FRAMEWORK FOR THE ESTABLISHMENT OF CENTRE OF EXCELLENCE ON CIRCULARITY IN INDIA

STUDY REPORT

Draft - Final

11th April 2023

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The study acknowledges the support provided by UNITAR and UNEP in the framework of the one-UN Partnership for Action on Green Economy (PAGE). The draft outputs of the study were presented to the PAGE team members and their incisive and impactful suggestions helped strengthened the output of this study.

The study received valuable guidance and insights on the focus issues from the Reference Working Group members during the conduct of the study. The different stakeholders consulted during the study (through interviews and focused group discussions) highlighted the key gaps and opportunities that the proposed CoE could address and helped strengthen the feasibility of the suggestions being made for the proposed CoE, both in terms of its architecture and the services. A list of all the members of the different groups the study took guidance from, and the stakeholders interacted with is attached as **Annexure 3**.

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1. Background

India is on a development path with rising per capita income, increasing urbanization and changing lifestyles. This growth has been coupled with consumption of natural resources, raising issues on resource depletion, resource degradation and resource security. The looming threat of climate change has further compounded the situation due to the rise in the greenhouse gases (GHG) emissions resulting from the economic activities.

In this context, the circular economy (CE) approach will greatly help to decouple economic growth from material consumption and waste generation, making India more competitive and future ready. In March 2022, as a part of one of the post budget webinars, the Honourable Prime Minister of India, Shri Narendra Modi re-emphasized on the importance of CE in the context of the depletion of all types of natural resources that is being witnessed, identified it to be the demand of the hour in such a scenario and encouraged people to make CE mandatory part of their lives.

India imported raw materials worth US$ 108,425 million in the year 2020[1]. Given the imperative of accelerated economic growth, it is also important to reduce import dependency on critical raw materials. CE will help reduce the imports by keeping used materials in circulation[2]. Also, in context of green-fencing policies by many material exporting and product manufacturing economies (such as electronics producers), particularly in Asia, a CE approach becomes an enabler for the growth of the domestic manufacturing sector and provides a strong impetus to India's *Atma Nirbhar Bharat Abhiyan* or *self-reliant India.* missions

Figure 1 shows the trend in domestic material consumption (DMC) and DMC per unit of GDP since 1999 in India[3]. There is evidence of decoupling happening as measured by this indicator, which could be due to increased productivity in use of resources. However, more systematic efforts are needed to reduce absolute consumption of virgin material resources by extending product life, practicing reuse, recovery, and recycling of used resources and creating a supply of secondary raw materials.

[1] "World Integrated Trade Solution" https://wits.worldbank.org/CountrySnapshot/en/IND/textview#:~:text=India%20Exports%20and%20%20Imports%%2020of%20Product%20Groups%202019&text=India%20Raw%20materials%20imports%20are,%2C%20product%20share%20%20of%2033.57%25.&text=India%20Consumer%20goods%20imports%20are,%2C%20product%20share%20of%2016.52%25.

[2] "Circular economy in India: Rethinking growth for long-term prosperity" https://archive.ellenmacarthurfoundation.org/assets/downloads/publications/Circular-economy-in-India_5-Dec_2016.pdf

[3] "Reference Report for "National Resource Efficiency Policy" for India" https://www.teriin.org/sites/default/files/2019-04/National-Policy-Report.pdf

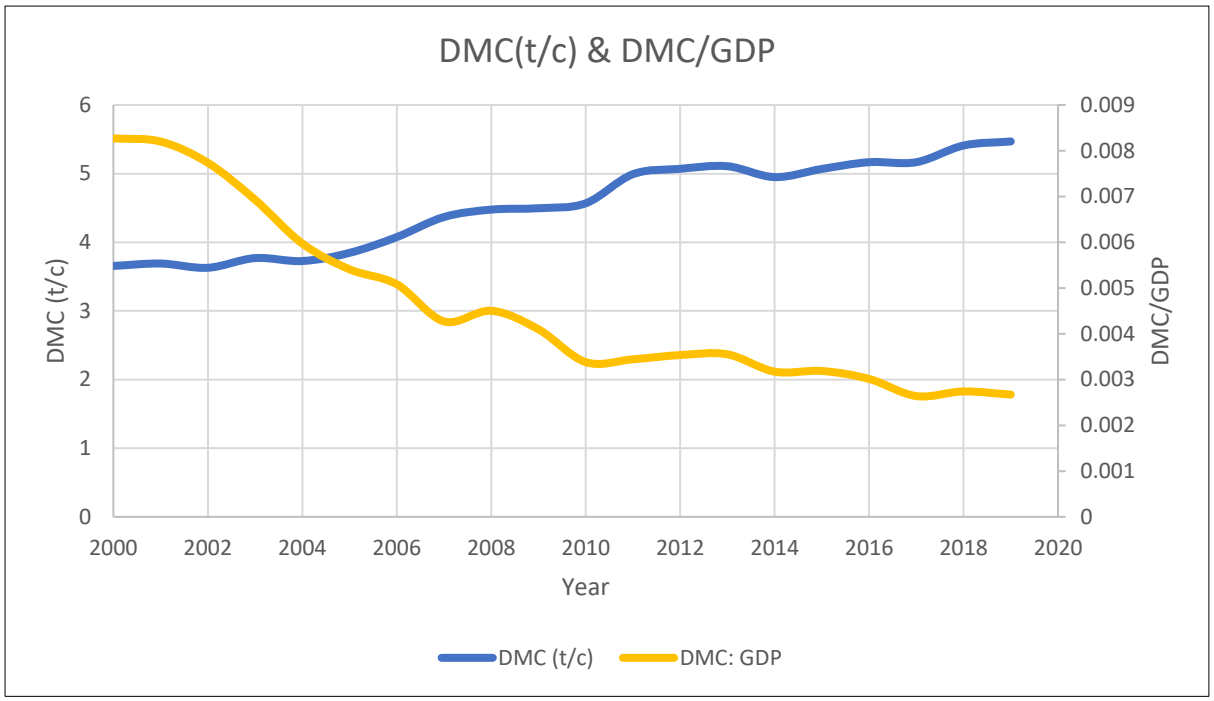


Figure 1: Domestic Material Consumption per unit of GDP in India

A recent study has estimated that USD 0.5 trillion value could be unlocked by 2030 through circular transition in India[4]. Further, estimates also suggest that a CE path adopted by India could bring in annual benefits of INR 4 million crores (approx. USD 624 billion) in 2050 and would in addition reduce negative externalities[5].

CE is one of the important strategies to meet the Sustainable Development Goals (SDGs). CE has several important co-benefits including promotion of green jobs and entrepreneurship, creation of business models and associated entrepreneurial and livelihood opportunities, building of innovation capital and provision of opportunities for sustainable finance to move towards green growth. In addition, CE helps in reducing greenhouse gas (GHG) emissions, thus having potential to contribute to India's decarbonisation journey. GHG emissions, for example, could be 44% lower in 2050 compared to the current development path if India embarked on the circular economy transition[6].

The CE paradigm has the power to impact the entire value chain of products, by transforming the way products are made upstream (through circular designs, use of recycled content, packaging reduction) and midstream when used (extended product life, ease of repair) thus helping minimize pollution and environmental degradation downstream.

Role of CE in slowing down and eventually halting biodiversity loss, reversing its decline, by restoring ecosystems and rebuilding natural capital is also well known[7]. Biodiversity-based agro-industries are a promising means of ensuring that biodiversity protection is integrated into practices. Biorefineries, for example, can increasingly use various organic materials, like agricultural waste products, as input to make higher-value products such as biochemicals. Concept of circular bioeconomy is also assuming importance

[4] "Approaches for Measuring India's Circular Economy Transition" https://www.ficcices.in/Ficci_Accenture_CES_REPORT_2022.pdf
[5] "Accelerating India's Circular Economy Shift" https://www.ficcices.in/pdf/FICCI-Accenture_Circular%20Economy%20Report_OptVer.pdf
[6] "Circular economy in India: Rethinking growth for long-term prosperity" https://ellenmacarthurfoundation.org/circular-economy-in-india
[7] "The role of the circular economy in addressing the global biodiversity crisis" https://circulareconomy.earth/publications/the-role-of-the-circular-economy-in-addressing-the-global-biodiversity-crisis

as an economic model that is based on the use of these bio-based resources which can act as renewable natural capital and integrates principles of waste to wealth. The model has potential to address the current environmental and associated economic crisis by reducing our dependence on consumption of non-renewable resources such as minerals.

2. India's push towards Circular Economy

The evolution of CE is depicted in Figure 2. This evolution tracks the initiatives undertaken by the various ministries in the Government of India and the steering done by Ministry of Environment, Forests and Climate Change (MoEFCC) and the NITI Aayog.

The traditional focus of CE policy push in India has been on managing waste at the downstream stage in the life cycle of products. For example, the notifications of various waste management related rules, such as the Plastic Waste Management Rules, e-Waste Management Rules, Hazardous and Other Wastes (Management and Transboundary Movement) Rules, Construction and Demolition (C&D) Waste Management Rules, (Draft) Battery Waste Management Rules place impetus on strengthening the recycling component of the material and waste streams.

However, recent years have seen an increasing emphasis on upstream and midstream stages of the value chain through innovative design, reduction in raw material used and substitution of virgin raw material with secondary materials.

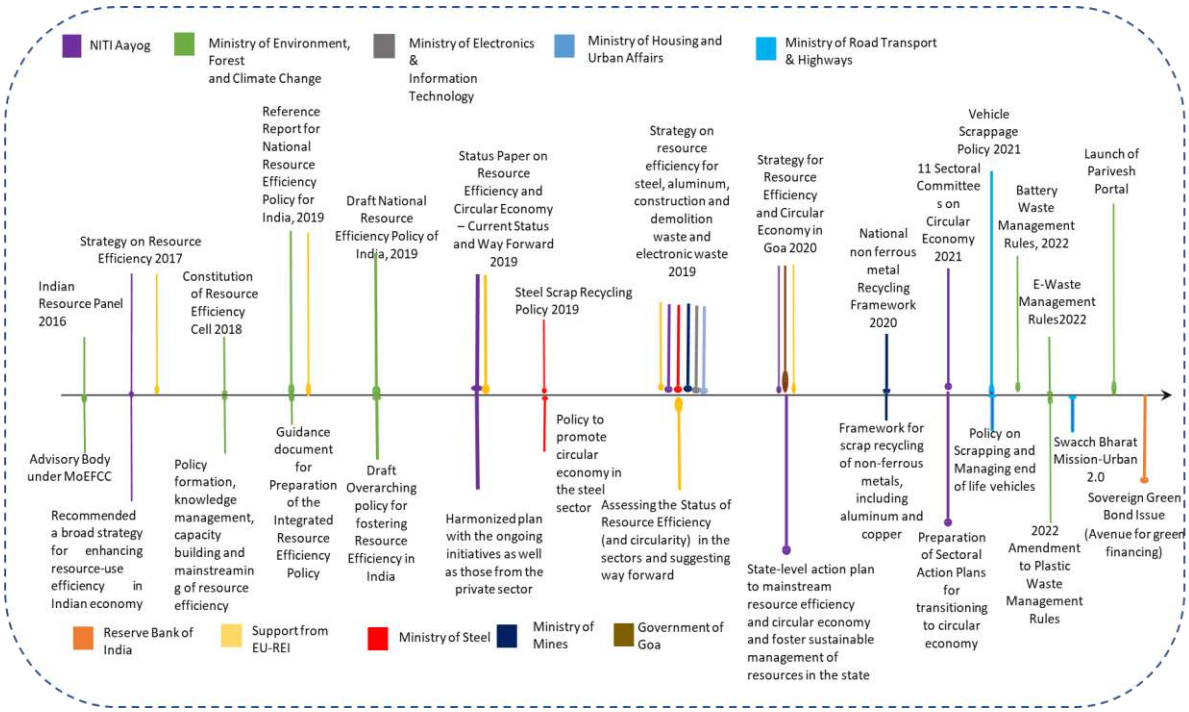


Figure 2: Evolution of Circular Economy in India

To given an example, the Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 has been specifically framed to streamline and encourage the reutilization of Hazardous Waste in a scientific and transparent manner following due procedure and adopting necessary safeguards that need to cover more categories of waste. The C& D Waste Management Rules, 2016 also promote C & D waste utilization. Sub-rule (11) notes '*shall make provision for giving incentives for use of material made out of construction and demolition waste in the construction activity including in non-structural concrete, paving blocks, lower layers of road pavements, colony and rural roads'*. There are some pioneering examples of productive

utilization of C&D waste in Delhi NCR where recycled concrete aggregates are being successfully used in manufacturing high quality concrete blocks and pavers.

India is also seeing a growing number of "green" certifications and labelling standards, which drive sustainability in production processes and encourage end-users to consume environmentally friendly and socially sound products. The Confederation of Indian Industry (CII) developed the GreenPro Ecolabel (Type - 1 Ecolabel) which enables the end-users in the building sector and manufacturing industries to choose right products, materials and technologies for reducing the environment impacts during the construction, operation and maintenance of their buildings and factories. GreenPro Ecolabelled products have seen an increase over the last few years as seen in Figure 3, crossing more than 5000 products in 2022. This certification has established market linkages for these products providing confidence in product quality control and addresses the mindset barrier. Figure 4 enlists the sector-wise distribution of GreenPro products.

