Transforming into a Circular Economy for Sustainable Growth in the Post COVID - 19 Era: A Policy Framework for Sri Lanka

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Executive Summary

The concept of the Circular Economy (CE) has recently regained momentum and even reached mainstream discourses, catalyzed by the increasing need for innovative thinking to create sustainable development. The current rapid pace of digitization has also contributed to the rising popularity of the CE model.

CE is an industrial system that is regenerative by intent and design, and it attempts to use waste from all ventures to produce beneficial artifacts for human use. CE aims to eliminate waste through the superior design of materials, products, systems and business models, and encourage people to consume palatable food and lead a change in lifestyle deviating from the severe competition under the present Linear Economic (LE) model which is characterized by production and waste that entail significant costs on the environment and overall well-being.

The global traction in favour of CE is evident from the European Union's (EU) efforts to refocus its industrial and waste policies by applying a conscious circular approach, i.e., where products and services are designed to regenerate (recovery), reuse and recycling, thus allowing the materials to be diverted back to industrial or biological nutrient cycles. Asia needs stronger regulatory frameworks and clearer government signals for businesses and people to respond to CE.[2] The general understanding is that governments should provide incentives for companies and industries to invest in CE technologies similar to China, Europe and the United States[3] .

Amidst the call for a 'great reset' to pave way for equitable and inclusive recovery across countries in the post COVID-19 or 'new normal' era, there is scope for economies to also consider CE in their post COVID-19 recovery agenda. Accordingly, the paper presents a critical review of the positive and negative impacts of the pandemic and argues how Sri Lanka can steer towards a better, more resilient low carbon-based CE. As there has been a growing recognition of the shortcomings in the current LE model and policy gaps have been identified, the paper highlights the need for diversion of investments towards building a more resilient, low carbon-based CE model. It is also essential to recognize and integrate such investments into the stimulus packages for economic recovery instead of postponing the transition of economies from LE to CE citing the COVID-19 pandemic as an excuse. The paper puts forth arguments that highlight the high degree of contemporary relevance of the transition and also explores the wide array of possibilities for a sustainable and rapid post COVID-19 recovery through the adoption of CE models. Going forward,

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[2] Janice Yeo, Southeast Asia director for sustainability consultancy Corporate Citizenship

[3] Anne-Maree Huxley, a sustainability consultant on the Blue Economy based in Australia

economic planning should target the general well-being of the people, all other living things, and the environment using innovations emanating from CE-based thinking rather than focusing on LE principles which are centric on boosting competitiveness, profitability, and growth of businesses at the expense of natural resources.

Together with the political leadership, there should be a mindset shift in the private sector[4] *for the CE model to be successful. The acceptance by companies as part of one linear value chain is a key barrier to the transition from LE to CE. Global companies that are breaking free of this "business-as-usual" thinking are seeking collaboration to pilot the new CE models. Market disruption in this new landscape is initially driven by start-ups, global banks, companies, and multinationals, such as H&M (textiles), Philips (light fittings), Renault (car manufacturer); and DHL (logistics) are also creating independent new value chains.*

Fundamental changes are imperative for the transition from LE to CE. First and foremost, there should be a visible change in the thinking and acceptance of, and commitment for, the transition from LE to CE by all major stakeholders in the system. Initial groundwork for the move towards CE is hampered in countries that are plagued with macro-economic legacy issues and they find it strenuous to move from LE to CE in the short term. It is further amplified by the belief that the country should first deal with the serious legacy issues prior to transition from LE to CE. While noting that many of the legacy issues are by-products of the LE model itself, it's imperative to delicately deal with such issues that are stalling Sri Lanka's development strategy across all sectors of the county even at the expense of short-term hardships. Although some of the legacy issues have become more complex due to the Covid-19 pandemic, there is hardly any room for further postponement of essential adjustments.

As Sri Lanka launched its Climate Prosperity Plan (CPP) outlining the national investment strategy, on 6th November 2022, H E the President Ranil Wickramasinghe of the Democratic Socialist Republic of Sri Lanka, reiterated Sri Lanka's call for climate compensation at the 27 th Conference of Parties of the Signatories of the United Nation's Framework Convention on Climate change (UNFCC) held in Egypt (COP 27). With this "tone at the top", the relevant authorities have taken necessary steps to prepare a workable and comprehensive framework that includes the key elements of the "Green Development Strategy" (GDS) and CPP of the Government. In this regard, it would be essential to secure the support of all stakeholders in the economy. The transition from LE to CE focusing on GDS and CPP would require the aligning of already functioning GDS CPP projects into the GDS work processes under a CE framework. Learning from the illustrious success stories, within and outside the country would assist Sri Lanka in the avoidance of pitfalls and learning the art of accessing the global value chain under "new normal conditions".

[4] Ariel Muller, director of sustainability non-profit Forum for the Future's Asia office

Introduction

"We have been drawing down nature's assets through extraction of natural resources, depleting the nutrient supply in soils, driving down fish stocks, and so on—and using nature as a sink for our waste—burning fossil fuels, for example. As a result, the biosphere has been severely degraded; some ecosystems, such as coral reefs, are at the point of collapse.[5] *"*

A circular economy (also referred to as 'circularity') is "a model of production and consumption, which involves sharing, leasing, reusing, repairing, refurbishing and recycling existing materials and products as long as possible that aims at tackling global challenges like climate change, biodiversity loss, waste and pollution.[6] Accordingly, CE is an alternative economic model, where products and services are designed to regenerate (recovery), reuse and recycling, (the 3 Rs), thus facilitating materials to be diverted back to industrial or biological nutrient cycles. Consumption and markets are designed to optimize the use of existing products while also encouraging access to products rather than focusing on ownership. In response, during the last decade, several leading businesses have invested in the transformative path from LE to CE, while pioneering institutions and government bodies put forward significant legislative proposals to enable the transition.

The current renaissance of the CE began in 2003 and gained momentum when the Chinese government instigated the promotion of CE as a solution to the country's widespread environmental problems, followed by the first CE Law in 2009, i.e., the *Circular Economy Promotion Law of the People's Republic of China*. A few years later, in 2011, the CE discussion entered the EU resulting in the *Roadmap to a Resource Efficient Europe*. The roadmap is one of the seven 'Europe 2020' flagship policies focusing on resource efficiency as a response to concerns regarding increasing risk and volatility of resource markets, as well as a supposed failure of sustainability policies. In 2015, the EU further augmented existing initiatives with a wider CE strategy along the theme of 'closing the loop'. Accordingly, the timeline of the renewed interest around CE shows the beginning of the trend with China's policy initiatives in the mid-2000s followed by the initiatives of the Ellen MacArthur Foundation, established in 2009, and those of the EU in 2011[7].

The emergence of the ongoing COVID-19 pandemic has led to disastrous human, social and economic consequences which have also revealed the vulnerability of the current LE economic model to a multitude of risks. LE focuses on produce and wastes, which ultimately result in disposal and pollution in the environment that are detrimental to human & animal health. With the call for a 'great reset' for a sustainable and inclusive global economic recovery, all stakeholders ranging from policymakers at the macro level to households at the micro-level have been forced to return to the drawing board to revisit, rethink, and question existing policy norms. Prior to the COVID-19 pandemic, momentum had been increasing for a system change in favour of the CE model.

[5] Partha Dasgupta, Economics Nature's Way, Finance and Development, Fall 2021, IMF.

[6] (Wikipedia, based on circularity indicators. wwwllenmacarthurfoundation.org)

[7] (During 2005–2012 most articles centered on China, while publications that focused on Europe or were geographically independent first took off in 2012).

While it may be convenient to cite the pandemic and sideline or deprioritize any policy propositions in favour of CE, it must be noted that international financial institutions, particularly the International Monetary Fund (IMF), highlighted the potential finances that would be available for both advanced and developing economies, towards CE-oriented initiatives.

Despite the multifaceted negative qualitative and quantitative impacts of the COVID-19 pandemic, there have been some positive impacts on the environment, especially on the energy front. For instance, the global use of coal had declined by 8%, oil by 60%, and electricity by 20% compared to Q1 of 2019, leading to record low global CO_2 emissions and triggering the need for diversification and circularity of supply chains. "The pandemic has highlighted the environmental costs of the 'extract, produce, use and dump' LE model of material and energy flows and that the short-term solutions to cope with the pandemic will not be sustainable in the long-run, as they do not reflect improvements in economic structures of the global economy"[8].

Against the backdrop of these arguments in favour of CE, the current period appears an opportune time to transition to this circular model across the economy, with unique approaches for each sector. It must be noted that the post-COVID-19 investments needed to accelerate towards more resilient, low carbon production methods, and CE models will need to be integrated into the stimulus packages for economic recovery being promised by governments. Rechanneling existing investment or attracting new funds will be challenging as countries, such as Sri Lanka, are plagued with a host of legacy issues that have aggravated during and post pandemic periods.

