy context is starting to emerge, in the form of, for example:

- the White Paper on Science, Technology and Innovation<sup>16</sup>, and the Decadal Plan<sup>1</sup>, which identify the circular economy as a key new source of economic growth;
- the updated National Waste Management Strategy (NWMS)<sup>17</sup>, in which the circular economy is a central concept;
- the Extended Producer Responsibility (EPR) Regulations<sup>18</sup>;
- as well as the broader policy framework relating to the green economy<sup>15</sup>.

South Africa is also playing a leading role in advancing the circular economy across Africa, as co-chair of the African Circular Economy Alliance (ACEA), and co-founder of the African Circular Economy Network (ACEN). It is also active in the international landscape, as a member of the Global Alliance on Circular Economy and Resource Efficiency (GACERE), and as an active participant in the World Circular Economy Forum (WCEF).

### Unlocking South African opportunities: The need for a sectoral focus, and a systems view

South Africa has been driving elements of a circular economy for decades, through return water flows, renewable energy and waste recycling, for example. However, these activities have not (yet) reached a scale where they can meaningfully transform the economy and decouple growth from resource consumption and environmental impact<sup>14</sup>.

Furthermore, the circular economy has often been narrowly interpreted in South Africa as a 'waste' issue; i.e., as synonymous with recycling or with the waste hierarchy. Circulating waste back into the economy as secondary resources is indeed an immediate 'low-hanging' opportunity. However, international studies, including in other BRICS countries<sup>10,11</sup>, have shown that the greatest opportunities for driving circularity and improved resource productivity lie in resource-intensive sectors of the economy, such as agriculture and manufacturing; as well as those that directly affect human well-being, particularly in the context of rapid urbanization, such as human settlements and mobility.

The circular economy is a systems concept, that cuts across all economic sectors. To understand the opportunity that it provides for South Africa, it is necessary to adopt both a sectoral focus, and a broad systems approach. In other words, there is a need to identify specific opportunities within key sectors of the South African economy, while also piecing these together into a systems view of the collective opportunity.

The transition to a circular economy must also be driven by evidence and supported through innovation. As a leading scientific and technology research organization, with both sector-specific and integrative expertise, the CSIR is well positioned to inform the national circular economy discourse, and to identify circular economy opportunities for South Africa.

Drawing lessons from circular economy strategies in other developing countries<sup>10,11,19</sup>, and adapting these to the South African context (taking into account the contribution of each sector to GDP and employment in South Africa, as well as those that are inherently resource-intensive, and where potential exists for value-adding processes to be localised); the CSIR has identified the following five sectors as having significant potential for circular economic development (Figure 2):

- Mining
- Agriculture
- Manufacturing
- Human settlements
- Mobility

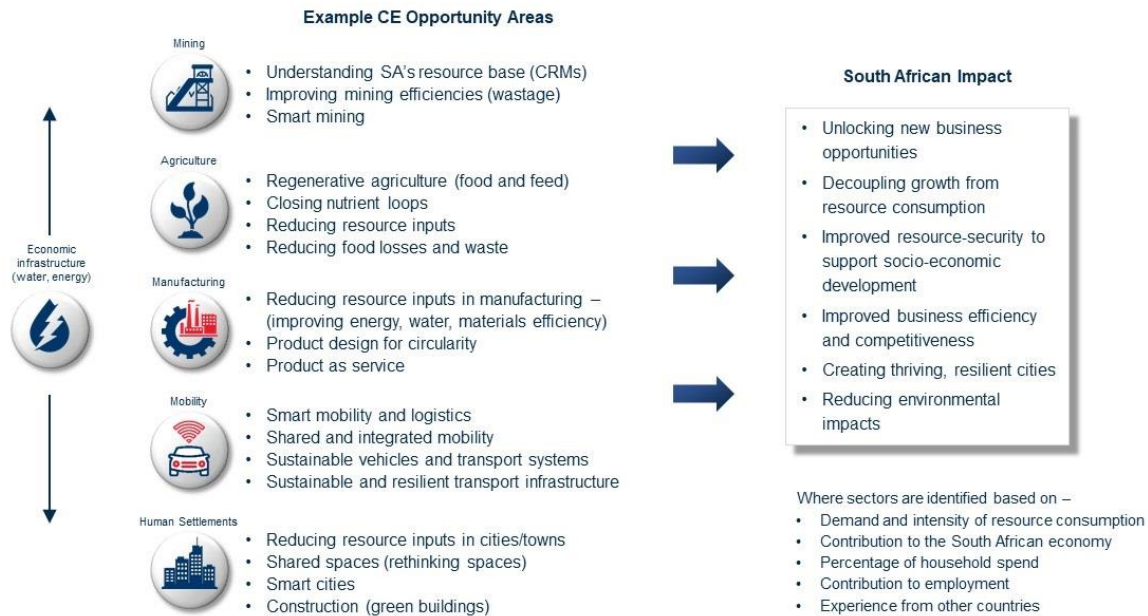
In addition, two cross-cutting thematic areas have been identified, representing key resources and infrastructure for all economic activity in South Africa, and which are currently facing significant constraints in being able to meet increasing demands; and where there is therefore an urgent need for innovation in terms of resource efficiency and sustainability:

- Energy
- Water

The CSIR is undertaking studies aimed at identifying and unlocking specific circular economy opportunities within all seven of the above-mentioned economic sectors and cross-cutting thematic areas (Figure 2).

### Conclusion

South Africa stands on the threshold of profound choices regarding its future development path. In following the global trend for green and inclusive development to be the cornerstone of a post-COVID economic recovery, the President has called for a recovery that is transformative, inclusive, digital, green and sustainable<sup>20</sup>. A circular economy transition is core to the South African development pathway; with the President affirming that *"we cannot afford to be out of step with international moves towards green growth and green development"*<sup>21</sup>.



**Figure 2:** Identifying circular economy opportunities for South Africa through a cross-sectoral approach

While the circular economy is gaining traction internationally, increased circularity in the Global North will inevitably have consequences for extractive-based economies such as South Africa. Implementing a circular economy domestically provides opportunities for safeguarding our economy against future resource constraints and volatility in international markets, while unlocking the socio-economic benefits (particularly job creation) associated with economic growth. It also provides opportunities to develop local value-adding industries; and to compete in export markets that are placing increasingly stringent environmental requirements on products.

International literature and best practice suggest that the circular economy is not just about waste and recycling, but about sustainable resource management. In a developing country context, it is about managing risks to economic development, and unlocking new opportunities for growth and job creation. In the South African context, the greatest opportunities are likely to lie in resource-intensive sectors, such as mining, agriculture, and manufacturing; and in those that directly affect human well-being, such as human settlements and mobility; as well as in energy and water, as two key resources underpinning the economy. There is a clear need to identify appropriate circular economy opportunities and interventions for South Africa. The CSIR is well positioned to inform South Africa's choices in transitioning to a more circular economy, and to help unlock these opportunities through science, technology and innovation.

**Acknowledgements:** The authors acknowledge the funding from the Department of Science and Innovation through the CSIR's Parliamentary Grant.

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