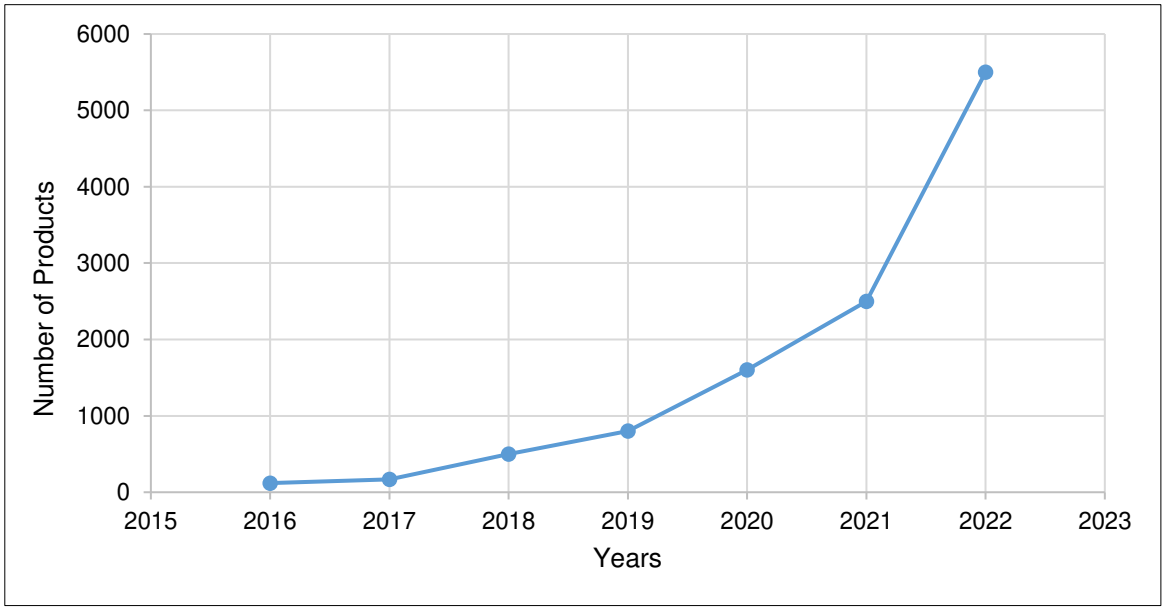


Figure 3: Trends in number of GreenPro Eco-labelled products

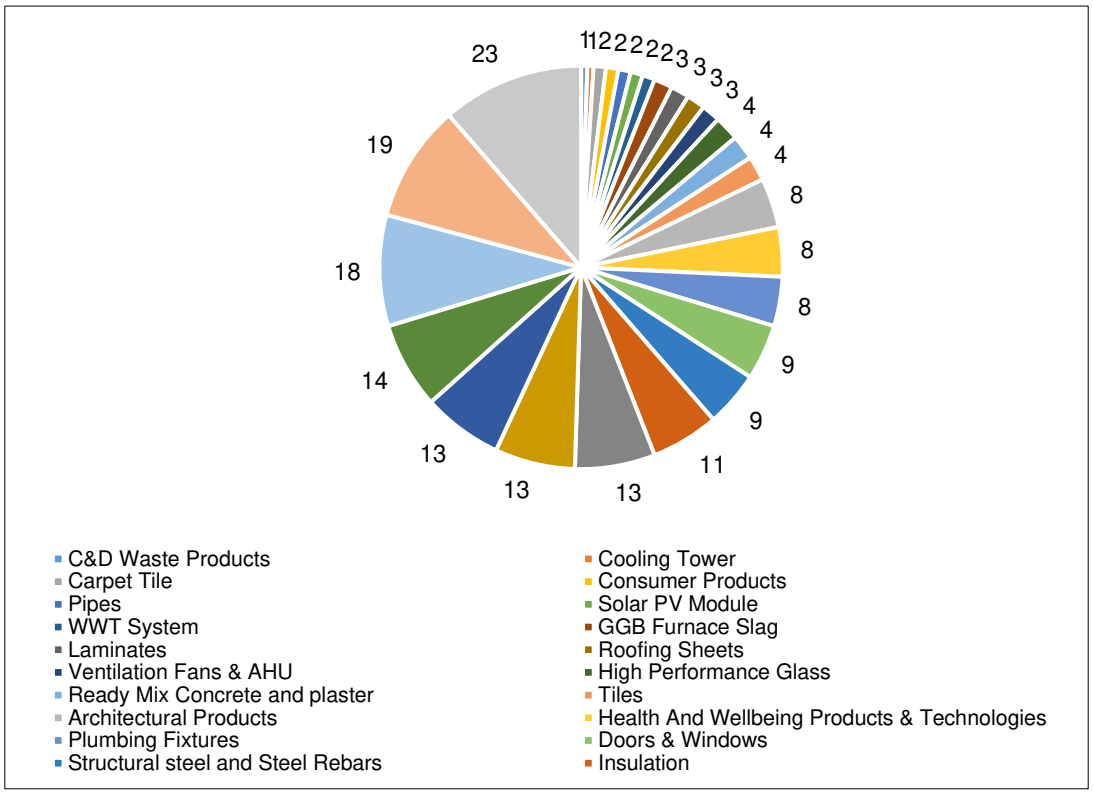


Figure 4: Sector-wise distribution of manufacturers having GreenPro Eco-labelled products

The GreenCo Rating, being implemented by the CII - Sohrabji Godrej Green Business Centre, is a "first of its kind in the world" holistic framework that evaluates companies on the environmental friendliness of their activities using a life cycle approach. Implementation of GreenCo rating provides leadership and guidance to companies on how to make products, services and operations greener. Industry personnel are trained on the latest "green concepts" and capacities built for implementing global best practices. The number of companies registered under GreenCo over the last few years has also witnessed a rising trend as seen in Figure 5

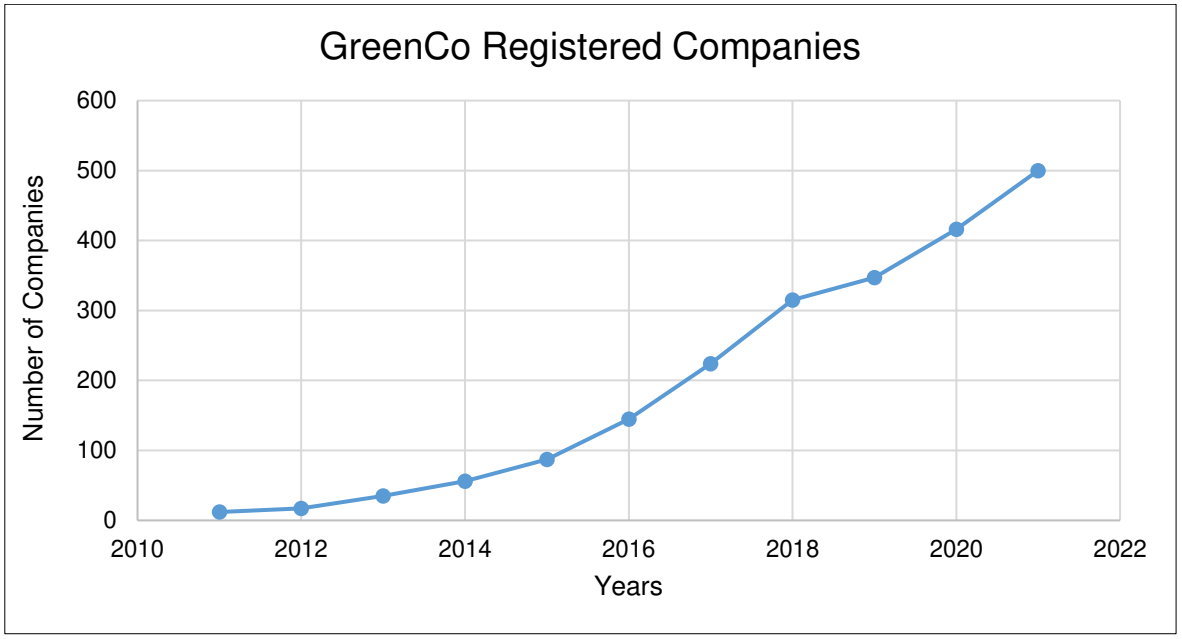


Figure 5: Number of companies registered under GreenCo certification

The various criteria that classify a manufacturing or service sector company to be GreenCo certified are listed in Figure 6. Many of these criteria are in alignment with objectives of CE.

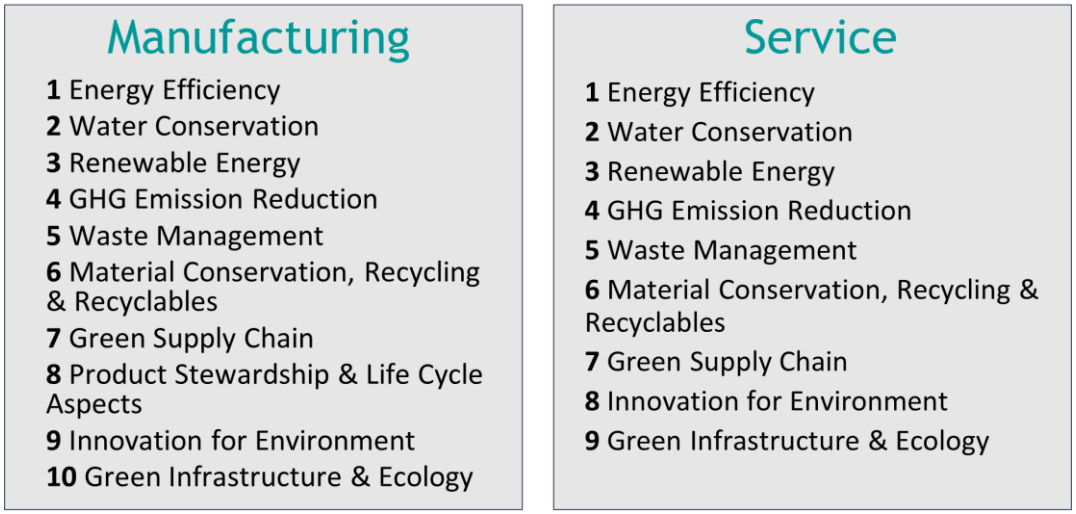


Figure 6: Criteria considered by the GreenCo certification

There have been many initiatives by the Indian government to promote the green building movement in the country. Incentives like larger floor-to-area ratio (FAR) to developers who build green, or incentives like reduction in property tax and stamp duty to consumers who build using certain green standards are examples. Green building codes such as the Green Rating for Integrated Habitat Assessment (GRIHA) and the Leadership in Energy and Environmental Design (LEED) have been developed. Estimates suggest that overall projects under LEED stand at 4,304 projects with more than 2.53 billion gross square feet[8]. In case of GRIHA, there are more than 3,571 projects with a footprint of more than 52 million gross square meters[9]. There are CE parameters linked to efficient use of resources like energy and water and use of non-toxic materials in green building certification. However, there are opportunities to integrate CE principles further through bringing in parameters linked to managing the demolition waste e.g. by mandating certain percentage for on-site utilization. Using deconstruction prior to demolition to salvage reusable materials from the construction site such as doors and windows, bricks, reinforcement, structural steel, can enable their use directly without much processing. For this there is a pressing need to build capacity of the

[8] "The Top 10 Countries for LEED demonstrate that green building is a truly global movement" https://www.usgbc.org/articles/top-10-countries-leed-demonstrate-green-building-truly-global-movement
[9] "Home: Green Rating for Integrated Habitat Assessment" https://www.grihaindia.org/

companies, developers, and contractors, and urban local bodies along with awareness creation among people.

The key policy and program push on the circular economy is presented in Figure 7.

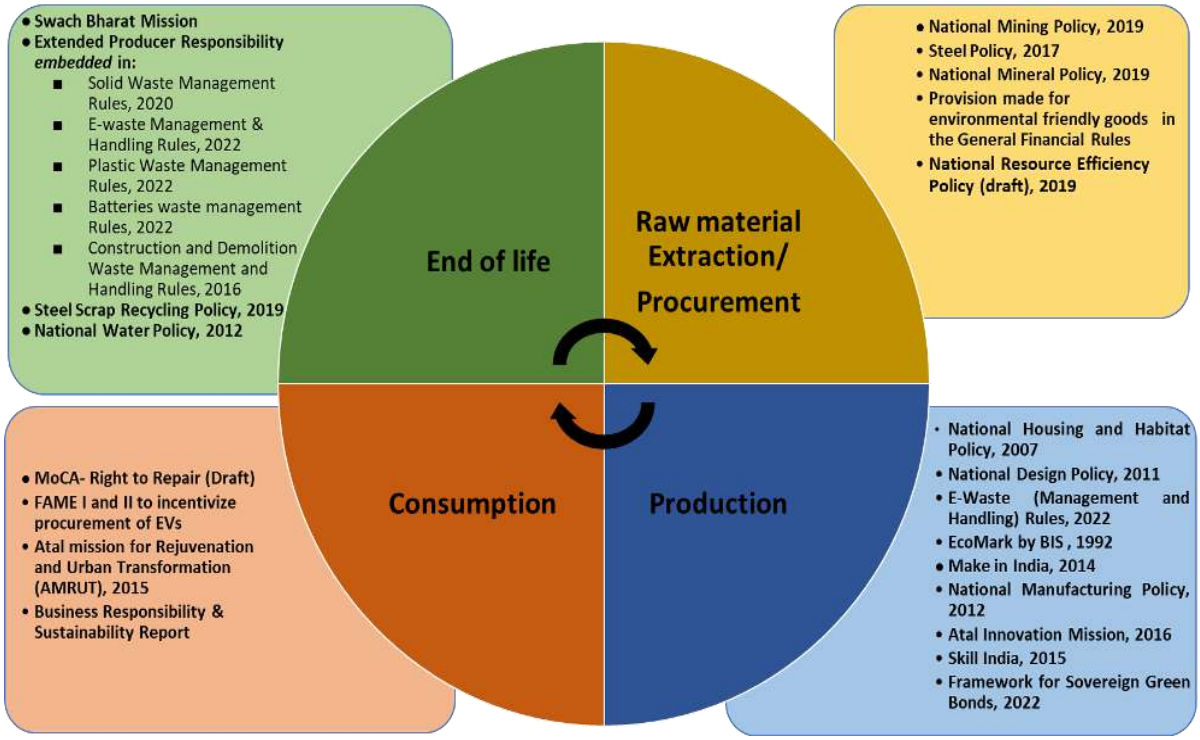


Figure 7: Policy and program push on Circular Economy

In February 2021, the NITI Aayog formed 11 Committees to identify the actions for CE in India[10]. Each Committee was led by the concerned line ministry and officials from MoEFCC, CPCB, and the NITI Aayog itself. Several domain experts, academic and industry representatives were also opted. These focus areas were identified considering their volume or scale, associated environmental and social risks that they pose and opportunity areas for enhancing resource use efficiency, recycling and recovery. Further, additional criteria such as potential to reduce imports, generation of green jobs and green enterprises and possibilities to promote innovative business models were also considered.