This paper introduces the CE Model and its conceptual framework and, highlights that the pandemic has clearly displayed the benefits of CE and its relevance to today's world order than ever. The paper also describes the need for a top-down approach addressing methodological and implementation challenges during the transition and sets out the factors that would help in implementing the CPP and the GDS as announced by the President of Sri Lanka. Against this backdrop, the main challenges confronted by Sri Lanka in the transition from LE to CE due to macroeconomic legacy issues and the need to partially/fully address such issues along with the ongoing COVID pandemic rather than postponing them are also described. The paper also lists out critical action points in transitioning from LE to CE and the implementation of GDS in Sri Lanka. Some guidance and action points for policymakers and regulators are also listed while emphasizing the need to enact necessary laws and regulations in line with CE fundamentals. The paper closes with a summary of the salient points of the discussion, reiterates the importance and benefits of the transition from LE to CE and the necessity for initiating early action to implement CPP and GDS in Sri Lanka within an appropriate policy framework.

1: Conceptual Framework of the CE Model

1.1 Linear Economy vs. Circular Economy

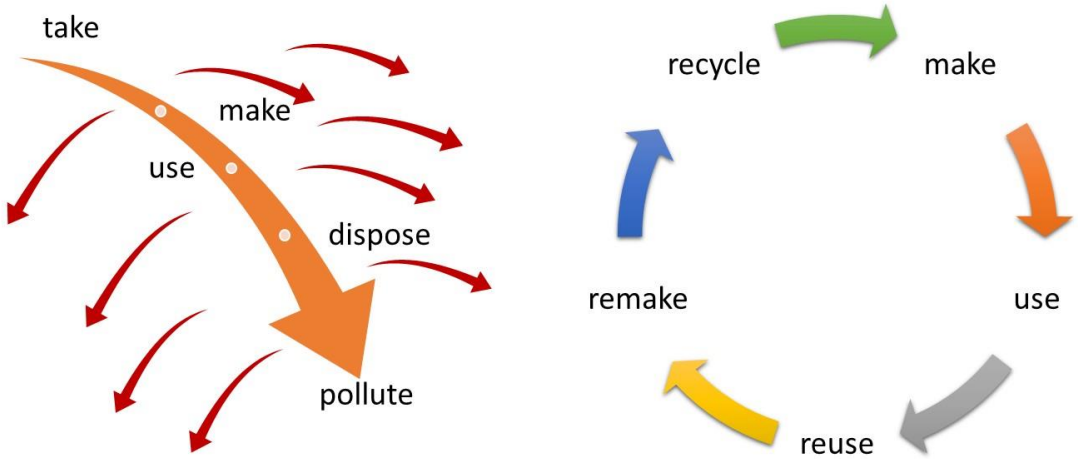
The Ellen MacArthur Foundation defines CE as "one that is restorative and regenerative by design and that it aims to keep products, components, and materials at their highest utility and value at all times, distinguishing between technical and biological cycles"[9] The underlying goal

[8] Dr A Mohammed Hassan Ramadan, Are climate change and mental health correlated, 2021
[9] https://www.ellenmacarthurfoundation.org

of this concept is transitioning to renewable energy sources away from the current domination by fossil-based sources. Accordingly, the transition seeks to achieve three goals: (i) eliminate waste and pollution generation at the design stage, (ii) keep recycling and reusing materials and products, and (iii) regenerate natural systems.

As shown in Fig 1, LE is used to describe systems that produce products and wastes, all of which ultimately result in disposal and pollution in the environment.

Fig 1: Simple Comparison of Linear and Circular Economic Models



Source: European Cluster Collaboration Platform-Community news, Difference between LE and CE, Fox on 04/12/2019, Clustercollaborative.eu

CE, on the other hand, uses waste from all sources in follow-up ventures to produce beneficial artifacts for human use. Figure 1 also indicates that the process of produce/recycle/reuse, according to CE, is repeated *ad infinitum*.

A key aspect to be considered in this regard is that the world today is in the midst of the 4th Industrial Revolution (4IR). 4IR is also continuously evolving using newer sciences, such as artificial intelligence, algorithm-based computer creations, and machine learning, etc. which may consistently minimize the need for 'human touch' in economic and business activities to the minimum. However, it continues to contribute to the production of goods and services within the same LE framework that has no regard for the environment and overall well-being of all living beings. At the speed 4IR is advancing, it is hard to assume that the current linear processes will use and reuse raw materials and redundant computer parts, reduce waste, and introduce alternative products for silent killers like plastic. Currently, the most impairing determinants are the emissions of carbon dioxide, plastic waste consumption and other greenhouse gases, along with the deleterious effects of pollution on the human & animal health and the environment.

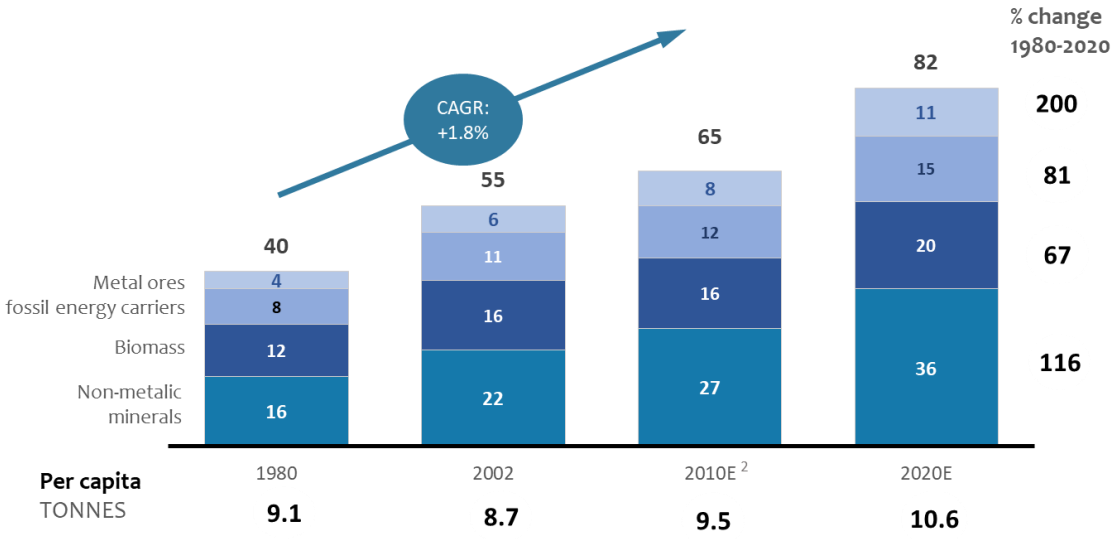
2. Impact Comparison between LE and CE Models and Opportunities Offered by CE for Future Resilience and Competitiveness

2.1 Resource Inefficiency and Unsustainable Growth

CE creation needs different multiple business models and tweaking the same old models would not result in the change that economies require. The United Nation's (UN) 2030 agenda for the Sustainable Development Goals (SDGs) includes 17 goals to deal with the most pressing social and environmental challenges. Accordingly, goal 12 which is to ensure sustainable consumption and production patterns would require nothing less than a complete overhaul of the linear system of "*take-make-waste*". Accordingly, aligning with this goal or even with the essence of the SDGs, as a whole, will require shifting to patterns of production and consumption that are characteristic of the CE system, i.e., based on a restorative or regenerative system in which all products are designed and marketed with the intention of *"regenerate, reuse and recycle"* in mind. The section below discusses some of the policy thinking underlying the CE for future resilience and competitiveness.

The World Economic Forum estimates that 80% of the US$ 3.2 trillion value of the global consumer goods sector is lost irrecoverably each year due to the current inefficient linear *"make, take, waste"* model. Besides being unsustainable, this excessive use of natural resources (Fig 2) also leads to environmental problems such as soil degradation, water pollution, waste generation, carbon emissions, deforestation, sea pollution, etc. If ignored, total demand for natural resources is expected to reach 130 billion tons by 2030 – up from 50 billion in 2014 – and a more than 400 per cent overuse of Earth's total capacity. Therefore, in Asia, the manufacturing center of the world, the opportunity for CE is massive but it requires a concerted attempt by all stakeholders.

Fig 2: Global Resource Extraction[1] during 1980-2020
(billion tonnes)



1 Resource used: amount of extracted resources that enters the economic system for further processing or direct consumption. All materials used are transformed within the economic system, incl. material used to generate energy and other material used in the production process
2 Forecasted from 2002 OECD extraction scenario for 2020

SOURCE: OECD : Behrens(2007): WMM Global Insight; Ellen MacArthur Foundation circular economy team

There has never been a more salient time than the COVID -19 pandemic period to consider how the CE could be translated into reality — ***a new normal*** — as economies begin to recover and activity goes back to business as usual thereby entailing depletion of national resources, increases in inequalities and inequity and therefore, the imposition of an unsustainable pattern of growth and development which threatens everyone's well-being for generations to come. This is highlighted in Figure 2 which shows how global resource extraction has been steadily growing over the past four decades. Accordingly, the true adoption of a 'new normal' should entail transitioning away from unmitigated growth at all costs and the old fossil fuel economy, thereby paving way for delivering a lasting balance between people, prosperity, and the planetary boundaries.

2.2 LE has Threatened Human and Animal Health

While addressing public health consequences is clearly the priority, countries must revisit momentum that was built around the world prior to the pandemic, reassess the threats under LE model and explore the positive impacts of CE models. The last decade has seen several leading businesses investing in this transformative path, while pioneering institutions and government bodies put forward significant legislative proposals to enable the transition. The fragility of the global supply chains was revealed throughout the early stages of the pandemic, particularly for those who struggled with the availability of medical equipment.

Climate change and natural disasters as well as economic downturn also persuade human beings to move towards the reduction of resource waste and use and reuse of scarce resources. Although worldwide aggregation is not possible, hundreds of animals have died due to wildfires, floods, droughts, famines, and poaching of animals, especially vanishing breeds like elephants and leopards, and sea pollution by oil and chemical leaks of ships. **Frequent wild fires in large forest reserves in countries like USA, Australia, Brazil and some parts of Europe have forced respective governments to minimize such disasters.** One of the largest environmental damages is reported from Australia in 2020 with its three months long wildfires covering a wide area resulting in a massive emitting of carbon dioxide through the release of stored carbon which could also lead to more incidents in the future. The burning Amazon up until August 2019 also has similar effects. As such, arresting such events had to be rooted in the action of today while noting that such occurrences may well take place in the future.

Despite warnings by governments, illegal activities are prevalent in many countries. For example, threats to on-land animals are also partly attributable to the destruction and obliteration of vast forest lands for modern-day development, global warming, consumption of plastic waste by animals, climate change, human-animal conflicts while inadequacy of laws to deal with the sea pollution and protection of marine resources. Illegal sand mining and tree cutting, destroying forestation, including medicinal plants and fertile lands for commercial construction, wasting water in reservoirs and canals are widespread in Sri Lanka and some countries in Africa. Concurrently, the human and wild animal conflict has reached alarming levels for people as well as animals, while frequent oil spills into the sea and destruction of marine resources are clear threats to human and animal lives. The diversion of industrial and chemical waste into rivers is a visible environmental damage for which there should be specific laws to penalize those who pollute rivers as well as sea waters.

Recent examples of serious sea pollution that led to the loss of marine resources can be cited from Sri Lanka as well as other countries. The recent incident of a ship carrying a consignment of chemicals and raw materials catching fire within the Sri Lankan Sea boundaries has created grave concerns in relation to the country's coastal environs. Experts have noted that this would be the worst marine ecological disaster faced by Sri Lanka with far-reaching implications. Although with hard bargaining, compensation may be received for expenses in handling shipwrecks, the damage to the environment cannot be compensated. This is a case in point where, commercial interest-based LE models have disregarded compliance with international standards and laws of the land. Hard on the heels of the recovery phase of Covid pandemic, Sri Lanka faced an unprecedented economic crisis flagged by a balance of payment crisis that has resulted in import controls, debt standstill and social unrest. Although not officially announced, people have begun to use and reuse of resources (CE) instead of make use and waste economic model (LE) followed hitherto.

2.3 Attractiveness of CE to Enterprises and Consumers

CE presents significant savings opportunities to businesses and economies. Co-benefits include higher product quality, environmental resilience, and material input savings which represent about 20% of the total material input costs incurred by the consumer goods industry. Companies could also increase their revenue through new client relationships and new types of business models. CE performance-based models could make high-quality products much more affordable. Finally, a CE could help create resilient and prosperous economies in a healthy environment with restored natural capital. For example, today, only 15% of used mobile phones are collected, most of which are being recycled and 50% without further recycling, but with increases in remanufacturing and reuse. Embedded value in post-consumer products can be recaptured through maintenance, reuse, remanufacturing, and recycling. SMEs and MSMEs in Sri Lanka are well prepared for reusing, reproducing, and avoiding waste.

2.4 LE Promotes Silent Killers while CE Generates New Products out of Industrial Waste

In LE, the used plastic and other waste on roadside flow into the sea while burned waste in incinerators results in large amounts of waste and loss of productive resources and value. In recent years much focus has been placed on increasing recycling rates. Although this has had some positive effects, it is ultimately an inefficient approach because the linear system was never designed with recovery in mind and in many cases is optimized for disposal. For electric and electronic equipment, around 72 million tons of waste are produced annually, representing a substantial value. For example, 1 ton of mobile and smartphones contains around US$28,000 worth of gold, silver, copper, and palladium. This is driving the emergence of new business models for phone recovery and new industries.

Additionally, in the LE model, new products are almost entirely dependent on the use of virgin materials – significantly exposing future profitability to increases in material prices and price volatility which means that the system is geared towards disposal, rather than recovery. Sri Lanka has undertaken notable initiatives with regard to the establishment of an efficient waste management system in urban areas, the Metro Colombo Solid Waste Management Project and the Aruwakkalu Sanitary Landfill facility are some such initiatives. In addition, amid these CE-centric

'waste to resource conversion' initiatives, the first waste-to-energy power plant in Sri Lanka commenced operations in early 2021 in partnership with a private company.

2.5 The Case for Carbon Pricing and Climate Change Mitigation under CE

A nationwide scheme for pricing Carbon Dioxide (CO_2) emissions—for instance, a carbon tax—would substantially lower the economic costs of attaining emissions targets. The tax would increase the price of carbon-intensive fuels and electricity, thereby providing incentives to reduce energy use and shift toward cleaner fuels across all sectors and help spur clean technology investments. Carbon pricing also mobilizes revenue, reduces deaths from local air pollution, and is straightforward to administer. Many governments have integrated carbon charges into petrol and diesel taxes, for example, and extended them to coal, natural gas, and other petroleum products.

Momentum on carbon pricing is building internationally. Emissions trading schemes have recently emerged in China, Korea, and Germany, while Canada is raising its carbon price to US$135 by 2030. As the world's second-largest emitter, the USA will need to act decisively to help deliver the global emissions reductions needed over the next decade. The present US administration appears to be seizing this opportunity to adopt innovative approaches that can move the global climate agenda forward on all fronts.

The IMF focuses on three areas where the right policies can make a significant difference in accelerating the transition to the new climate economy; a robust carbon price; standardized reporting of climate-related financial risks; and financial support to developing countries[10]. A robust carbon pricing would provide a critical market signal to producers and consumers in all sectors of the economy, and it has proven to advance investments in renewable energy, energy-efficient buildings, reforestation, and other climate-friendly activities — with a positive impact on growth and jobs while reducing carbon emissions. It also shows that a mix of steadily rising carbon prices and green infrastructure investment could increase global GDP by more than 0.7% per year over the next 15 years—and create millions of new jobs. Many businesses now use a shadow carbon price in their models. But the average global price is currently $2 a ton, and it needs to rise to $75 a ton by 2030 to curb emissions in line with the goals of the Paris Agreement. Due to the urgency to act, the IMF proposes an international floor price for carbon among large emitters, such as the G20. Focus on a minimum carbon price among a small group of large emitters could facilitate an agreement, covering up to 80% of global emissions. Crucially, a floor price could avoid less efficient and contentious border carbon emissions.

2.5.1 Investing in Climate Solutions

Climate change is one of the major challenges the world will face in the 21st century**.** The Paris Agreement (2015) expects to limit global warming to well below 2, preferably to 1.5Celcius, and further explore the possibility of limiting the increase of global temperature below 1.5C. Achieving this ambitious goal calls for changes in production and consumption patterns and the transformation of energy, transportation, and land use for which the CE framework would be useful. The international rating agencies have begun to assess climate change and government responses to potential risks in climate change in their sovereign ratings. At present, given government strategies and business models that pay little or no attention to climate change, with resource use and waste

[10] Kristalina Georgieva, Managing Director, IMF, 2021, IMF blog

is likely to raise global mean warming level to beyond 30C with consequential droughts, floods, heat waves and high sea levels thus reducing the possibility of climate change adoption. More recently, the USA has put forward a new climate plan that pledges US carbon neutrality by 2050. The plan envisions stronger energy efficiency standards clean technology subsidies, and US$ 2 trillion of public funding over 10 years for clean energy infrastructure and critical technologies, such as green hydrogen. Canada has pledged to cut greenhouse gases by about 30% below current levels by 2030 and to achieve emissions neutrality by 2050. However, more needs to be done by all nations to scale up and accelerate the transition to a low-carbon economy, which is a key component of CE.

The Glasgow Climate Pact (COP-26) is the latest global agreement reached in November 2021 aiming to reduce the worst impacts of climate change. The agreement will set the global agenda on climate change for the next decade as follows:

- **Emissions:** further cuts to emissions of carbon dioxide (CO2) - a greenhouse gas which causes climate change and to keep temperature rises within 1.5C - to prevent a "climate catastrophe. The main goal was to secure global net zero (total emissions are equal to or less than the emissions removed from the environment) by mid-century and keep a maximum of 1.5 C degrees of warming within reach.
- **Coal:** an explicit plan to reduce use of coal (responsible for 40% of annual CO2 emissions). Countries agreed to "phase down" rather than "phase out" coal.
- **Fossil fuel subsidies:** agreed to phase-out subsidies that artificially lower the price of coal, oil, or natural gas. However, no firm dates have been set.
- **Deforestation and reduction of methane:** world leaders promised to reduce_ deforestation and Methane emission by 30% by 2030.
- Accelerating the phase-out of coal and mobilizing at least $100bn in climate finance per year.