In the Independence Day speech on 15th August 2021, honourable Prime Minister emphasized on the need for an "action plan to build a CE so that resources are conserved to improve our economic, natural, and social capital and at the same time reduce carbon emissions"[11]. Along these lines, he announced the Mission Circular Economy. Currently, NITI Aayog is in the process of developing the Circular Economy Mission Document and a Dashboard on Circular Economy indicators. The Circular Economy Mission Document will integrate the actions suggested by these committees and will also provide a monitoring & evaluation (M&E) framework for various stakeholders to measure the progress towards CE.

The Union Budgets in recent years have also emphasized on CE and highlighted the role that it can play and the opportunity that it can create. Specifically, the 2022-23 Budget mentioned that the CE transition

[10] "Govt Driving Transition from Linear to Circular Economy" https://pib.gov.in/PressReleasePage.aspx?PRID=1705772

[11] "The Prime Minister, Shri Narendra Modi addressed the nation from the ramparts of the Red Fort on the 76th Independence Day" https://www.google.com/search?q=PM%E2%80%99s+address+from+Red+Fort+on+75th+Independence+Day&oq=PM%E2%80%99s+address+from+Red+Fort+on+75th+Independence+Day&aqs=chrome..69i57j0i546i649.346j0j7&sourceid=chrome&ie=UTF-8

will support productivity enhancement as well as create large opportunities for new businesses and jobs. Further, the Budget had emphasized on the need to focus on addressing important cross-cutting issues of infrastructure, reverse logistics, technology upgradation and integration of the informal sector. Support for active public policies covering regulations, Extended Producers' Responsibilities (EPR) framework and innovation facilitation was also highlighted. The Union Budget of 2023-24 has emphasized on green growth and announced 500 new 'waste to wealth' plants for promoting CE with a total investment of Rs 10,000 crores under the GOBARdhan (Galvanizing Organic Bio-Agro Resources Dhan) scheme. These will include 200 compressed biogas (CBG) plants, including 75 plants in urban areas, and 300 community or cluster-based plants.

India's G20 Presidency has also taken circular economy as a key thematic area to the G20 discussion table with an aim to venture towards co-developing technologies and pilot projects to demonstrate real-world applicability of RE/CE solutions, enabling mechanisms for private sector participation, and mobilising mainstream financing. There have been 4 key sub-thematic areas that India's G20 Presidency is focussing on under the broader theme of CE. These are: Circular economy in the Steel Sector; Extended Producer Responsibility for Circular Economy; Circular Bioeconomy; and Creation of a Resource Efficiency & Circular Economy Industry Coalition.

Given this momentum on the Circular Economy, it is an opportune time to set up a Centre of Excellence (CoE) on Circularity in India that can help India take forward the goal of transitioning to a circular economy, to grow sustainability, and also to showcase its commitment to the world and lead by example. CoE has been understood as a team, shared facility or entity that provides high standards of research, leadership, services or education, and brings innovative mechanisms to promote knowledge and scientific advancements[12].

Currently, there is no clear 'go to' institution that focuses on all life-cycle stages with the mandate to undertake Sustainable Development Goal (SDG) 12 related research, provide policy advice to foster sustainable consumption and production. At the same time, there is emerging domestic willingness, investment interest and experience across industry sectors to put in place new practices that are more closely aligned with SDG 12 targets and circularity, but this needs to be taken forward in a coordinated manner to have a synergistic effect. The CoE on Circularity in India can be the entity that can help design and implement solutions to address challenges faced in meeting SDG12 and catalyse and leverage the strong policy push by the government to bring about a transformative transition to circularity. Given India's net zero target by 2070, the CoE on Circularity can also be a nodal agency to guide the development and implementation of circularity-oriented efforts and strategies to meet this target.

3. About this Study

This study focused on developing a framework for establishing a Centre of Excellence on Circularity in India. This study report has been prepared by Dr. Prasad Modak, Managing Director, Environmental Management Centre Pvt Ltd (EMC) and his team with support and guidance from UNITAR and UNEP, provided in the framework of the one-UN Partnership for Action on Green Economy (PAGE). MoEFCC is the main governmental partner for this study and will take a lead in establishing the Centre in India. The Report presents a framework for a Centre of Excellence on Circularity in India and is also accompanied with a Guidance Manual for the MoEFCC to set up such a Centre.

This study report is the outcome of a wide range of activities including analysis of existing Centres of Excellence on Circularity equivalent in and outside of India, a study of market for identifying the service offerings of the proposed Centre and its mapping to the needs at various levels of the government, industry

[12] "Understanding the key processes of excellence as a prerequisite to establishing academic centres of excellence in Africa" https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-020-02471-0

and other stakeholders. Prioritization of services that could be provided by the CoE has also been suggested along with the architecture for the Centre.

The study has been implemented in close cooperation with relevant key Indian stakeholders in the domain of CE. Under the supervision of a Reference Working Group consisting of technical experts, guidance was sought at critical junctures during the study's progress. The Reference Working Group was constituted during the initial phase of the study. Key person interviews and focus group discussions have also been conducted to evaluate the proposed structure and the service areas of the CoE and the findings have been included in the study. Review of secondary literature sources including publications and ongoing projects in the domain of CE have also been done to scope out the service areas of the CoE. The draft findings of the study were presented to the members of the UN Partnership for Action on Green Economy (PAGE). and their inputs and feedback have been integrated. This group of experts belonged to multiple agencies within PAGE, such as International Labour Organisation (ILO), the United Nations Industrial Development Organisation (UNIDO), United National Development Programme (UNDP), etc. A complete list of all the consulted group of experts and the stakeholders is attached in **Annexure 3**.

A final stakeholder consultation will be held to discuss this study output with the various stakeholders from government, academia, industry and think tanks including those with whom interactions were held during the course of the study. Any feedback received from this final consultation will be integrated in this draft-report to finalize the study output.

Detailed proceedings of all the consultations and workshops held during this study are attached as **Annexure 2**.

3.1 Objective of the Study

To assess the relevance and viability for a Centre of Excellence (CoE) on Circularity in India and develop a framework supported by a guidance on how to establish a CoE on Circularity in India, that is validated by key stakeholders in the country.

The study will establish criteria, elaborate a theory of change, propose an institutional and governance framework, and financing and operational mechanism for the proposed Centre, and provide an overview of the scope of services.

It is expected that the framework and guidance on establishing a CoE on Circularity will contribute to taking forward India's intent to align future economic policies and investments more closely with SDG12 and the country's 2070 net zero target.

3.2 Scope of Work

The work in the study was structured into 6 key activities:

1. Global Review of Existing CoE Equivalents on Circularity

The existing Centres of Excellence on Circularity equivalent have been analysed for their focus (research, consultancy, capacity building, special services, training and education), ownership (government, non-government and private bodies), financing models, location and aim. The review provided inputs in the development of the framework for the proposed CoE. A repository of existing CoE on Circularity equivalent institutions has been developed and will be useful to MoEFCC for potential collaborations.

2. Market Assessment

A proxy market assessment has been carried out to map the landscape for related services and suggest the gaps that the CoE should meet. Such an assessment helped in identifying the services that the CoE could offer and identify entry points and areas that could be addressed by the CoE especially on policy, regulations and reforms, and innovation. This exercise also provided substantial input to frame the financial stability of the CoE/s. Here, interactions with key stakeholders and institutions in India have been conducted to

identify the demand for the services of this CoE. Key person interviews and a focused group discussion have been carried out to understand their perspectives on the market need in the context of the CoE.

3. Service Identification

Based on the findings of the market assessment exercise and interaction with key stakeholders, an exhaustive pool of services has been identified for the CoE to deliver. From the total pool, a list of prioritised services has also been pinpointed, that the CoE can take up immediately. A service roll-out plan has been developed, along with service delivery models.

4. Development of Governance Arrangements

Different governance models were studied to come up with a recommended structure and operational arrangements for the CoE.

5. Development of Investment Strategy

The study investigated various possible funding sources and mechanisms for the proposed Centre. The analysis was closely linked to the market assessment and aligned the service provision with the most promising revenue streams. The investment strategy was designed keeping in mind that it will be a key factor during the selection of host entities. A cost and revenue calculation exercise are also carried out to map the financial flows of the CoE for the first few years post its establishment.

6. Development of guidance manual for selecting host entity

Integrating the findings from the above topics, a guidance manual has been prepared for selecting the host entity (apex/network). This manual presents the evaluation framework and lists potential host institutions with profiles to assist the MoEFCC in selecting the appropriate institutes as part of the Centre of Excellence.

3.3 Timelines of the Study

Figure 8 presents the detailed timelines of the study.

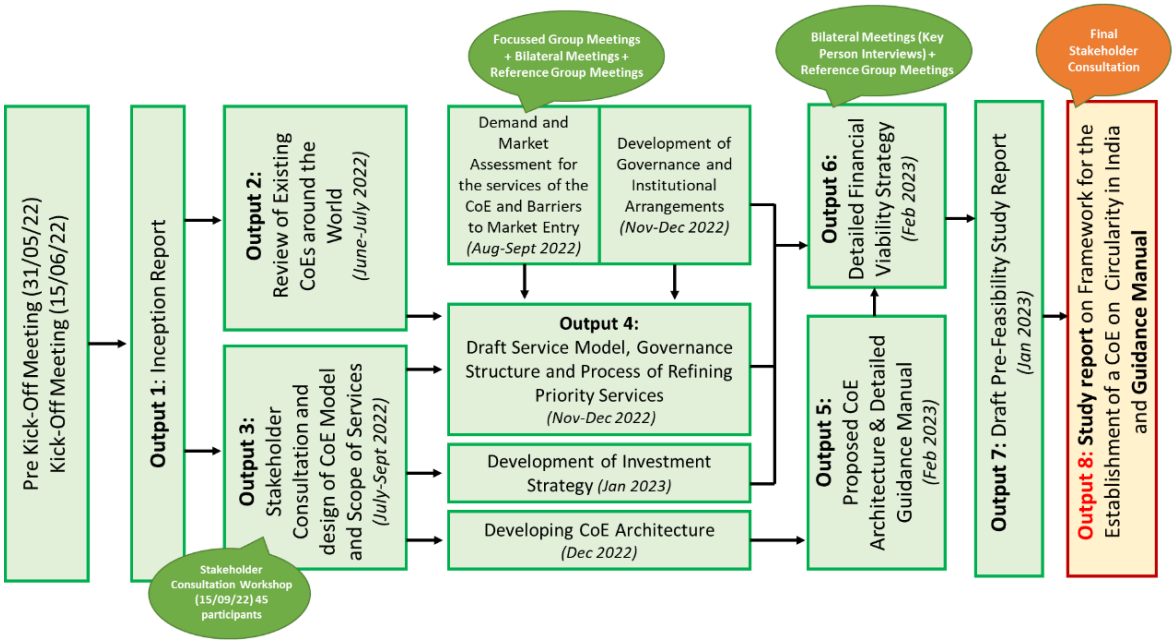


Figure 8: Timelines of the Study

4. Concept of a CoE

The concept of a Centre of Excellence (CoE) has evolved over time. The **prime characteristics of such a Centre is by the scope of its operations, services provided, vision and mandates, funding arrangements, and role and powers**. Centres of Excellence exist across several domains and topics. However, a common thread that runs through the CoEs, irrespective of the domain and topic is the commitment of being at the forefront of research and guidance, equipped with the ability to reach multiple stakeholders, have an innovative approach, and strong technical skills. The CoE may also be able to pool in expertise and infrastructure that would enable an effective and efficient delivery of its services.

As per the guidelines for the recognition of the CoEs by the Ministry of Skill Development and Entrepreneurship, Government of India[13], there are 3 main **existing models of CoEs in India**:

1. Centers within a Training Institute
2. Stand-alone Independent CoE
3. Networks of Excellence

Centres housed in a training institution or an academic institute, often comprise a team consisting of faculty members from different disciplines, but with a clear focus on a particular area of research. This Centre may be able to bring together facilities and infrastructure around R&D from multiple disciplines. Such a Centre may also run various kinds of graduate and post-graduate courses with an objective to impart knowledge and skills in a specific subject to practitioners in that area. These courses help improve the competence and to enhance the level of professionalism in that area of work. The institutions leverage CoE as a specific mechanism to establish and drive world-class excellence within their technical or functional space. An example of a CoE housed within an academic institute and funded by the Government of India is the Centre of Excellence on Environmental Economics at the Madras School of Economics.

In some situations, a CoE is set up from scratch, not connected to an existing institution. This requires intensive capital and human resources investment, as all facilities, recruitment, operational structures, and processes need to be established. This process may be several years long, hence building a strong positive repute in the initial stages post inception becomes crucial. Involving industry in co-financing and sponsoring the Centre can be highly effective. These centres may be linked to wider governance or organizational structures. One such Centre is the Centre for Materials for Electronic Technology under the Ministry of Electronics and Information Technology. A centre may also be linked to industry. The CII's Centre of Excellence on Sustainable Development and the Mahindra-TERI Centre of Excellence for Sustainable Habitat are examples.

A Centre of Excellence can also refer to a network of institutes and research/training/consultancy organisations that collaborate with each other to enrich the capacities of their teams and provide services. It is important to bring together enthusiastic institutes, rather than selecting unwilling and underperforming institutions. Close collaborations with national and international expertise and institutions prove extremely useful in designing and providing the services of the CoE.