Nearly 200 countries signed up for the Glasgow Climate Pact and the Paris Agreement's Rulebook was completed. The agreement pledged to significantly increase money to help poor countries cope with the effects of climate change and make the switch to clean energy for which it was proposed to make available one trillion yearly dollar fund from 2025 onwards. In November 2022, at the Conference of the Parties to the UNFCCC (COP27) in Egypt, the expectation was to: building on the previous successes; paving the way for future ambition, with a clear recognition of the gravity of the global climate challenge; and appreciating of the value of multilateral, collective and concerted action as the only means to address this truly global threat. The following were agreed at the COP27:

- **Climate Action**: Reaffirmed the Parties' commitment to limit global temperature rise to 1.5 degrees Celsius above pre-industrial levels and to follow the rules set at Paris meeting. The UN's Inter-governmental Panel on Climate Change indicated that greenhouse gas emissions must decline by 45% by 2030 to limit global warming to 1.5°C for which there was no clear agreement. Similarly, there was no agreement on the reduction of fossil fuel.
- **Establish new funding arrangements**: a dedicated fund to assist developing and vulnerable countries in responding to Loss and Damage; and establish a 'transitional committee' to make recommendations on how to operationalize both the new funding arrangements and the Fund at COP28 next year.
- **Agreed on the institutional arrangements to operationalize the Santiago Network for Loss and Damage:** to catalyze technical assistance to developing countries that are particularly

vulnerable to the adverse effects of climate change, and empowering all stakeholders to engage in climate action, in particular through the five-year action plan on Action for Climate Empowerment.

- **New pledges, totaling more than USD 230 million, were made to the Adaptation Fund:** to help many more vulnerable communities adapt to climate change through concrete adaptation solutions. Despite expectations, the decision to delivering investments of at least USD 4-6 trillion a year was not reached at COP27. It will require a swift and comprehensive transformation of the financial system and its structures and processes, engaging governments, central banks, commercial banks, institutional investors and other financial actors to ensure global transformation to a low-carbon economy. Similarly, the goal of developed country Parties to mobilize jointly USD 100 billion per year by 2020 has not yet been met, with developed countries urged to meet the goal, and multilateral development banks and international financial institutions called on to mobilize climate finance.

Keeping in line with agreements reached at Paris meeting and COP26, Sri Lanka has already taken action with respect to the following:

- commenced the process of reducing carbon emission by 14.5% by 2030
- initiated Marine Spatial Planning
- recently established a Climate Office
- spearheaded the UN declaration of the 1st March as World Sea Grass Day
- employing the National Policy for Conservation and Sustainable Utilization of Mangrove Ecosystems
- implementing the Commonwealth Pilot project for Climate and Ocean Risk Vulnerability
- leading the Commonwealth Blue Charter Action Group on Mangrove Ecosystems and livelihoods Sri Lanka
- pledged not increase further energy capacity via coal power
- pledged to phase out fossil fuel subsidies
- pledged to aim for 70% of renewable energy for electricity generation by 2030
- will join the recent Global Methane pledge Made in Washington

2.5.2 The Benefits of Investing in Renewables and Innovation

The impact of renewables could be higher for green investment, in part because many jobs in renewables do not require much education beyond high school and have low barriers to entry. Per $1 million invested, around 5–10 jobs could be created in green electricity; 2–12 jobs in efficient new buildings like schools and hospitals; and 5–14 in green water and sanitation through efficient agricultural pumps and recycling.[11] These results indicate that public spending on infrastructure can make a meaningful contribution to employment creation. Overall, 1% of global GDP in public investment spending can create more than 7 million jobs worldwide through direct employment effects alone. It is also notable that climate change has a direct impact on employment, livelihood of people in the agriculture sector which provides about 25% of employment, food security, supply chains, rural poverty and more importantly the human civilizations and hence the aggregate demand which in turn drives economic growth.

[11] Mariano Moszoro is a Senior Economist in the IMF's Fiscal Affairs Department.

According to the climate change losses index, Bangladesh, Nepal and Sri Lanka have been included in the 10 most-affected countries in 2017 implying the vulnerability of the South Asian region to climate change. The index also shows that Sri Lanka has suffered a loss of 1.13% as a percentage of GDP during 2017 due to repercussions of climate change. Sri Lanka being an agricultural economy, its contribution to GDP has been less than 10% primarily due to the adverse impact of climate change.

3. Facilitators of Transition from LE to CE:

3.1 The establishment of a Government-wide Programme and Top-down policy Initiation

The Dutch government plans to make its economy circular by 2050. To achieve this, it has developed a government-wide CE programme in which several ministries are involved. All programmers are aimed at handling raw materials more efficiently: e.g., the procedure for Waste (VANG), Green Growth, and Bio-based Economy, and the CE programmes will also help to create a safe and healthy human environment. Amsterdam, for example, has become the first municipality to adopt the Doughnut Economics model and the Circular 2020-2025 strategy as the basis for its recovery from COVID-19. The new model and strategy concretely aim to cut food waste by 50% by 2030, implement strict sustainability requirements in construction tenders, and also reduce the use of new raw materials by 20% [12].

Decisive policy measures are essential to change the nature of the economies. China's top-down growth model that started from President den Xiaoping has changed the country's entire economic landscape with visible transformation under a similar approach by the present President Xi - Jinping's outward-looking policy package driven by Belt and Road Initiative (BRI) providing clear evidence for top-down policy initiation. While the jury is out on the larger questions of transformation, measures such as environmental taxes, carbon emissions trading zones, administrative guidance on pollution, and financial incentives are already having an impact on business and industry in the locations where these are being instituted. It may, however, be noted that although China has illustrated how top-down policy can produce change, not all governments or economies can adopt similar approaches, nor the modern society appreciates the top-down approach as the best way to bring innovation and business creativity to the fore.

Governments should create policies such as shifting taxation from labor to resources, setting specific recycling targets for industries, and making companies responsible for products throughout their life cycle to make CE more effective. Japan, South Korea, and Taiwan have done so, ensuring manufacturer responsibility by demanding that they recycle 75% of their annual production while some have applied the CE model for their urban planning. Similarly, Singapore's Jurong Island, an artificial island where the country's energy and chemicals industry are located, has a setup that enables one refinery's waste stream to be another refinery's feedstock. This system is considered a highly successful example of CE thinking of the entire value chain. Over the last decade, the recognized solution for sustainable development by most of the nations including the EU was to

[12] Etienne Kechichian and Nadal Mahamoud, the circular economy can support COVID-19 response and build resilience, World Bank Blog, |May 18, 2020, by Raphael Espinoza, Vitor Gaspar, and Paolo Mauro , IMF

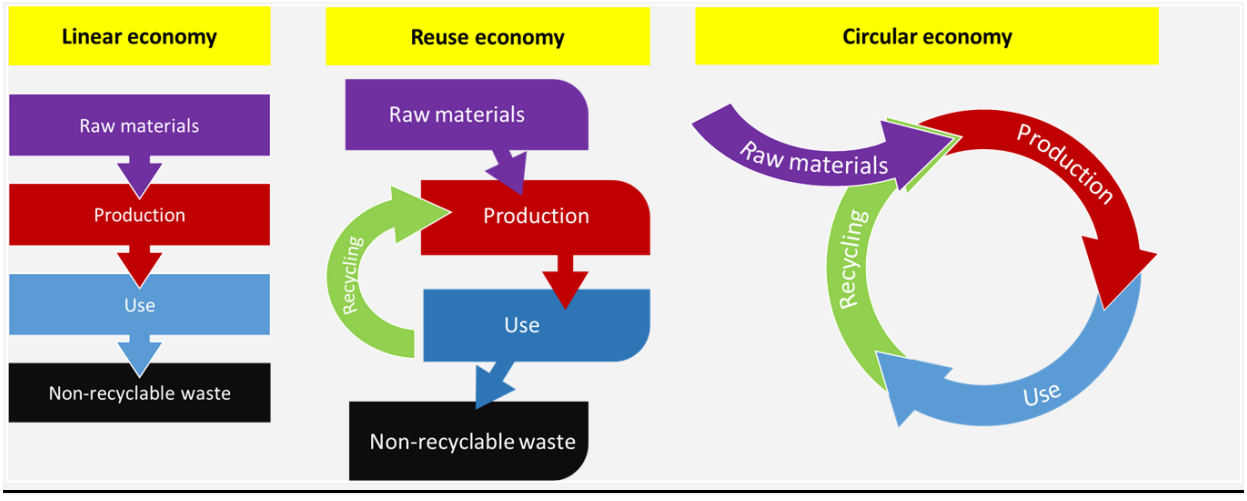
embark on the CE, which includes improving resource efficiency (mainly related to water, energy, and material utilization) throughout the value chain and resource circulation through the end-of-life regenerate, reuse and recycling. CE also approaches to achieve dematerialization and shared use of resources, which are just a few examples that illustrate the wider range of capabilities of CE.

The private sector on their part should concentrate on redesigning business models, efficient production systems, and consumption habits under CE. In transforming supply chains to boost CE the private sector should work closely with global buyers and focus on product design, and to work with factories to extract more value from the production process for which design, education, and awareness are critical. Overcoming these challenges could deliver significant benefits in Asia.

3.2. Reuse of Resources

3.2. 1. Remanufacturing Infrastructure: Through clustering of remanufacturing networks and the creation of economies of scale in waste management and remanufacturing and other services, CE facilitates the transition. However, while the knowledge and technology may exist to achieve the above, the practice of designing and building infrastructure that accommodates a scaling up of CE networks will take time to emerge. Asia is rapidly urbanizing, and many countries are stepping up investment in infrastructure. However, unplanned urbanization allows economies of scale to develop around waste, recycling, and other consumer services resulting in, infrastructure and spending at non optimal levels and failing to be sufficiently forward-looking to address new business models under CE. Many countries including Sri Lanka are planning to build smart cities through innovative communication systems and business-friendly hi-tech facilities. As far as the CE-based business model is concern, remanufacturing is the process of disassembly and recovery of a product, returning it to its original state without loss of quality and often with the same warranty which can be a valuable approach. China enacted its first CE Promotion Law in 2009, but others in the region are still behind in enacting specific laws to implement CE models. Fig 3 shows the stage-wise transition from LE to CE, i.e., LE to reuse economy and then to CE. The transition takes place through the recycling of used resources to production (stage1). In stage 2, recycled raw materials, as well as other raw materials, are fed directly to production. The circular process continues without non-recyclable waste.

Fig.3 Transitioning from a Linear to a Circular Economy



Source: www.ellenmacarthurfoundation.org

3.2. 2 Join Post- Covid Supply Chains

To promote entry to the new supply chain, first, the idea of extracting additional value from waste should be recognized in supply chains that were set up to deliver efficient use of resources. However, what is often missing is the industrial infrastructure to reuse by-products. Second, in key production locations, supply chains are already responding to the rising cost of utility inputs, such as electricity, fuel, and water. The global brands that control vast global supply chains are increasingly familiar with the concepts of circularity in production and are equipped with the right leadership and design products and services to support these new business models. Some of the Asian factories are capable of competing with dominant peers on the supply chains designed under new normal conditions.

For developing countries like Sri Lanka while stepping up their efforts to join the old supply chains, should explore new ways of joining the post Covid new supply chains. For example, new CE thinking would be needed among buyers as well as brands as proven in the case of Sri Lanka's garment industry. Yet, the GOSL should facilitate new green-based projects to access global and regional value chains and that may require compliance with guidelines and cross border transfer standards, such as reduction in environmental pollution via greenhouse gas emissions, adoption of climate change mitigative action, promotion of enterprises to move towards green buildings using new infrastructure facilities and the usage of environmentally friendly new technologies. GOSL should pay attention to these factors and facilitate the entry of Sri Lankan companies into these supply chains. This warrants an explicit announcement by the GOSL compelling system-wide adherence to global and regional requirements in the transition from LE to CE, and the enactment of dedicated laws, rules, and regulations. The current foreign currency crisis, import restrictions and the general downturn in the economy in Sri Lanka have added significant pressures when the country begins the transition from LE to CE. GOSL needs to address these legacy issues in a gradual manner sharing burdens across all stakeholders.

3.2.3 Waste Recovery/Recycling: consumer behavior, as well as business practices, are key in transitioning towards a CE even with the right infrastructure. Businesses must raise awareness among consumers, provide information and convenience for their behavioral change and collaborate with the government to make sure that the right infrastructure is in place to accommodate changes in consumer behavior.[13] However, significant investment is required to enable waste segregation, which is the first step in moving up the waste hierarchy away from landfilling and incineration. On average, the countries with a plastic waste ban imposed domestically, send 32% of plastic waste to recovery, 66% to incineration, and 2% to disposal. In comparison, the countries that do not have a ban, send on average, 24% of plastic waste to recycling, 22% to incineration, and 54% to disposal. The striking feature is that the level of plastic waste recycling is only 8% higher in the countries with a ban, whilst the level of incineration is 44% higher than the EU member states with no ban. Hence, the outcome of the landfill ban has been primarily to shift the plastic waste from landfills to incineration.

[13] The percentage of municipal waste landfilled in EU-28 in 2012 Source: Eurostat (accessed June 2017).

3.2.4 Reconsiderations in Trade Policy: It is necessary to enable CE products and materials to flow across geographies. Several countries currently ban the import of remanufactured and other secondhand goods, as well as certain waste streams, arguably because of a lack of confidence in the value of these products and inadequate foreign currency resources in some countries. When moving to a CE, services will become increasingly important and some of the secondhand value goods may have to be supported at the initial stages. Currently, given the foreign exchange crisis and import restrictions, knowingly or unknowingly people in Sri Lanka have begun to rely on the reuse of resources and depend on the secondary market for used products. In this context, it is imperative to re-think regulation with the CE framework in mind, and free up businesses to act. Certain frameworks may be better driven by industries themselves. For example, defining standards of circularity would be useful, and could help facilitate linkages and materials cascading between companies and industries. Policies can also support consumer engagement while adequate regulations could provide consumers with confidence over the quality of remanufactured goods.

3.2.5 Reduction of Household Waste:

Switching to reusable items or establishing policies that allow for goods to be distributed in alternative packaging help reduce unnecessary consumption. The popularity of recently opened bulk and refill stores in Hong Kong, Singapore and Thailand are a good indication of the market's interest in reducing excess packaging.

The success of collecting waste material in Asia would require a collaboration between the private and public sectors to invest in the right technology, develop technical expertise to maintain a proper waste processing system, and create a secondary market for waste materials. In Hong Kong, home-grown soymilk brand Vitasoy has long been committed to nutrition, taste and sustainability, and has been investing in infrastructure that collects and recycles. It launched a pilot scheme to collect recycled materials, beginning with Tetra Pak cartons from across 75 schools.

Successful lessons could be drawn from cases in Taiwan and Hong Kong. Taiwan, with the help of government planning, has reduced household waste by 50 to 60% in recent years and has shifted food waste treatment from incineration to composting. Japan's commitment to reduce waste is both structural – in terms of limited space and natural resources – and policy-driven, which produced the innovation of "deconstructing" skyscrapers." Similar schemes in India repurposed 100 metric tons of end-of-life plastics into 40 kilometers of roads between Pune and Bangalore.

3.2.6 Promote Missing CE Research Outcomes in Moving from LE to CE: The opponents of LE argue that it is only material resources that undergo this virtuous cycle and that CE may be accurately described as a practice at the exceedingly early stages of the industrial revolution, but it is not a true description of today's practices. They argue that CE is an idealized version of what is invented for the future and that it is just the latest prescription. CE research still lacks study frameworks for assessing the different dimensions of their implementation, especially, institutional aspects, such as changing routines and emerging practices. Yet, the general lack of consideration of socio-political aspects in CE research is a noticeable gap and it can lead to several risks: (a) the CE concept tends to be seen as a mere technological and organizational approach, disregarding the socio-cultural dimension of its implementation process; (b) current debates in the political realm show that the uptake of CE ideas by policymakers leads to the suggestive assumption

that the current economic systems could become entirely sustainable by implementing CE principles of closed material and energy loops, regardless of the character of the product; (c) CE models are still seen as originating from anti-governmental groups that are aimed at stifling rapid development, and (d) the transition from LE to CE entails many risks and it is vital to have acceptable research outcomes, objective policy debates and continuous consultation with all stakeholders.

Major producers and exporters of fossil fuels are most vulnerable to climate change transition risks while, gas exporters and those with low costs of production are less exposed than producers of coal and, to a lesser extent, oil. Countries with inflexible labor markets, Sri Lanka for example, may face higher economic and social costs from shifts in industrial structure. In contrast, other sovereigns could gain if they establish leading positions in new technologies and industries, or benefit from resource endowments used to power a greener economy (e.g., lithium for batteries). These risks have to be addressed within an appropriate framework paying particular attention to context specificities and innovative methodological approaches. The concept of CE has recently regained momentum, received recognition by G-20 and financial support from international financial institutions and even reached mainstream discourses through new policy initiatives. Hence is the need to undertake further research on the implementation aspects of CE model.

4. Legacy issues impedes Smooth Transition from LE to CE in Sri Lanka

4.1 Setback in Growth during 2020 -2022 due to Covid-19 Impact and Outlook for 2023

Despite the negative growth at 3.6%[14] and significant setbacks during 2020 due to the Covid pandemic, Sri Lanka managed to turnaround its growth by 3.7% in 2021 due to part recovery of the domestic economy. The fuel shortage, transport difficulties as well as import restrictions have adversely affected growth prospects resulting a negative growth in 2022, while prospects for 2023 appear to be more promising.

4.2 Unprecedented Health Care Spending by GOSL and Fiscal Pressures

Given the low revenue base due to tax cuts and high expenditure aggravated by Covid related lockdowns, isolations, and abnormal working conditions, GOSL was compelled to resort to an unprecedented amount of borrowing from banking sources during 2021 and 2022. The central government debt/GDP ratio rose from 100.6% in 2020 to 104. 6% in 2021. Like in all countries, the primary focus of the GOSL was to sustain strong health conditions until the pandemic is brought under control.