5. Need, Relevance, Role and Expected Outcomes of a Centre of Excellence (CoE) on Circularity in India

5.1 Need and Relevance

Circular economy (CE) is perceived as a sustainable economic system in which economic growth is decoupled from resource use through the reduction and recirculation of natural resources and "closing of material loops". India has recognized the role of CE as a necessary step to achieving sustainable development. A Centre of Excellence (CoE) on Circularity in India could enable this transformative

[13] "Guidelines for Recognition of 'Centre of Excellence'" https://www.msde.gov.in/sites/default/files/2021-11/Revised%20CoE%20Guidelines%2012%20November%202021.pdf

transition through support on policy design and implementation, guidance to industry, promotion of investments and financing, and fostering innovation and business models to develop circular solutions. In addition to this, the CoE will commission and oversee activities of different stakeholders, ensure alignment with other policies and goals, ultimately also creating a market for services that currently are missing but are critical for the transition to CE. **It is intended that the Centre does not become only a repository of knowledge but rather an accelerator of innovative ideas for circularity with the potential to impact on markets.** The CoE will provide a platform to interlink multiple stakeholders from different backgrounds. They can also invite other already available networks or form new networks to facilitate knowledge exchange as well as collaborative activities for research and capacity building.

India has witnessed key developments in CE in the past decade. The CoE on Circularity can play a vital role in accelerating the progress of efforts taken at the national and sub-national levels. Furthermore, such a Centre will have a frontrunning advantage as there is currently no other institution that solely focuses on conducting research and providing implementation support centric to circularity. The CoE's relevance can be put into context in the aspects bulleted below (*the CoE can be relevant in other contexts as well, and the pointers mentioned here do not provide an exhaustive picture*).

- India is hosting the **G20 Presidency** this year, and CE has been recognised as one of the key themes. It provides India the right opportunity to give greater visibility to its focus and commitment to push the boundaries towards a more comprehensive circular economy approach in the future by creating a nodal centre on CE such as the CoE.
- At the 2021 UN Climate Change Conference (UNFCCC COP26), Hon'ble Prime Minister of India Shri Narendra Modi announced **Mission LiFE**, to bring individual behaviours at the forefront of the global climate action narrative. The campaign was launched in June 2022, and aims to accelerate the transition to CE by nudging individual and community behaviour through a set of simple actions that drive mindful utilisation, rather than mindless consumption. The CoE on Circularity can play an important role in taking forward the LiFE campaign; as many of the CoE's roles (as proposed in Section 5.2) are in alignment with the objectives of the campaign. The CoE can help in instigating the necessary changes in the policy structure by providing research and advisory support to the government, thus creating a policy environment that is conducive to the CE transition. The CoE can also raise awareness regarding CE and nudge individual behaviour to become more responsible and mindful which is a key aspect of the Mission LIFE. Lastly, the CoE can propel supply side changes through collaboration with industries and supporting the scaling up of circular business models.
- The **Annual Budget of 2022-23** brought attention to the need for increasing circular infrastructure and tools like reverse logistics and planning and setting up these will need technical assistance, which the CoE can provide as it will be equipped with the necessary expertise. The recent **Budget 2023-24** has brought in further attention to the topic of circularity in the context of green growth. **The Green Credit Programme** has been announced for encouraging behavioural change and it will be notified under the Environment (Protection) Act. This will incentivize environmentally sustainable and responsive actions by companies, individuals and local bodies, and help mobilize additional resources for such activities.
- At the **COP26 Summit of 2021**, Hon'ble Prime Minister of India Shri Narendra Modi pledged that India would achieve **net-zero** emissions by the year 2070. Circular Economy is a vital approach that can support and enable India's decarbonisation journey, and the CoE on Circularity can play a pivotal role in driving decarbonisation through CE.
- The **Draft National Resource Efficiency Policy** of 2019 was a landmark development in the evolution of CE in the country. Though the policy didn't see the final light, some of the key elements of this Draft Policy could be taken forward for implementation by the CoE.
- Recently, a **Strategic Action Plan for Circular Economy in India** was prepared, to which the CoE can provide the implementation guidance and support.

- There has been significant **push towards key circular economy-linked policy approaches** like Extended Producer Responsibility and Sustainable Public Procurement, which can be analysed and strengthened by the CoE.
- The current landscape of Circular Economy in India lacks the aspect of **inclusivity**. It is important to bridge this gap by bringing in the required research and fostering collaborations with the right kind of institutions (NGOs, industry organizations, labour unions, social impact consulting organizations, etc.).
- **Impact focussed investment funds** are actively searching for financing opportunities in India, and it is important to connect these funds to the businesses working on or developing circular solutions/initiatives.

5.2 Role

The key roles that the CoE on Circularity in India could take up in bridging gaps and catering to a transformative transition are captured in Table 1. The role of the CoE can expand over time and this expanding role can bring with it newer services and additional funding opportunities which help to expand its scope of operations.

Table 1: Key Roles of the CoE on Circularity

Short Description of Role	Example of work that can be done under the specified role
1. Serve as a **national think tank** that leads policy and applied research, addresses knowledge gaps through the conduct of studies and assessments and serves as a platform for public policy consultation	Research to guide the development of policy instruments/schemes to promote circular infrastructure and circular business models.
2. Act as a **policy advisor** on the adaptation of regulations and orient promotion and financing models to a transition to a circular economy	Integrating circularity in Public Procurement or advising the financial sector on the design of circular financing instruments.
3. Act as a **facilitator for creating partnerships**, and link up with other international and national institutions, particularly to promote quality research	Fostering partnerships by engaging with national and international institutions on large research or implementation-focused projects and exchanging good practices.
4. **Act as a coordinator with local and state governments** to foster circularity at the sub-national level	Coordinate with the local and state governments to prepare circular economy action plans at the sub-national (state/region/district/city/ULB) levels.
5. **Developer of regulatory/policy sandboxes** by working with various government ministries and departments	Key topics of focus could include Sustainable Public Procurement (SPP), Product Life Extension (PLE), Overarching Extended Producer Responsibility (EPR), amongst others.
6. **Build capacity** and **raise awareness** on aspects of Circular Economy	Designing knowledge products and capacity building programs catering to different audiences to develop a conceptual understanding of CE Introducing CE in educational curriculums
7. Act as a training entity for **developing master trainers as well as best researchers and human resources** associated with circular economy	Developing and delivering training programs for senior government officials on circular economy in conjunction with administrative training institutes

	Supervise the training and certification of individuals and agencies that provide services related to Circular Economy.
8. Creator of **knowledge inventories and databases** to manage Circular Economy centric data flows	Creation of a catalogue of research related to CE and creation of an inventory of ongoing research and related documentation
9. **Facilitator of collaboration** by bringing together agencies/entities to pool experience and expertise from different disciplines	Organization of large events and series of high-level meetings between academia, industry, and government stakeholders to discuss high-priority real-world problems and develop circular solutions
10. Enabler of a **market for circular services**	Catalyze the creation of circular infrastructure such as Material Recovery Facilities and circular Common Effluent Treatment Plants
11. **Promoter of circular business models and entrepreneurship**	Facilitation of investment channels and flow of funds to circular start-ups by collaborating with funding agencies and investors
12. **Facilitator of technology transfer** from academic/research institutions **to industry**	Facilitate technology transfer of emerging digital technologies (such as Artificial Intelligence, big data, Internet of Things, machine learning) to foster CE transition. Assuming an advisory role in piloting tech-centric circular business models.
13. Guiding entity and leader in the setting up of **industry bodies**	Establishment of a Remanufacturing Council in India
14. **Leader of building awareness** on circular economy	Building social awareness regarding the holistic understanding of the circular economy (going beyond the traditional downstream focus) and thereby helping to change local attitudes which may also reinforce the need and supply side functions of CoE.
15. **Overseer of ethicality** in research and practice on CE	Developing and scrutinising standards related to CE research, consultancy and advisory

5.3 Expected Outcomes

The Expected outcomes from the work by the CoE on Circularity in India include:

- Mainstreaming of the concept of CE in India.
- Fostering partnerships and collaborations between agencies/entities on CE.
- Enhancing capacity of stakeholders for delivering CE related services
- Monitoring of transition to the Circular Economy

6. Alignment with SDGs

Circular Economy encourages innovation in design and manufacturing to ensure product longevity; instils reuse, repair, recycling and other value retention approaches in production and consumption systems; promotes sustainable use of natural resources; minimizes waste and emissions; regenerates ecosystems; enables sustainable supply chains; and creates sustainable and socially inclusive business models. These outcomes of the CE also drive the fulfilment of multiple SDGs.

The CoE on Circularity has been envisioned as a "one-stop-shop" for Circular Economy. Hence, through its actions, the CoE can directly and indirectly supplement the achievement of SDGs other than SDG 12. Along these lines, the CoE is in alignment with six SDGs, namely SDG 7, 8, 9, 11, 12 and 13. Figure 9 sheds further light on this alignment.

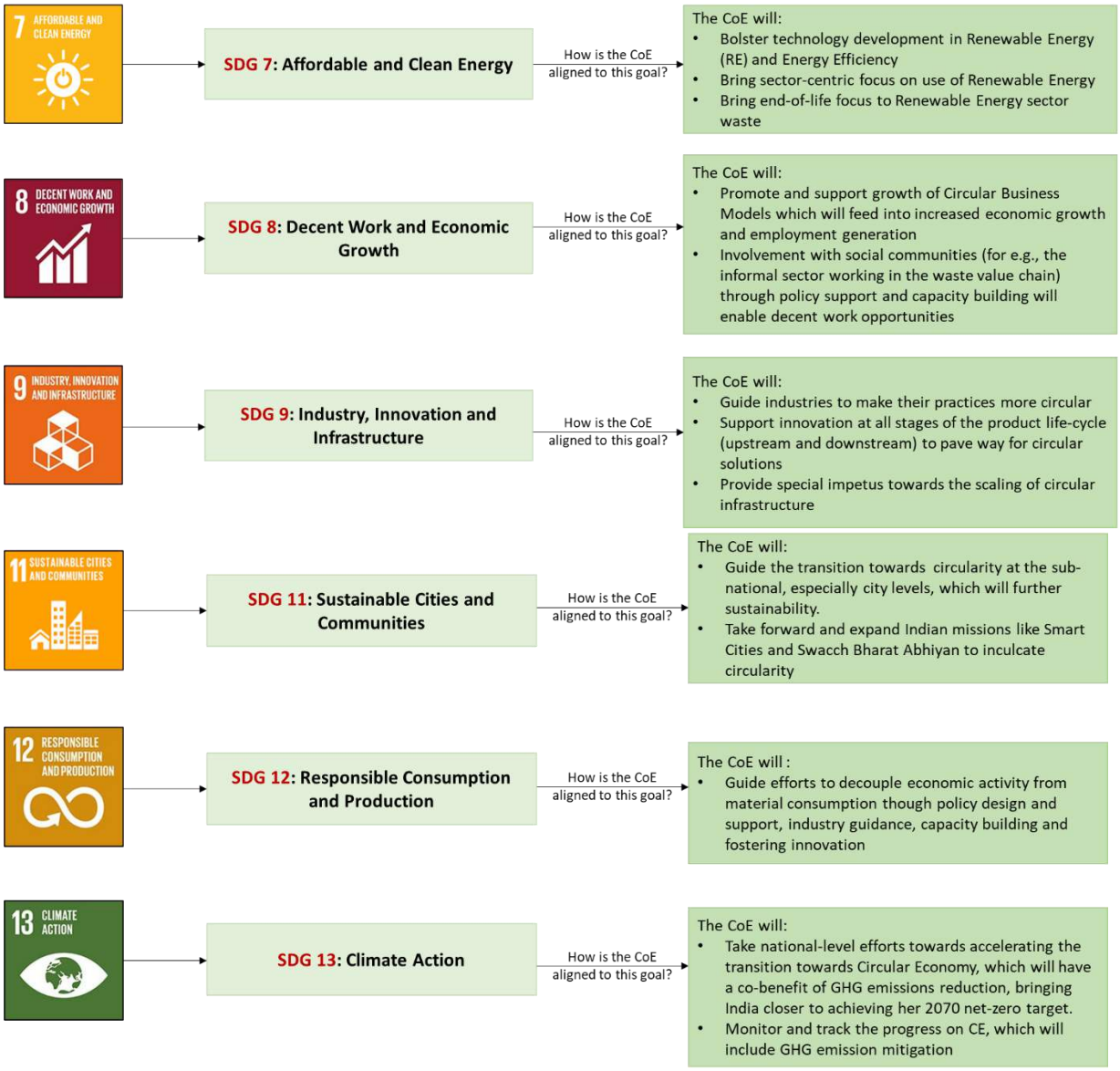


Figure 9: The CoE's Alignment with SDGs

7. An Overview of existing Centres of Excellence equivalents on Circularity across the world

7.1 Approach and Methodology

A detailed web search was done to identify existing CoE equivalents on Circularity across the world. This search was complemented with information about existing Centres available with the project team and the Reference Group members. For a Centre to be considered a CoE equivalent on circularity, information on the Centre's website regarding the focus on circularity as the main or one of the main themes of the Centre's work were looked for. Conscious effort was also made to identify Centres with their focus on different life cycle stages to bring in a holistic coverage of the existing Centres.

Figure 10 presents the mapping of the identified Centres on a world map that aided in identifying the geographical spread of the Centres. It was observed that many Centres were concentrated in the European region.