4.3 The Road to Strong, Inclusive Green Growth and Fiscal Consolidation

In Sri Lanka, the preponderance by successive governments to resort to monetary financing of fiscal deficits has resulted in the continuous increase in fiscal deficits and external borrowing. It is, therefore, imperative for GOSL to start addressing fiscal policy related legacy issues during the transition from LE to CE rather than postponing them for a future date. Many countries have tried a robust set of budgetary rules and institutions to achieve three overarching fiscal goals: sustainability; economic stabilization; and simplicity (for fiscal rules in particular). Even simple numerical rules can promote fiscal prudence but continuous commitment and adherence to targets

[14] CBSL Annual Report-2020

would be critical. For instance, countries that follow debt rules generally manage to reverse debt increases of above 15% of GDP in target range of about 10 years in the absence of new shocks—significantly faster than countries that do not follow debt rules. Over the last two decades, Sri Lanka's fiscal authorities have not complied with the fiscal targets included in the Fiscal Management Responsibility Act (FMRA) No 3 of 2003 and this Act was amended in two instances , i.e. in 2013 (FMRA Amendment No.15 of 2013) and in 2021 (FMRA Amendment No 12 of 2021) , by enhancing the borrowing limits, extending target date of compliance and limiting the observance of budget deficit to 60% of GDP. The above flexibilities have not helped to reduce GOSL's reliance on bank financing. A compelling debt rule (fiscal rule) should be incorporated in the proposed Constitutional Amendments if Sri Lanka were to achieve its declared fiscal targets. At the same time, it is necessary to protect the most vulnerable citizens from the crisis consequences through better targeting of fiscal support, especially, women and children and provide more focused support to viable firms on green projects under the GDS to ensure growth prospects and encourage businesses to move for more greener and environmentally friendly projects.[15] Projects—ideally with the participation of the local and foreign private sector—would aim at mitigating the effects of climate change and facilitating digitalization. Partnering with the private sector to assess the viability of firms before providing support can also improve targeting and reducing administrative costs.

4.4 Monetary Easing by CBSL and Potential Impact on Inflation:

Throughout 2020 and up until August 2021, CBSL relaxed monetary policy measures to support the revival of the economy providing credit to GOSL and the private sector. According to CBSL, demand driven inflation had "moved broadly in the desired range of 4-6% during 2020. Private consumption, which makes up almost 70% of GDP, stayed muted because of partial lockdowns, domestic travel restrictions and other social distancing measures in 2020 but started showing a gradual increase in inflationary pressures during 2021. In response, CBSL announced tighter monetary policy measures since August 2021 and thus far in 2022.

Inflationary trends have picked up more visibly during 2022 due to short supply of main food items, high transport charges, fuel shortage and high gas prices. The GOSL's heavy reliance on bank financing for domestic and foreign debt service payments have added significant demand pressures due to which CBSL was compelled to further tighten monetary policy measures. In response, the headline inflation measured in terms of the Colombo Consumer Price Index for November 2022 (Y-O-Y), has reduced to 61%, whilst Core inflation has declined to 49.4%.

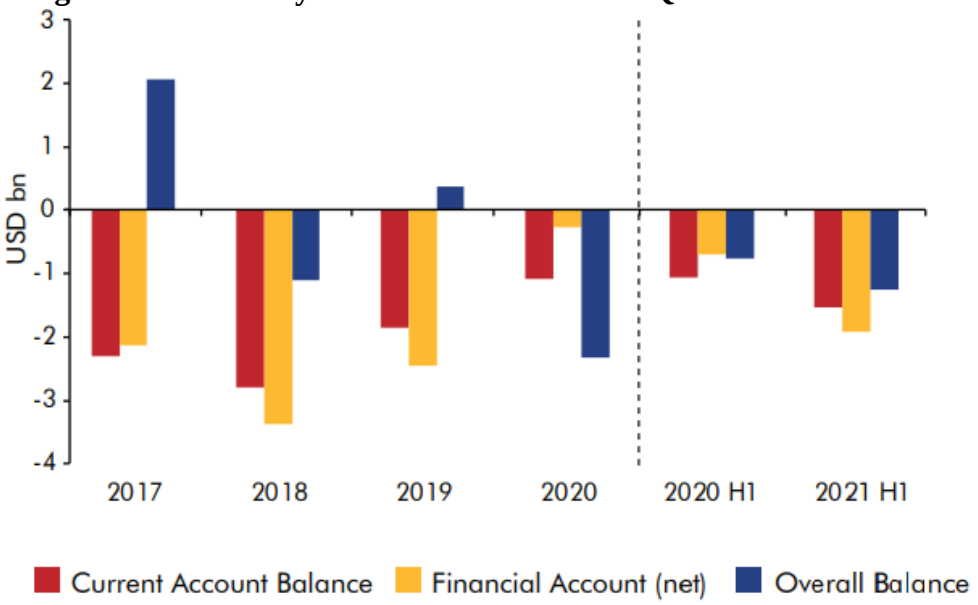
4.5 Covid-19 has Aggravated External Sector Issues

Excessive monetary expansion since the announcement of the Covid-19 pandemic and reduction in the inflow of foreign currency have exerted pressure on the exchange rate, while importers rushed to import and hoard non-essential goods in anticipation of a depreciation of the exchange rate (despite import restrictions announced by GOSL). Accordingly, the trade deficit has widened to USD 8, 139 mn in 2021; terms of trade to a negative 8.6 %; current account balance to negative USD 3.343 mn; and to a negative overall balance of USD 3967 mn at the end of 2021. Meanwhile,

[15] Ian Parry, A New Vision for the US Climate Agenda

the worker remittances have reduced significantly during the same period due to foreign job losses, travel restrictions and lockdowns in foreign countries, and more recently, due to diversion of remittances towards the informal market. Sri Lanka continued to maintain its unblemished record of debt servicing amidst numerous pressures on the gross official reserves (GOR) by settling the maturing International Sovereign Bonds (ISBs) during 2020, 2021 and up to April 2022. However, the GOR dropped to about $ 2.9 bn (including an unusable SWAP from China amounting to USD 1.5 bn) by September 2021 thus compelling the country to declare a debt standstill in April 2022. Fig 6 shows the deteriorating Balance of Payments (BOP) situation during 2020 and as at end June 2021.

Fig 4: Balance of Payments of Sri Lanka from Q2 of 2017 to Dec 2021



Source: Central Bank of Sri Lanka

4.6 Wider Financial Sector Remained Resilient

The banking sector recorded a moderate expansion in 2020 and during the first half of 2021. A long outstanding legacy issue in Sri Lanka is the frequent failure of some of the Licensed Finance Companies (LFCs), Specialized Leasing Companies (SLCs) and a number of unlicensed companies due to a variety of reasons. Their subdued performance during 2020 and the effective consolidation programme pursued by CBSL from 2021 onwards helped the sector's survival amidst widespread adverse impacts of the pandemic**.** Sri Lanka's wider financial system thus remains broadly stable and resilient, although some pockets of vulnerability remain, in both bank and non-bank financial institutions. The financial sector may face significant pressures with the commencement of the debt restructuring exercise.

These legacy issues have significantly weighed down on macroeconomic fundamentals in numerous ways over a few decades and it is advisable to address these now, prior to the transition from LE to CE although it will be burdensome on all stakeholders.

5. Critical Action Points in Transitioning from LE to CE and Implementing GDS in Sri Lanka

5.1 GOSL Leadership, Clear Policy Guidance and Commitment

The experience in Asia is that, stronger regulatory frameworks and clearer government signals are needed for businesses to respond to the CE and that governments should provide incentives for companies and industries to invest in CE technologies[16]. In May 2021, the then President of the Democratic Socialist Republic of Sri Lanka announced the GDS highlighting climate resilience and green economy (more in line with 3R concepts of CE) and planned to help shift the food security centric agriculture production and renewable energy to new heights in the new normal. However, with the sudden ban of the use of chemical fertilizer, the agriculture sector was left with no appropriate alternative and the sector suffered a significant setback followed by a continuous social unrest. The clear message from this episode was that policy authorities alone may not be able to pioneer CE transformation or implementation of GDS without the support of, and consultation with all segments of the society. All relevant sectors need to buy into the new business model in a phased manner and think fresh, redesign their products and processes, and develop new strategies while exploring the benefits of the 3 Rs, i.e., the key elements of CE. On 6th November 2022, while launching Sri Lanka's CPP, the present H.E the President Ranil Wickramasinghe reiterated Sri Lanka's call for climate compensation at the COP 27 Conference held in Egypt. In implementing the work plan formulated under the GDS, it is necessary to make appropriate budgetary allocations for this project; ensure involvement of the private sector businesses; set specific recycling targets for industries, and make companies responsible for products throughout their life cycle.