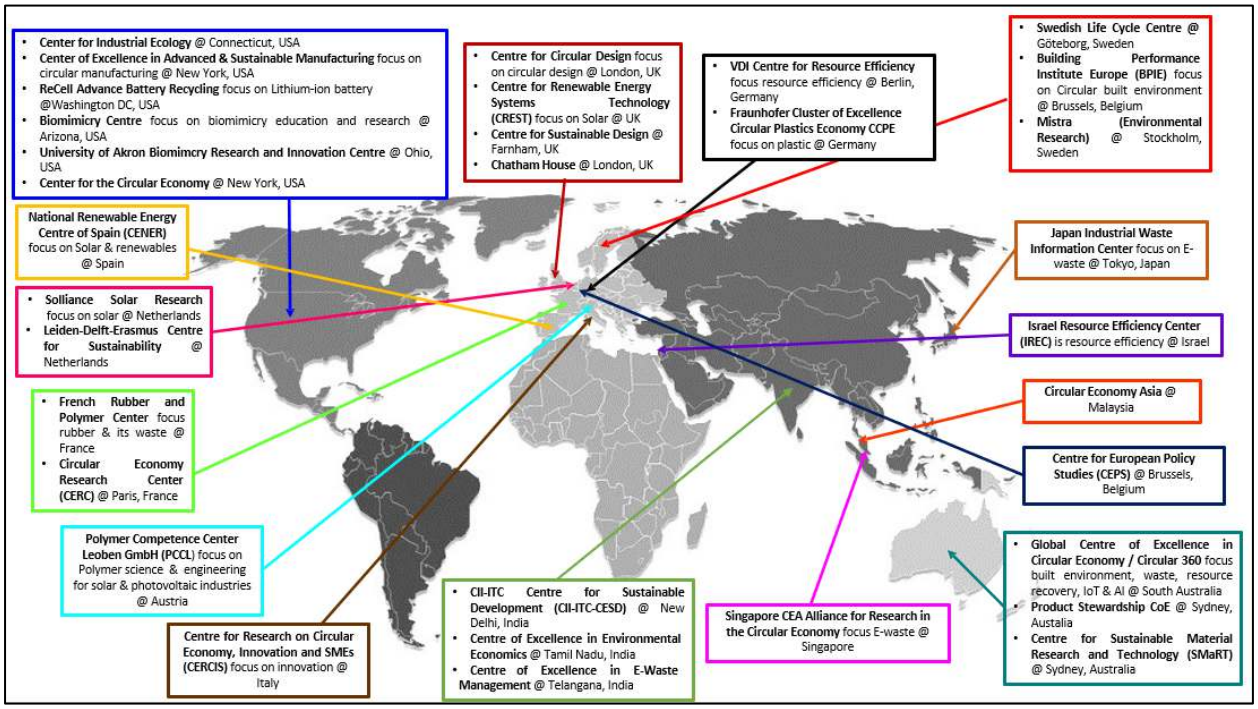


Figure 10: Figure 10: Centres of Excellence established across the world

Figure 11 presents the establishment timeline of selected existing CoEs (based on the information available about their establishment date).

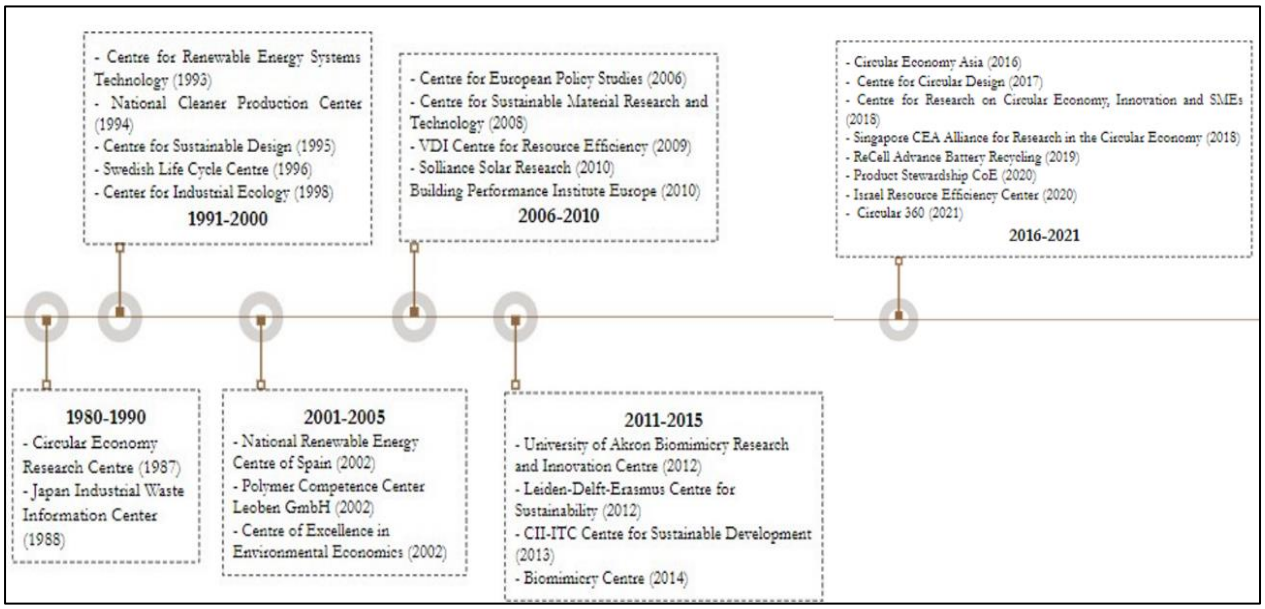


Figure 11: Establishment timeline of selected existing CoEs working around Circularity globally

Selected Indian and international CoE equivalents listed in Figure 12 were deep dived into along key parameters including governance, service offerings, and financing arrangements. This selection of Centres for deep diving was based on their popularity and availability of details regarding their work. The details pertaining to the structure and functioning of these selected centres are provided as a Repository of Factsheets in **Annexure 1**.

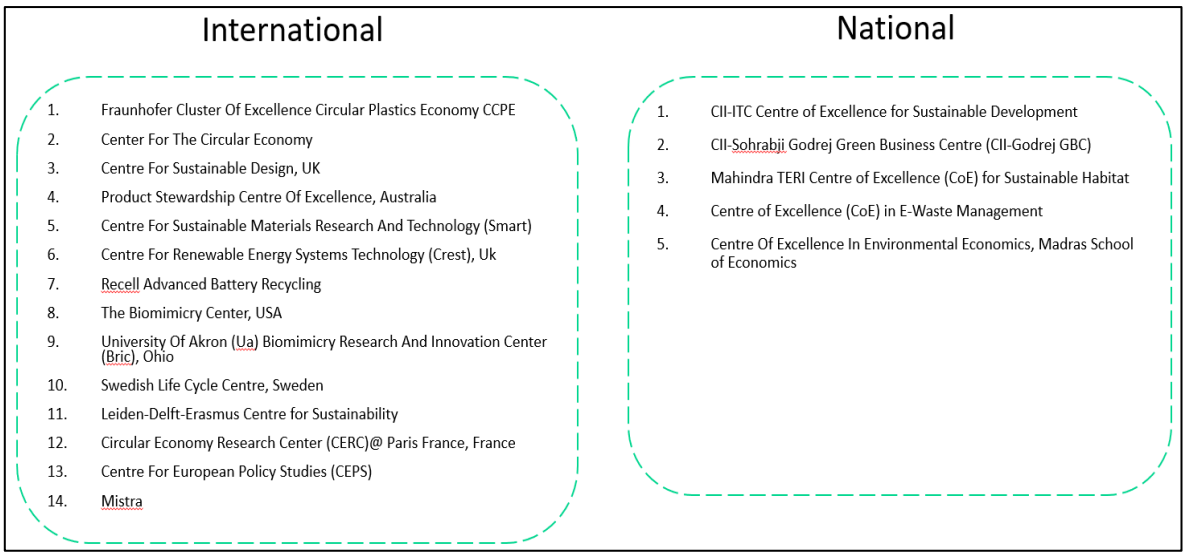


Figure 12: Shortlisted CoEs for deep diving

7.2 Key Findings from Selected Centres

Based on the review of some circularity-equivalent Centres of Excellence, the key findings that emerged are presented in Figure 13.

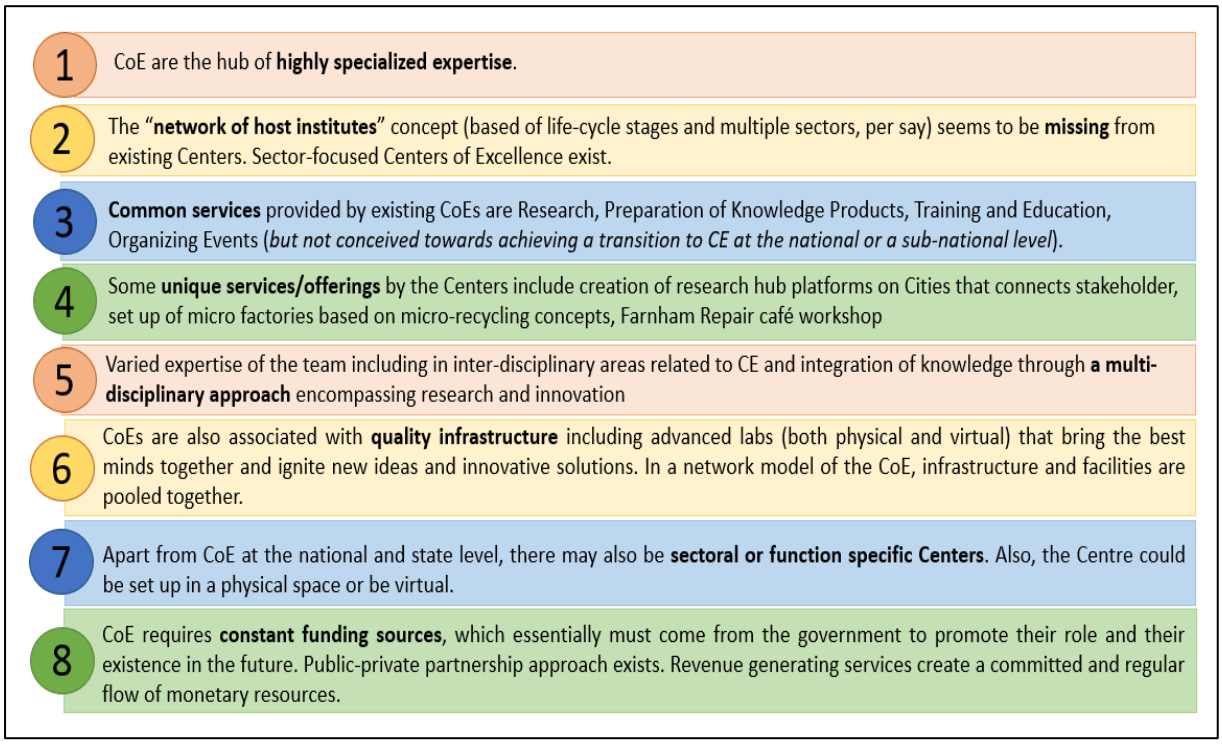


Figure 13: Key findings from the review of existing (Indian and international) CoEs

It was also observed that there are some common characteristics which apply to all the different types of CoE. From these characteristics, a few key features that would be particularly relevant for a CoE on Circularity were identified. They are enlisted here.

Varied expertise of the team: The team of the CoE should consist of individuals and organizations who are known for their work in concerned specific domains, but also inter-disciplinary areas related to CE. The Centre's team will need to play a key role in integrating knowledge through a multi-disciplinary approach encompassing research and innovation.

Quality infrastructure: CoEs are also associated with quality infrastructure which may include advanced labs (both physical and virtual) that bring the best minds together and ignite new ideas and innovative solutions. In a network model of the CoE, infrastructure and facilities are pooled together.

Location: The location of a Centre of Excellence is an important characteristic as CoEs play an integrative role. Apart from CoE at the national and state level, there may also be sectoral or function specific Centres. Also, the Centre could be set up in a physical space or be virtual. However, irrespective of the location, the impact area of a CoE is likely to go beyond the level of governance, geographic area or a stakeholder group.

Financing arrangements: The financing requirement in establishing a Centre of Excellence may be enormous given the state of the existing institutions. As these institutions are committed to engage in quality and innovation, they require constant funding sources. In such cases, some funding has to essentially come from the government to promote their role and their existence in the future. In addition to this, a public-private partnership approach can be explored that may also be performance based. Some services should also be revenue generating to create a committed and regular flow of monetary resources.

8. Vision, Mission and Operational Principles for the Proposed CoE

8.1 Vision and Mission of the CoE

From the review of existing Indian and international circularity-equivalent Centres of Excellence elaborated in Section 7, it was observed that the Centres deep-dived into have developed vision and mission statements, capturing the essence of the work done by them. It thus felt imperative to design these statements for the CoE on circularity as well.

The Vision Statement of the Centre of Excellence on circularity in India is proposed as follows:

To be the nodal centre that provides solutions for a transformative transition towards a circular economy.

The Mission Statement of the Centre of Excellence on circularity in India is as follows:

To support the transformation from a linear to a circular economy, through cost-effective circular solutions considering a life cycle approach, linking stakeholders within the country and with those outside the country, providing thought leadership and knowledge resources to build capacity, supporting circular economy implementation through advancement of policy design and instruments, guiding business strategies to integrate circularity and following a collaborative and partnership-based model to ultimately promote sustainable growth.

8.2 Operational Principles for the CoE

In order to achieve the mission statement proposed in Section 8.1, a set of strong principles are needed, creating a foundation that will power the operations of the CoE. The operational principles of the CoE are enlisted here.

Principle 1: The CoE will recognize pertinent gaps in service delivery within the Circular Economy domain and address these by the provision of relevant services

Principle 2: The CoE will follow the life cycle approach and focus on robust research and knowledge creation.

Principle 3: The CoE will build a strong network by pooling national and international expertise.

Principle 4: The CoE will develop standards assessing service quality and will continuously measure progress to create more efficient methods of service delivery.