5.2 Establish a Comprehensive Legal and Regulatory Framework and Adoption of International Best Practice

- **Laws to deal with damage to marine resources and environment pollution:** The urgency of enacting appropriate laws or the need to amend existing Laws were highlighted during the ship blaze that took place in the Sri Lankan waters during 2021 and 2022[17] . Sri Lanka may not receive due compensation due to lack of dedicated laws or inaction by the authorities.
- **Laws to implement regeneration, reuse and recycling of resources under CE strategies**. Regulatory measures backed by legal enactments on electronics and ICT should be introduced for implementing the 'right to repair and upgrade obsolete software".
- **Uniform regulation or an Eco-design directives to standardize electronic products, systems and devices such as mobile phones, tablets and laptops should be designed for energy efficiency, durability, reparability, upgradability and maintenance.** Such products should be legally enabled for reuse and recycling, including options for a country-wide take back schemes to return or sell back old mobile phones, tablets and chargers without any environmental pollution.
- **Laws to Reduce Plastic Waste**: Plastic waste is a prime cause of animal and human health risks in Sri Lanka. Currently, Sri Lanka is the 5th largest plastic polluter in the world and the country discards approximately 5mn kg of plastic a day. Throughout the past 45 years, plastic processing was a thriving industry and at present, Sri Lanka has over 400 companies are tied up with plastic

[16] Junice Yeo, Southeast Asia director for sustainability consultancy Corporate Citizenship

[17] Sri Lanka probes environmental impact from container ship fire

processing with an annual capacity of the local plastic processing industry around 140,000 metric tons. At present, only 14% of plastic packaging material goes through recycling attempts, and only 2% gets reused in the same application. Of the rest, 4% is lost in the recycling process and 8% finds an end-use in lower-grade applications. This dismal failure by all stakeholders must be understood in the backdrop of the loss of life due to terminal illnesses like cancer on people of all walks of life, frequently reported on-land animal deaths, and unseen and unnoticed depletion of marine resources due to plastic consumption.

- **Establish a regional convention to protect sea and marine resource pollution due to plastic and other harmful debris**. According to scientists and researchers, the plastics that are collected on the sea beaches of Sri Lanka are not only those from inside the country but also from the thrown away by the neighboring countries in the region. More recently, the sea beach near Mount Lavinia was turned into a plastic garbage site although the invasion is still a mystery.
- **Laws to Promote Environmentally Friendly and Renewable Power Generation in Sri Lanka**: Moving towards renewable energy has been a longstanding legacy issue in Sri Lanka and this situation also prevents the adoption of CE models in the near future although some isolated attempts have been made by successive governments in the recent past. Sri Lanka's electricity supply needs to be changed and strategized to meet changing demand patterns. The electricity demand is expected to grow from 18524GWh in 2020 to 30890 GWh in 2030, which would result in a peak demand to expand from 3050 MW in 2020 to 4872MW in 2030. The details of the proposed new power strategy is not clear as yet but it is aimed at generation of eco- friendly and uninterrupted power supply. As the strategy involves public/private partnership with respect to power generation and distribution, it would be essential to ensure that relevant laws and regulations are enacted to encourage low-cost energy for households and small businesses, setting up of renewable energy projects, use of industrial waste for energy generation (a move towards CE) and maximizing energy use of the construction sector through new policies and legislation. While the provision of energy at an affordable cost is a responsibility of the GOSL, these efforts should not compromise the fight against climate change and the recently declared “go green” policy on investment in renewable energy.

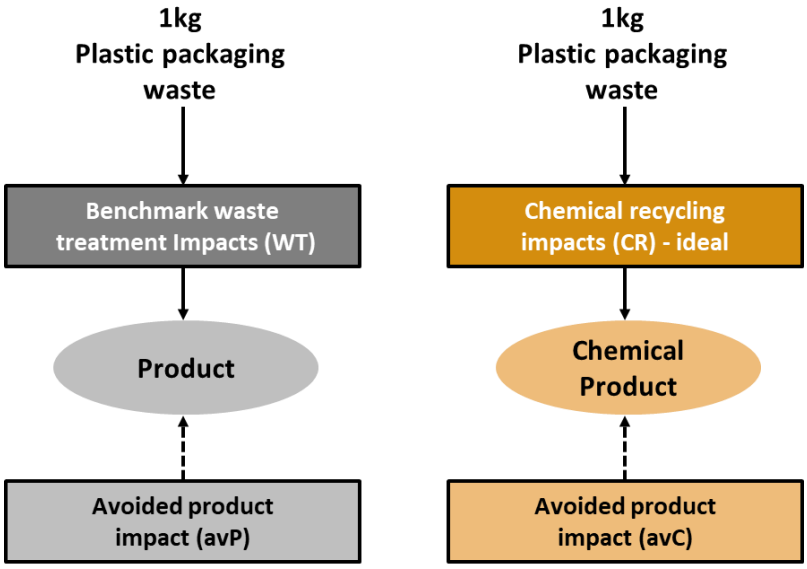
5.3. Encourage Food Security Through CE Processes.

Sri Lanka has achieved a moderate successes in food security despite the significant setback in production during 2021 due to the ban of chemical fertilizer use. GOSL is now taking extra efforts to ensure that the domestic food supply chain is uninterrupted, and that people get their basic food supplies albeit at high prices due to several other constraints, such as the vagaries of climate change, fuel shortage, destruction by wild animals, etc. The food waste under the present LE model should also be looked into as an important step towards the move towards CE.

Food production by-products and food waste can be cascaded in animal feedstock, used for chemical extraction, or used to produce energy and fertilizer via anaerobic digestion. This process is taking place in Sri Lanka but not in a consistent manner. A key enabler to these approaches is the elimination of toxic chemicals and clear separation from technical materials. The outer-most loop of the technical cycle is where recycling occurs. Fig. 5 shows the comparison between benchmark

waste treatment (WT) and chemical recycling (CR) including the avoided conventional products (avP) and chemicals (avC). The input stream is 1 kg collected and sorted plastic packaging wastes.

Fig 5: Conservation of Resources and New Product Generation through Recycling



Source: Resource's conservation and recycling, vol 162

Consumable products will cascade and metabolize through biological cycles. For example, Sri Lanka's garment factories have begun collecting and reusing residue clothes and cascading them as furniture stuffing, and then as insulation fiber and unto the biosphere while restoring natural capital. But these are on a voluntary basis, and these practices should be regularized. These new products out of reuse should be popularized among the public through a variety of government and private sector propaganda programmes.

5.4. Breaking free of business-as-usual

The traditional thinking of companies that they are part of one linear value chain has been a barrier in shifting to the new supply chain under CE guidelines. Some of the global companies are now breaking free of this business-as-usual thinking and finding ways to collaborate to pilot the new model and create circular waste streams. H&M, which collects garments in all stores globally to close the textile loop; Philips, which offers "light as a service"- where customers pay for the performance of the lights rather than searching for ownership; innovative practices by car manufacturer Renault; and logistics company DHL are some examples. In the construction sector, new types of buildings incorporate the production of renewable energy by using solar cells. Sri Lanka has already begun the construction on similar lines but the industry as a whole, should accept the CE concept and work consistently to ensure that Reuse, Regenerate and Recycle principles are embedded in their business models. Some businesses would find it hard to adjust and accommodate new CE operational systems after a series of partial shutdowns/lockdowns of their businesses for several months in 2020 and 2021. GOSL's policy implementation should therefore be a gradual transition from LE to CE with clarity and articulation.

5.5 Design Post Pandemic and Envisaged New Normal Conditions under CE Model

Compared to some of the high-tech multinational industries, SME and MSME industries tend to reuse, reduce waste, and also keep the environment clean. To have a smooth transition through such produce there should be substantial investments in both company and public infrastructure. The challenge is to break the silos mentality in the financial community and mobilize capital into the CE based market. For SMEs, access to finance is already a challenge across the region, with many having to seek shadow banking systems where high interest rates prevail. It is therefore necessary to enhance awareness of the CE model of financial service providers, investors and private equity professionals thus promoting them to play a catalytic role in providing finances for product innovation within CE. Private equity and development institutions could take a lead in the early stages to build a market for CE entrepreneurs. By way of proactive recovery financing, GOSL may consider rolling out stimulus and financial support packages for green industries and SMEs.

5.6 Resource Reuse and Recycling Combined with Digitization would Facilitate Transition from LE to CE

Accelerated digitalization refers to the essential adjustment to digitization**.** COVID-19 has forced the private sector to quickly embrace a new business model to accommodate social distancing and shuttered office spaces and this trend may be continued. Digital solutions are imperative, and they have promoted virtual workspaces, mobile government, and a multitude of platforms to monitor and trace infections, helps businesses close loops, implement more efficient processes, minimize waste, promote longer lives for products, and lower their transaction costs. Digital technologies (DTs) will play a crucial role in ensuring the low carbon and energy-efficient future of the built environment. GOSL has announced a comprehensive digitization plan for the country and necessary laws are being enacted. Globally, by 2025, employers will divide work equally between humans and machines. DTs, such as the Internet of Things (IoT), big data, and data analytics, are considered essential enablers of the CE. Although these aspects indicate only a little guidance on how DTs can be applied to capture the full potential of circular strategies for improving resource efficiency and productivity, they support business analytic (BAs) capabilities required to accomplish CE principles. It is necessary to study the practical scholarly research that create a common language for aligning activities across disciplines such as ICT systems and the CE body of knowledge, and to identify the gap between the current and entailed BA requirements as well as the strategic initiatives needed to close it.