9. Market Assessment for Circular Economy Services

9.1 Building Blocks for Market Assessment

A landscape matrix was prepared to capture the key perspectives and focus that the CoE would need to integrate while assessing the market for actual services. The matrix highlights the need for a life cycle perspective, sectoral/cross sectoral focus, addressing emerging issues and use of tools and metrics.

Keeping this landscape matrix in the context, a (proxy) market assessment was conducted to identify the gaps and entry points for the CoE to consider and accordingly design its services. The requirement of services varies across sectors and stakeholders.

It was clear that transitioning to CE will also involve multiple stakeholders and a multi-level approach transcending from national, regional, state, and local scales. A key focus of the CoE would be to provide a platform to build the bridge between universities and academia, strategic partners, industrial associations, chambers of commerce and government ministries and departments, especially when cast in a network configuration.

Figure 14 presents this landscape matrix. The periphery of the landscape highlights the need for the Centre to bring in focus on **5 key elements** through the service provision- **policy push; education, awareness generation and capacity building; technology advancement and innovation; and business models and circular investments.**

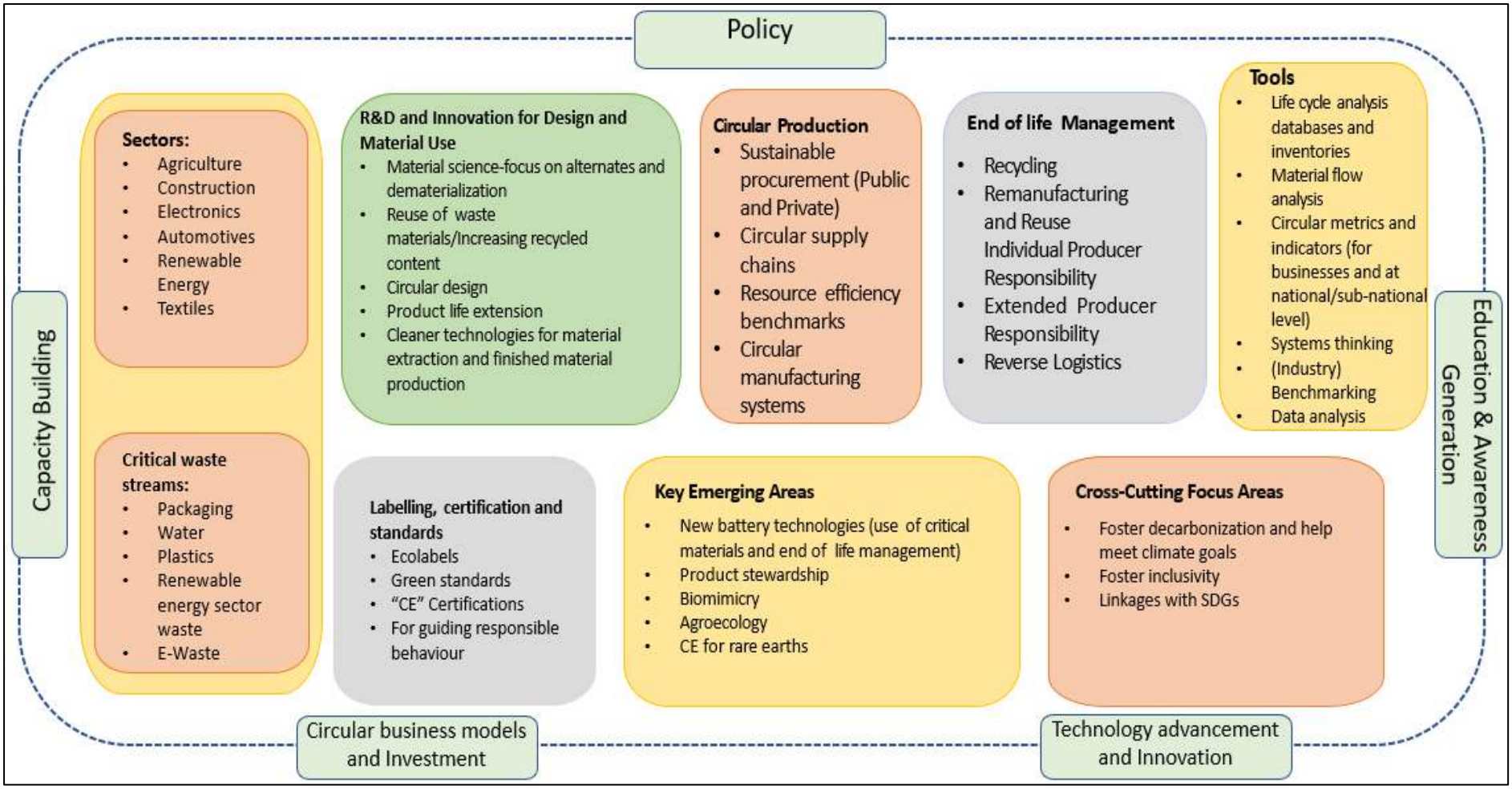


Figure 14: Landscape Matrix- to scope the structure and services of the proposed CoE

9.2 Key Findings from the Market Assessment

Broad factors affecting the market for Circular Economy in India have been summarized in Table 2, in the form of key findings.

Table 2: Findings of Market Assessment

Factor	Current push to CE fostering services	Identification of areas that can guide future service requirements
CE as a strategy to drive the success of reformative Indian campaigns and policies	Focus of Budget 2022-23 and 2023-24 on CE Achieving net-zero targets Sustainable Consumption and Production gaining traction Atmanirbhar Bharat and 'Make in India' emphasizing on self-sufficiency, which can be achieved through CE	Future guidance for G20 commitments Implementation Guidance for Strategic Action Plan on CE Inclusion of CE centric criteria in public procurement
Sub-National Level Guidance	City-level action (SMART City Mission) Aspirational Districts	State wise/District wise action plans on CE
Regulatory Push	Extended Producer Responsibility and its expansion in coverage of sectors/waste streams Revamped waste rules	Possible law on CE in the future Policy sandboxing by working with various government departments and ministries
Investment Push	Stepping up circular investments Increase in impact investment funding centric to CE Development of new private equity funds solely focussing on funding CE solutions Increasing investments in renewable energy sources (solar, wind and EVs)	Design of newer investment products/mechanisms Stepping up funding mechanisms for circular businesses
Stakeholder Push	Increasing traction on CE by policy makers, industry members and associations, research institutes and academic centres	Stepping up academic and policy centric research on CE Incorporating CE in sustainability policies of companies Inclusion of CE in corporate reporting
Push from Industries	Increasing traction by larger industries to integrate circularity principles in its processes	Collaboration with industry associations in different industrial sectors to mainstream circularity across its members and for that identification of harmonized set of opportunities

Factor	Current push to CE fostering services	Identification of areas that can guide future service requirements
	MSMSe looking for handholding support and guidance on identifying CE opportunities	
Capacity Development and Awareness Building	Government campaigns and missions surrounding individual action on CE, like LiFE Knowledge building sessions on CE by international organisations like World Bank Awareness building webinars/discussions by Indian industry associations like Bombay Chamber of Commerce and Industry Large scale events on CE (such as the CE Symposium organised by FICCI)	Inclusion in academic curriculum Training and capacity building programs for government officials Knowledge products on CE
Measuring & Reporting on CE	CE Metrics / scoring Development of corporate level metrics to measure CE Life Cycle Assessment and Material Flow Analysis	Constructing and implementing benchmarks
Infrastructure Growth	Guiding creation of common circular infrastructure like MRFs and STPs Retrofitting existing infrastructure Progress towards integrating circularity in real estate (standards and certification developed by Indian Green Building Council)	Green bonds for circular infrastructure Integrating circularity criteria into green infrastructure
International Reference Frameworks	ADB, AIIB, WB, IFC are pushing Circular Economy and Resource Efficiency Updating of international frameworks to include Circular Economy	Tailoring of international frameworks to the Indian context and facilitating adaption
Standards and certifications, Evolving Management Systems	Progress on integrating circularity into product and service provision and development of ecolabels (GreenPro standards) Progress on assessing the "greenness" of industries through rating schemes (GreenCo)	Circularity labels Environmental Product Declarations (EPDs) assuming importance

Factor	Current push to CE fostering services	Identification of areas that can guide future service requirements
Sustainable Production and Consumption	Sustainable Public Procurement (SPP) and Green Public Procurement (GPP) gaining traction	Inclusion of CE centric criteria in procurement
Active Dedicated Funds	International-level funds on Circular Economy (BlackRock's BGF CE Fund) National level funds on climate (Eversource Capital, Everstone Capital)	Climate and ESG dedicated funds will push circularity agenda Special funds for promoting R&D towards promotion of technologies and products in relation to circular economy, environmentally benign technologies for safe disposal of toxic/hazardous substances and the development of Artificial Intelligence for increase the effectiveness and optimize circular economy business models and streamlining the infrastructure needed to keep products and materials in use
Fostering innovation and entrepreneurship	Need for structuring the startup ecosystem in the country and aligning it to CE	Need for a platform to integrate both indigenous and scientific knowledge in the circular products and solutions
Digitization	Opportunities for circular solutions to integrate digital technologies for effective and efficient circularity fostering solutions	Push the boundary or use of digitalization for developing circular products and solutions Incorporation of digital technologies into innovative business models to foster circularity
Technological Advancement in CE	Government actively formulating policies and promoting projects that leverage advance IT and OT solutions (for example, solar and wind tech, waste management recycling tech)	Need for investments in advanced recycling technology in line with circularity principles leading to resource efficiency in this sector. Bringing in technologies that can spearhead circularity and are conducive to the Indian ecosystem through international collaborations

9.3 Circular Economy: Significant Relevance in context of Net Zero Commitments

Transforming to CE will help India to decouple economic growth with GHG emissions and help meet the commitment to be net zero by 2070. However, there is a need for evidence-based demonstration about the inter-linkages between CE and decarbonization. While many strategies have already been implemented in this regard, a CE approach when adopted on a mission mode will make India future ready and take on a leadership towards a smart and sustainable growth.

Many Indian companies have pledged to reduce GHG emissions according to the Science-Based Target Initiative—a global alliance that enables businesses to establish their own climate pledges. It should be noted that one of the core strategies being adopted to move towards these targets is minimizing waste, even to the extent of zero waste target. There is also a focus on more efficient use of materials, the substitution of virgin with secondary/recycled raw materials and fulfilling of the extended producer responsibility (voluntarily or by mandates) along the value chain of their products and services.

9.4 Barriers to Providing Services on Circular Economy

The market assessment also focussed on identifying and understanding certain barriers that may arise in the provision of CE centric services by the CoE. Figure 15 captures these barriers, as indicated by the current Indian market for CE.

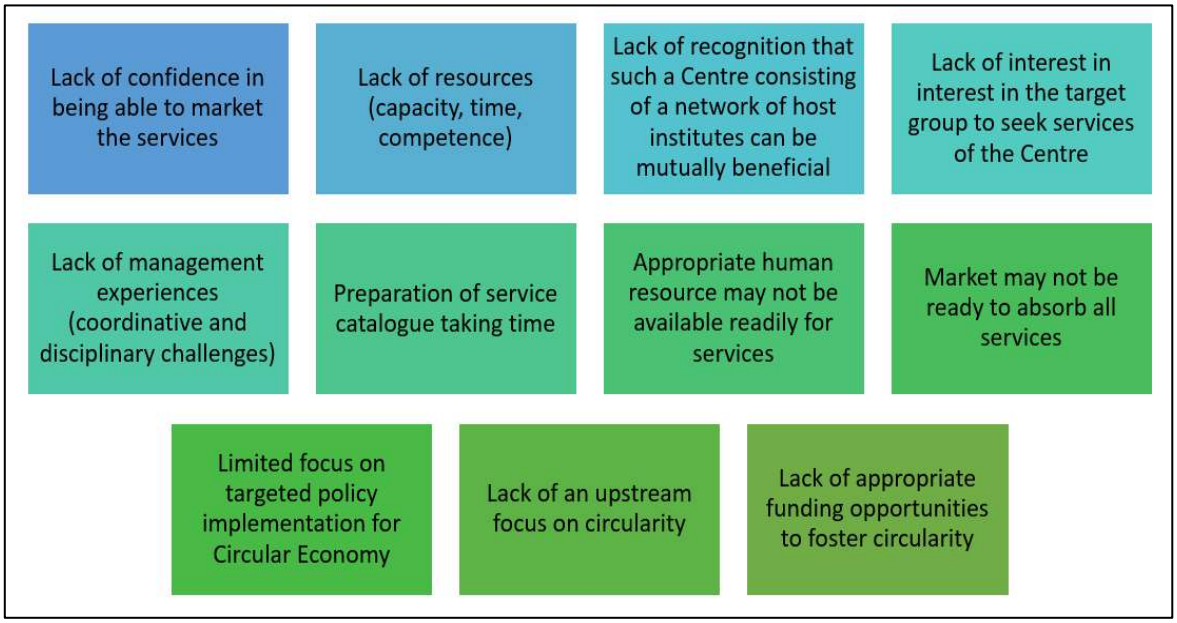


Figure 15: Market Barriers to Service Provision

These barriers are due to factors that include lack of awareness about CE and its potential in meeting our developmental goals, absence of appropriate skill sets and technical knowledge to provide CE fostering services, differing priorities of stakeholders, absence of policy implementation guidance, and inadequate financial support to design and roll out the services.

10. Service Offerings of the CoE

10.1 Principles for Service Identification

Certain key principles were identified to make the process of service identification more streamlined and accurate. As per these principles, the CoE should:

- Focus on improving CE in operations, processes, behaviour and thinking.
- Target key stakeholders (for instance, industry players, policy makers, research institutes and think-tanks, academic institutes, etc).
- Meet demands that are not currently addressed by other agencies.
- Create new markets for CE services and expand the scope of the existing services.
- Be complementary to functions of other institutes/organizations offering services to guide and/or foster CE.
- Strengthen industry competitiveness in terms of cost reduction and profitability.

It is also important that the CoE provides unique or differentiated services, which have viable demand but there is little or no "supply" of the business service in the market. This may ensure that the services of CoE meet the market demand and/or address the gap in market of services that are required to make a transition to the circular economy, ensuring its market readership and sustainability.

The services of the CoE were designed being mindful of providing flexibility to permit customization to its potential users/stakeholders. This customization should provide options on scope/emphasis of the service, delivery mechanisms and fee structures.

Finally, for some services the CoE may assume sole charge, and for some services it may operate in partnership with other agencies outside its network. These partnerships could be strategic as well as on operational levels; some attached with institutions (Indian or international) and others with individual experts (national and international) and others through competitive bidding for partnering. Such arrangements will add more robustness and coverage to the services offered by the CoE.

10.2 Service Buckets of the CoE

The findings of the market assessment indicated that the CoE would need to provide different kinds of services catering to different stakeholders.

The key services could be categorized into 4 domains, those that:

1. Bring about **policy action** through targeted research and advice.
2. Cater to **education**, **awareness and capacity building** for CE
3. **Instil circularity in industries**
4. **Drive innovation** and **enable the success of circular business models/entrepreneurship**

These buckets are presented in Figure 16.

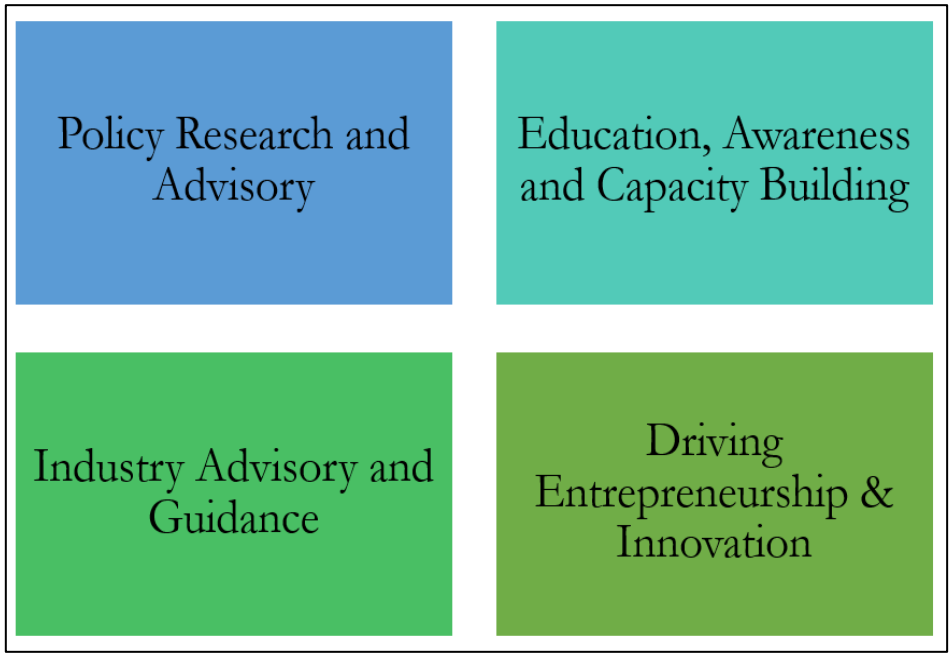


Figure 16: Final Bucket of Services

10.3 Specific Service Areas under the Service Buckets

Tables 3, 4, 5, and 6 lists some specific services that the CoE can provide under each of the four buckets. The rows highlighted in blue portray the type of service, whereas the ones highlighted in grey lay out exact scope of services under each service type.

Table 3: Proposed Services for the "Policy Research and Advisory" Bucket

Conduct evidence and research-based studies, assessments, and preparation of strategies and roadmaps to reorient the current policy framework towards enabling the transition to an inclusive, low-carbon, Circular Economy
• Preparing strategies in reaching 2070 net-zero target through circular economy approach • Estimating the potential of job creation and related skill requirements due to the CE in India and the necessary policy recommendations • Creating policy summaries to give government bodies an idea of the current international policy landscape surrounding CE to aid in decision making • Preparing repositories of technologies that can foster circularity at all stages of the life-cycle • Developing standards pertaining to circularity to drive consumer behaviour and maintain quality assurance (for instance, bringing a CE centric focus in ecolabelling) • Designing policy instruments to enable circularity at the product design stage • Development of 'Technology Strategy and Roadmap" focussing on R&D efforts in the domain of circular economy.
Direction for implementation of circularity at the sub-national levels through state/district/city level action plans and roadmaps
• Preparing state level CE strategy • Preparing city level circular economy roadmap or action plan • Building standard operating procedures for projects on common circular infrastructure and structured around public private partnerships
Guidance on implementation of sectoral action plans prepared by CE Committees constituted by the NITI Aayog and also guiding line ministries to mainstream circularity in their existing and new sectoral programs, missions
• Identifying opportunities for mainstreaming of CE in national programs, missions etc. e.g., Swatch Bharat Abhiyan, Smart Cities, Make in India, Start-up India, Digital India, etc.
Design financing models/instruments to foster a transition to a circular economy
• Designing circular finance instruments such as debt instruments in the forms of green bonds • Preparation of financing schemes for common circular infrastructure with reverse logistics for addressing e-waste, end of life vehicles, waste tyres, waste oil, gypsum and agricultural residues (for biofuels) based on PPP
Build regulatory/policy sandboxes for testing policy instruments by working with various line ministries
• Circular infrastructure in partnership with local government to support the evolution of new standards and regulation • Sandboxing product life extension strategies
Research on best practices in policy design and implementation for circular economy
• Developing policies to support circular and ESG-driven investments • Developing Sustainable/Circular Public Procurement criteria and guidelines for products and services • Documenting good practices on economic instruments to incentivize circular behaviour of individuals and industry • Guiding policy design to make circular products cost competitive in the Indian market • Research on recycled product specifications and CE centric product labels
Development of databases to guide policy design and measure the nation's progress on Circular Economy

• Building national-level projection tools that allows in estimating the size and opportunity of the CE and tracking the nation's progress on CE • Building sector specific tools to measure decarbonization due to circular actions in terms of reduction in GHG emissions • Preparation and mapping of sectoral material flows • Mapping material flow of waste streams and creating a comprehensive inventory database to monitor EOL processes and measure secondary raw material utilisation.
Guidance on building common circular infrastructure
Toolkits for PPP for developing common circular infrastructure such as Standard Bidding Documents

Table 4: Proposed Services for the "Education, Awareness and Capacity Building" Bucket

Leading and guiding the development of and delivering need-based innovative training modules
• Organizing trainings for government officials and public sector employees (IAS, IPS, IFS, etc.) on CE as well as standard setters (ISO/BIS personnel) • Developing "Training of Trainers" knowledge modules on CE and training high-level personnel • Guiding Digital and Green skills integration in skill development programs • Developing programs to create common understanding of CE amongst the general public through creation of CE knowledge products
Host stakeholder Consultation Workshops, exchange visits
• Organizing events for general public to bring about behavioural changes towards adopting sustainable lifestyles • Organizing and hosting seminars and workshops on circular solutions and strategies in partnership
Prepare educational curriculum at different levels of formal education that integrate circularity basics
• Introducing CE in education through curriculum design, especially at the graduate and post-graduate level for technology and science-based courses. Introducing CE at school-level curriculum • Developing learning platforms containing courses that cover CE-related topics
Provide accreditation services to CE-centric research cells and academic institutes
Creation and maintenance of an integrated and interactive "Knowledge Platform" on CE
Promoting knowledge about indigenous technologies associated with CE
Facilitate the creation of hubs for knowledge sharing and for building and enhancing capabilities on circular economy
Creation of knowledge sharing hubs to facilitate progress on the South-South Cooperation Dialogue on Circular Economy

Table 5: Proposed Services for the "Industry Advisory and Guidance" Bucket

Provide/Connect industry with appropriate technological solutions
• Providing a platform for larger scale national and international collaboration on exchange of technologies that foster circularity in industries along the value chain • Building a network for connecting the expertise of leading tech houses (emerging and established research institutions, such as IITs, NITs) to industrial processes
Establishing industry associations that can be frontrunners in taking forward the CE agenda
• Lead and guide setting up of industry bodies that will facilitate focused and structured approach to key CE aspects, such as a Remanufacturing Council
Technical Guidance to industry
• Technical Guidance to setting up of circular economy parks/ Industrial parks integrating circularity • Guide the design and implementation of potential circular opportunities relevant to industries especially to MSMEs • Introducing "CE Disclosures" as part of corporate sustainability reporting and climate disclosures • Provide circularity measurement and reporting services to industry • Develop guidance manuals and Industry/ Sectoral Benchmarks on Circularity • Prepare and Disseminate industry case studies including those on international good practices to the industry • Provide industry with legal/administrative information and guidance on compliance related aspects relevant in context of circular economy • Identifying entry points/viable applications for industrial implementation of R&D efforts in circular technology
Connecting industry relevant stakeholders
• Facilitating tie-ups with incubators, technology providers, entrepreneurs, and support organizations • Connect industry with students through a structured engagement program, such as an internship program

Table 6: Proposed Services for the "Driving Entrepreneurship & Innovation" Bucket

Provide entrepreneurial and Start-up advisory services for developing cost-effective circular business models
Guide industrial parks and hubs on integrating circularity in their set up and operations
Development of ESG Policy and Framework for Industrial Estates and Parks
Provide technical assistance for developing and implementing circular economy-based pilot and demonstration projects
Create innovation spaces (IS) like fab labs, makerspaces, hackerspace, living labs coworking spaces to strengthen innovation capacities
Drive and support supply chains in becoming more circular
Create a consolidated database for industry sectors to gain insights and develop estimation tools

Connect and scope CSR funding opportunities to CE pilot and demonstration projects
Conduct sustainability assessment of resource efficient and circular economy fostering technologies
Foster circularity in upstream processes by organizing innovation challenges in search of environmental product and service design solutions
Integrate circular economy in Atal Innovation Mission
Identify and support scaling up of end-to-end IT and Machine Learning solutions to Circular Economy
Facilitate pilot demonstrations of CE-technologies through hackathons, technology "melas", etc.
Connect circular start-ups with investment funds through collaboration and networking

10.4 Bundling of Services

It may be observed that some of the services are 'bundled', i.e., interlinked. If one core service is provided, then the other interlinked service could also be offered/marketed. This may require only a marginal additional effort but will have a greater synergistic impact and result in better "customer/client satisfaction". Figure 17 depicts a few examples of some services that can be bundled together. Examples have been given for services belonging to all four identified buckets. The deep blue boxes with bold text portray services (mentioned in Tables 3, 4, 5 and 6 in Section 10.3) that can be bundled together, and the white dotted box briefly explains how bundling could strengthen the service provision.

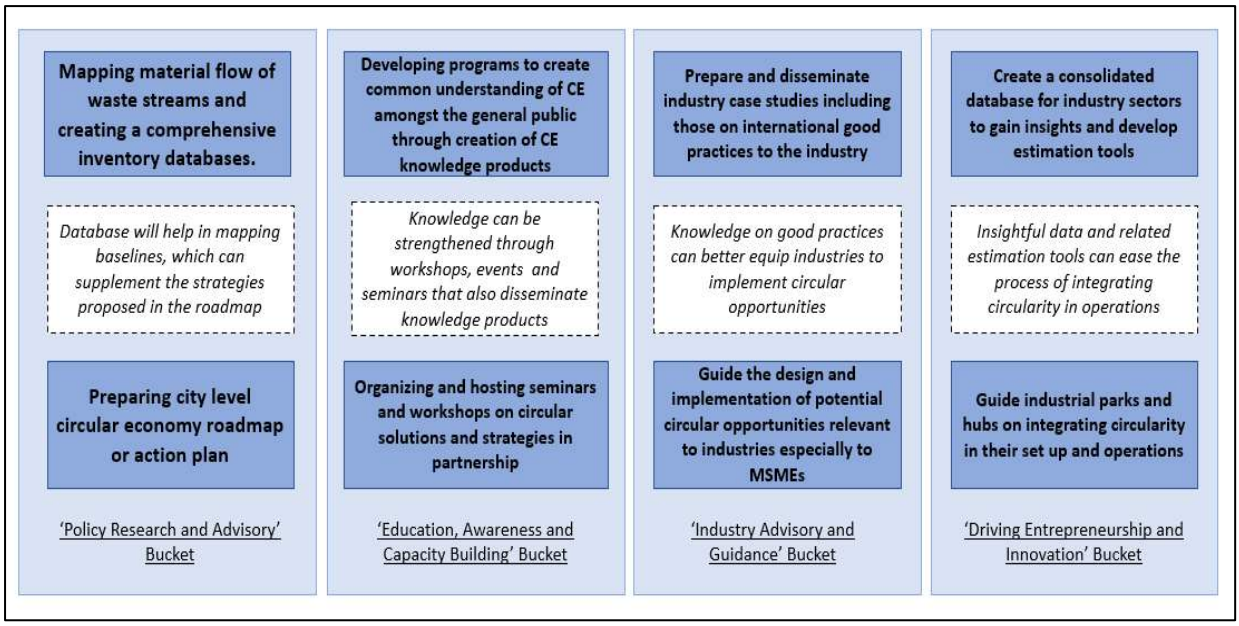


Figure 17: Bundling of Services

Such a bundled services approach can be adopted to offer an additional range of interlinked services in the CoE's early years.

10.5 Prioritisation of Services

As elaborated in the Section 10.3, there are a number of services that the Centre of Excellence can provide. However, not all services can be offered by the CoE from the initial phases. Prioritisation of activities will therefore hold importance. In order to facilitate prioritization, findings from the market assessment and various discussions, interviews and workshops held during the course of the study were referred to. Additionally, these insights were combined with the need to align the services with the demand that is being generated by recent policy push on circular economy and addressing of gaps to enable circularity transition to contribute to a sustainable growth.