6. Summary and Conclusions

The world economy is still grappling with the impact of COVID-19 pandemic and the external outlook is highly uncertain. In the years to come, countries will need to simultaneously rebalance, while ensuring that the recovery is built on a solid and durable foundation. Advanced countries also need to build on the G7's commitment by boosting climate finance in 2021–22 and doubling it to $60 billion in the next few years. There is an urgent need to improve on climate finance, by enhancing grants from their present low level, immediately doubling finance for adapting and diverting at least half of concessional climate finance for establishing greener processes and climate friendly objectives. The recently held COP-26 and COP-27 summits articulated the critical need for enhancing climate finance. To facilitate emerging and developing countries to develop policies and strategies aimed at early revival and strengthening of their economies and transition towards greener economies, the international community must act swiftly to ensure rapid and broad global access to vaccines and do more to help poorer countries combat the pandemic. COP 27

finalized some of the long overdue proposals but there was no unanimous agreement on the use of fossil fuel or the reaching of the 1.5C temperature levels agreed at the Paris meeting.

The global trends indicate that all countries should adjust to a "new normal" and that should include not only human behavior, lifestyles, business models, digital and online services but also the transition from LE (make, use, waste type) to CE (reduce/ regenerate, reuse and recycle). Only 9% of the world economy is circular. To accelerate the move towards CE, countries should develop new technologies to meet demands such as production, innovative ways of producing goods and services, distributing, purchasing, and consuming products within the CE framework. In that sense, CE is an alternative economic model, where products and services are designed with regeneration, reuse, and recycling in mind, while production encourages regeneration and repurposing through re-diversion of materials to industrial or biological nutrient cycles. Consumption and marketing should be re-designed to optimize the use of existing products and access to products are encouraged over ownership.

While the outbreak of COVID-19 pandemic has demonstrated that the supply chain under LE is dangerously fragile with deep rooted archaic practices, it is now time to embark on a fundamental transformation programme. One of the more comprehensive solutions to improve resilience is the use of CE models because it is based on the principles of designing out waste and pollution, keeping products and materials in use, and regenerating natural systems.

While some of the advanced European countries, the USA, China, and also some of the Asian countries are slowly coming out of the ravaging impacts of the pandemic, sustainable development is high on Asia's agenda. However, the way this development will be achieved and its quality remain highly debated, especially since Asia is plagued with legacy issues, such as high fiscal deficits and indebtedness, macro-economic and financial instability, social unrest, and security threats.

With the recent announcement of the GDS and the green economy by the GOSL, the country has fulfilled a void of a top-down approach combined with the "tone at the top". This vision should be supported by a comprehensive implementation framework that sets out effective action and strategy in moving towards the CE model. In doing so, the intensity of some of the macro-economic legacies may surface as complex issues demanding short to medium term solutions. The following steps may be considered in implementing the GDS.

First, there should be a fundamental change in the mindset and commitment by all stakeholders for the transition from LE to CE model. GOSL should secure support of all stakeholders in the economy as the transition from LE to CE will not be an easy task given the centuries old LE principles and work habits that have dominated economic policy and operations in Sri Lanka. The industrialists and businesses, including SMES and MSMEs should be made aware of the GDS and CPP programmes, while promoting their new initiatives through policy and operational measures. This would require an effective GDS and CPP campaign across the country.

Second, it is imperative to ensure that a GDS based National Plan meets it's declared objectives and delivers on commitments irrespective of the political party that will be in power. The National Plan prepared on CE principles should include measures to adhere to, irrespective of party politics

and different political or economic philosophies. Hence is the critical importance of enshrining the proposed GDS and CPP and the National Plan of action in the Constitutional Amendments that are currently being finalized. It is also important to establish an appropriate legal and regulatory framework that provides adequate legal backing for the transition from LE to CE and implementation of proposals under "new normal conditions". As discussed earlier, this would require making forward looking amendments to the existing legal enactments and enacting new legislation as well as regulations thereon as early as possible to enable all stakeholders to operate within the legal framework. The proposed legal amendments and new laws should plug loopholes, if any, while focusing on protecting the country's natural resources and environment, enabling the use and reuse of raw material, production, and reproduction of items while facilitating the transition from LE to CE in the medium to long term. At the same time, policy guidelines should remove regulatory rigidities around waste management to encourage competition and facilitate the flow of materials, defining circularity beyond a narrow concept of recycling.

Third, Sri Lanka should avoid two potential mistakes in the transition from LE to CE. The country should avoid getting further trapped in the LE framework in solving legacy macro-economic issues as the majority of such issues have been created by the LE model itself. The other is to avoid postponement of the transition until legacy issues are solved. Having experienced bitter lessons stemming from the postponement of necessary structural adjustments and treatment for legacy issues for many decades, the authorities should try to address such issues in the "new normal" environment and within a CE framework. When policies are announced, the government machinery should be ready to implement the same and that requires ground-level preparatory work.

Fourth, GOSL should prepare a comprehensive framework for the implementation of the GDS and CPP and avoid ad-hoc and one-off quick fixes. In this regard, it is necessary to conduct fitness tests on the already operating CE type or green-based projects and align their work processes and measures into the GDS and the broader CE model. In recent times, the garment and apparel industry, other innovative exporting companies, and a few foreign companies in Sri Lanka have either initiated or already transformed their operations to green concepts with circularity, and such companies should be recognized within the GDS plan of action and promote their enthusiasm which will be important in the transition.

In addition, it is essential to promote the positioning of Sri Lankan businesses on new global and regional supply chains which are responding positively to locational changes given the rising cost of inputs, such as electricity, fuel, and water in some of conventional locations. Global brands that control vast global supply chains are increasingly familiar with the concepts of circularity in production and are equipped with the right leadership and design products and services to support these new business models. Newly formed Sri Lankan businesses as well as the existing ones should promote circularity features sought after by global companies. GOSL and businesses should comply with new supply chain guidelines while promoting circularity in green based projects to access global and regional value chains.

Since the breakup of the pandemic, some central banks[18] , including CBSL, have acted as catalysts for a more sustainable financial system by implementing several stimulus packages. In moving forward, while concentrating on its core objectives, especially in the context of a transition from LE to CE with a large number of greener and environmentally friendly projects, CBSL should also re-strategize its operations towards early revival of the economy through its refinance facilities to the private sector in relation to GDS and CPP. CBSL needs to revisit its refinance policies and align its regulatory framework in favor of banking operations and projects that contain circularity while aiming to reach CE status in the medium to long term.

Finally, the ongoing partially comprehensive digitization should be used to help the transition from LE to CE to the full extent. The adoption of CE would be faster and more innovative if the transition is made parallel to the country's digitization plan. In that regard, the adoption of automation, IoT, and robotics in improving manufacturing processes, the use of cloud computing, big data analytics in streamlining supplier selection processes, management of supplier relationships, and logistics would be essential. These technological innovations that were confined only to a few segments of the society should now be spread widely across all sectors and services of the economy. GOSL has requested Information and Communication Technology Authority (ICTA) to roll out GOSL's ICT policy and practices on a country-wide basis helping early recovery of the economy. It may be useful for ICTA also to review, its policies and practices and make necessary adjustments to facilitate the transition from LE to CE and play a lead role in implementing the GDS and CPP.

Now that the GOSL's stance on the green economy has articulated the public policy on CE, Sri Lanka should recognize the need for CE policies at the national level especially in reducing over-reliance on other manufacturing countries for essential goods, conduct intensive research into bio-based materials for the development of biodegradable products and the promotion of bio-economy and promote the development of compact smart cities for effective mobility. Accordingly, fiscal policy of the GOSL should enable a green, digital, and inclusive transformation of the economy. Policymakers and regulatory authorities need to strike a balance between the provision of more short-term support to ensure a solid recovery and keeping debt at a manageable level over the longer term. Developing credible multiyear frameworks for revenue and spending (including how to strengthen fiscal positions over the medium term) will be vital, especially until the country has passed the debt peeks (between 2022-2025) and financing is made more structured. In an order of priority, GOSL needs to respond flexibility to the changing economic conditions, solve some of the legacy macro-economic issues, and set the stage for a greener, fairer, and more durable recovery.

Sri Lanka has already introduced several measures in line with CE models. It is necessary to codify and synchronize such efforts and prepare a National Framework that focuses on the environment, human and animal health, waste management, integrating climate in the country's economic assessments**,** including carbon pricing, scaling up climate in capacity development and help equip relevant institutions with the skills needed to take climate considerations into account and mainstreaming climate indicators in macroeconomic data**.** It requires a radical overhaul and not incremental change roughly halving carbon emissions through each decade to 2050. To fulfill the

[18] The European Central Bank, Dominica and Finland—are pursuing innovative ways to cope with climate mitigation and adaptation, respectively.

objective and achieve desired targets, countries like Sri Lanka will have to shift to renewables, build new electricity networks, increase energy efficiency, and embrace low-carbon transport network.

The CE is not an abstract concept. Going forward, governments, including Sri Lanka should adopt circular thinking that would help in quality growth, adopting relevant innovations associated with the CE model, targeting the general well-being of the population while balancing profitability or growth of businesses and other national economic priorities. The most important first steps towards the transition from LE to CE would be to declare the GDS and CPP as National Policies, secure blessings from all segments in the society and prepare a comprehensive framework to achieve the desired goals.

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