The key priority services and justification for their prioritisation are presented here:

i. **Coordinate and work with local and state governments to foster circularity at the sub-national level-** Circularity is strongly embedded in state and local economies. States can bring governance systems closer to their communities and actively engage all relevant stakeholders to support access and broaden participation. Local governments can easily understand the public's demands and could be in a better position to respond to some of them. Further, considering that the circular transition will change labour markets, state and local governments have a strong role to play in supporting a positive transition to circularity for work and workers. Goa in India became the first state to have prepared a State Strategy for Resource Efficiency and Circular Economy through a multi-stakeholder engagement method. Currently, Gujarat is also in the process of developing a CE Action Plan for the state. Development of such state level and local level circularity strategies/roadmaps/action plans could be guided or led by the CoE.

ii. **Build regulatory/policy sandboxes for testing policy instruments by working with various line ministries**- Many new innovations do not fit neatly into the traditional definitions of markets as recognised by existing regulatory bodies. One way in which policymakers can define new regulatory frontiers for such technologies is to implement 'sandboxes'- frameworks that provide participant companies with some regulatory flexibility while insulating the impact on consumers. Innovation sandboxes are being used internationally to examine real (and perceived) barriers and impacts of new policies through safe, real-world trials. Governments can play an active role by establishing and funding policy innovation sandboxes for circular infrastructure in partnership with local governments to support the evolution of new standards and regulation. The deployment of innovative solutions depends on developing adequate infrastructure, markets, and systems to support them. Currently, most policy frameworks have been developed to support and legislate linear processes and systems. These may inadvertently disincentivize the deployment of innovative solutions for CE and cause technological and infrastructural lock-ins. Fostering responsive public-private collaboration across value chains to identify and address barriers, support the scaling of new technologies, develop new policies, use regulatory sandboxes where appropriate, and align existing ones can support the transition towards CE[14]. Regulatory sandboxes allow innovative businesses to test new and highly innovative business ideas and products in a certain time frame under regulatory supervision of the respective authority. Worldwide, there is no agreed definition for regulatory sandboxes, but a variety of models and applications of this innovation instrument. It is important to also consider that under regulatory sandbox conditions, consumers, health and the environment have to still be protected as required by the law. The CoE can work with the different line ministries to conceptualize and build these sandboxes.

iii. **Preparing sectoral strategies in reaching the 2070 Net-Zero target through the CE approach-** As elaborated in Section 9.3, Circular Economy as an approach can accelerate India's efforts towards achieving decarbonization by 2070. In this regard, additional benefit can be obtained if efforts are focused following a sector-centric approach. The CoE can be involved in the creation of action-oriented, implementable strategies targeting high-impact sectors (based on emissions intensity and opportunities to transition to CE). Currently, think-tanks and research institutions in India have been successful in developing sector-specific roadmaps that could enable the CE transition, such as the Roadmap for a Circular Economy for Plastics in India prepared by TERI in 2020-21. However, there is a gap in terms of recommendation-oriented and targeted work that can act as a guidance to kickstart CE efforts in India's key sectors.

iv. **Design financing models/instruments to foster a transition to a circular economy (such as Green Bonds)-** Benefits can arise from dedicated funds for promoting CE including through funding organisations wishing to explore and pioneer circular approaches; identify, develop, and bring new business models and innovative technologies to market. Corporate CSR funds have

[14] "EU's Innovation Deal for a circular economy" https://ellenmacarthurfoundation.org/circular-examples/innovation-deal-for-a-circular-economy

started supporting social enterprises that are engaged in the CE. For example, green sole in India, receives support from corporates and its employees, as well as through corporate CSR. Green bonds finance can be used to finance projects that are aimed at waste management and to develop environmentally friendly technologies. Recently, the Climate Bonds Initiative published updated waste management bond criteria that apply to assets and projects with specific aspects of waste management and included these criteria in the climate bonds standard. CoE can help design these instruments by working with investors, different tiers of government and financing instruments to design and/or integrate circularity in these instruments.

v. **Measure the nation's progress on Circular Economy-** A growing commitment from companies to implement CE strategies demands the development of guidelines for consistent external communication. The fields of non-financial reporting and sustainability are well established with numerous available international reporting frameworks and approaches; however, there is still an absence of standardised reporting principles and procedures for publishing progress on circularity. Today, digital transition and an increasing call for value chain transparency present opportunities to improve the uptake and use of standardized reporting and benchmarking. Companies in India have been showing traction on the use of several internationally accepted sustainability reporting standards and frameworks for reporting non-financial parameters. These include those focused on environmental, social and governance (ESG). The CoE could provide the technical guidance on alignment of the different frameworks to better position the companies in comprehensive reporting and help develop a unified framework (either by government or voluntarily by industry bodies) for measuring circularity and the associated carbon savings. Along with reporting, the CoE can also support the development of various analytical tools and database inventories that can track national level progress on Circular Economy on various variables such as employment generation, waste management, value addition to GDP, GHG emissions mitigation, circular material flows, etc.

vi. **Lead and guide the setting up of industry bodies that will facilitate a focussed and structured approach to key CE aspects, such as a Remanufacturing Council-** Setting up a Remanufacturing Council could provide a platform and a unified, coordinated voice to remanufacturing issues and challenges. These associations can generate high impact actions which could boost remanufacturing, for practitioners, policy makers and researchers. They can play a key role in addressing the research gaps, creating awareness, providing support for the manufacturing industry and identifying and guiding the development of policy and strategy needs of business through sector-focussed representation. The CoE could lead and guide the setting up of industry bodies such as the Remanufacturing Council that will facilitate a focused and structured approach to key CE aspects.

vii. **Lead and guide the development and delivery of need-based innovative training modules including those for senior government officials-** Despite the growing and commendable developments in the domain of Circular Economy in India, there is still a lack of common understanding on the aspects that can foster a CE amongst people. Capacity and knowledge building surrounding CE is thus an extremely pivotal service that can address this gap. Capacity building sessions need to be tailored according to audiences. For instance, senior government officials can be informed about innovative ways in which CE can be inculcated into policy. Standard setters like ISO and BIS personnel can be guided on designing standards in a way that they foster CE. The CoE can thus guide the development of training modules catering to various audiences.

viii. **Technical Guidance to setting up of circular economy parks/ industrial parks integrating circularity and development of their ESG policy**- Industrial parks are spaces where multiple businesses can form a symbiotic relationship centred upon conservation of raw materials and other natural resources. These eco-parks could be focussed on specific waste streams such as e-waste, plastic waste, steel scrap and act as integrated waste recycling zones that co-locate different recyclers with common facilities and shared infrastructure. For this, prioritizing regions/cities having maximum potential of e-waste or plastic waste generation could be performed. These parks

can also promote investments for circular economy/industrial ecology wherein, the by-products of one unit can be feedstock for other industries. These parks may be set up by the State Industrial Boards (SIBs) or through a PPP format. The CoE can act as a Knowledge Partner to the SIBs and provide the technical guidance for setting up these parks.

Industrial estates and parks should focus on three core elements or pillars -sustainability; climate sensitivity; and resource efficiency and circular economy. To achieve implementation of these three pillars, these industrial estates and parks should abide by a common ESG (Environmental, Social and Governance) framework. The ESG framework will not only ensure meeting the compliance with applicable national and State level legislation but also ensure conformance to global standards. The CoE can be the Knowledge Partner to the estates and parks and help develop their ESG policy and framework.

ix. **Create innovation spaces (IS) like fab labs, makerspaces, hackerspace, living labs, and coworking spaces to strengthen innovation capacities-** Since CE is a systemic concept that challenges the traditional "linear" economic model currently defining production and consumption processes across the globe, mainstreaming it as a way of life calls for changes in all parts of the value chain. These changes need to be supported by new processes and systems. Such a change is thus rooted in innovation, and it is evident that in order to sustain a CE, it will need to be backed by innovative thinking. Fostering innovation for CE calls for a set of interacting actors sharing material and/or informational flows which require physical environment with access to technology, knowledge, and experimentation. There needs to be processes and spaces that are conducive to these conditions. In this regard, over the past few years, new structural and organizational entities facilitating the emergence of innovation have emerged. These are physical and/or virtual environments, playing the role of innovation intermediaries, provided with devices, tools, and new methodologies designed to strengthen innovation capacities in a context of exchange, sharing and collaboration in order to achieve a goal of common interest[15]. These new forms of work organization address the need for organizations to open their boundaries to their external environment in order to capture new knowledge in a collaborative and open innovation process. The concept of "Innovation Spaces" (IS) refers to different types of co-creation environments such as fab labs, makerspaces, hackerspaces, tech shops, living labs, and coworking places. These ISs have been of particular interest to academicians and research has yielded that they provide the organisational backing to enhance creativity. The CoE can thus be involved in establishing such ISs centred around finding circular solutions in various domains (technology, business models, etc.) These centres would be used as tinkering laboratories to solve different circularity issues and should act as lighthouse projects.

x. **Drive and support supply chains to become more circular-** Reconfiguration of core supply chain management (SCM) processes that underlie current production and consumption patterns will be a key factor in fostering CE. This will make their supply chains resilient to issues such as resource scarcity and climate change and also bring for them long-term financial performance. A World Economic Forum (2014) report[16] has argued that supply chains are the key unit of action with regard to CE implementation and success and will be the foundation for driving needed change. There is a need to push them towards sustainably sourcing to the highest standards from their network of suppliers, driving change through continuous improvement policies with suppliers and working closely with them to extend these approaches to their operations and raising awareness of sustainable sourcing among their consumers. CoE can provide services to the industry to encourage them, guide them and help design and implement measures to make supply chains more circular.

[15] "Innovation Spaces as Drivers of Eco-innovations Supporting the Circular Economy: A Systematic Literature Review" https://www.cairn.info/revue-journal-of-innovation-economics-2022-3-page-173.htm

[16] "Towards the Circular Economy : Accelerating the Scale-Up across Global Supply Chains" https://www3.weforum.org/docs/WEF_ENV_TowardsCircularEconomy_Report_2014.pdf

xi. **Provide technical assistance for developing and implementing circular economy-based pilot and demonstration projects-** Developing innovative business models is an iterative process that involves experimentation and piloting to obtain experience, and eventually scaling up. The experimentation and piloting provide information about how a new business model might be realized in practice with the goal to de-risk and accelerate the scaling up and guide the replication. Piloting helps create cooperation between the public and private sectors and civil society and can generate new information that can be used in other decision-making contexts. It can help showcase best practice solutions to common CE challenges. The findings from pilots play an essential role in giving directionality to the system level change with a holistic vision. Pilots for CE could involve redesigning a product or service to be more circular in nature, converting waste outputs from a business, city of an industrial cluster into value-added products, strengthening/creating reverse logistics or supporting supply chain management/ or setting up an entirely new supply chain (for example to divert waste from landfills). Feasible ideas that address a current or future waste stream such as plastics, glass, textiles, metals, or organics (or a combination of these) from a value chain perspective and helping close the loop should be piloted. CoE could provide technical assistance for developing and implementing circular economy-based pilot and demonstration projects

Some further relevant details related to the description of the service, the type and possible modes of service delivery, the targeted stakeholders, the business model and possible streams of revenue, barriers to the provision of the service, any institutions providing similar services in India and relevant partners that can help in the provision of the service on each of the prioritised services is included as **Annexure 4**.

Since the number of prioritised services is large and the Centre may face difficulties in implementing all services simultaneously, a detailed roll-out plan has been put in place, which is discussed in Section 11.4.

Alongside the 11 prioritised services, the CoE can also look into fostering circularity in Indian sectors. This activity can be aided by the third proposed prioritised service- "Preparing sectoral strategies in reaching the 2070 net-zero target through CE approach". Creation of sectoral strategies can kickstart the work of integrating CE in sectors, the recommendations of which can then be taken forward by the CoE through specific activities. For the initial stages post establishment, the CoE can take up three high-impact and relevant sectors, namely **plastics, construction** and **textiles**. Upon reaching maturity, the CoE can expand its activities to more sectors. Justification for the selection of the aforementioned sectors is enlisted here.

1. **Plastics-** India is one of the leading countries in plastic manufacturing, processing and trade today. According to the Brand Equity Foundation of the Union Government, as of January 2023, the Indian plastics industry is home to about 50,000 industries, most of which are MSMEs. The Indian plastic processing industry comprises approximately 30,000 units that use injection moulding, blow moulding, extrusion, and calendaring to create a wide range of products[17]. The sector is expected to generate Rs. 10 lakhs billion in revenue by the year 2027. The sector is also a source of significant employment generation, employing more than 50,000 people. Given the extensive size of the industry, it is bound to generate a sizable proportion of waste. According to estimates by TERI, India generates close to 3.46 million tonnes of plastic waste annually and CPCB estimates suggest close to 60% of this waste is recycled[18]. While this percentage is higher than what is achieved by developed economies, it has been observed that India's CE efforts within plastics are mainly centred around recycling. There is a need to explore other value retention approaches such as reusing and repurposing. Furthermore, informal sector employment makes up a large percentage of the plastics value chain, especially in downstream stages. There is a need to make the plastics

[17] "India's Plastic Industry" https://www.ibef.org/research/case-study/india-s-plastic-industry#:~:text=The%20plastics%20industry%20is%20currently,employ%20more%20than%2050%2C000%20people

[18] "A link towards integrating informal sector may complete the EPR mechanism" https://www.teriin.org/article/link-towards-integrating-informal-sector-may-complete-epr-mechanism

sector more inclusive. The CoE can look towards these aspects and drive a holistic transition towards circularity for the Indian plastics sector.

2. **Construction-** India aims to become the third largest construction market globally by 2025. The Indian construction industry, consisting of both real estate and urban development, works across more than 250 sub-sectors with multiple cross-sectoral linkages. With urbanization driving population growth in cities, the importance of the construction sector is ever increasing. Invest India estimates that by 2030, more than 40% of India's population will be dwelling in cities and by 2025, 68 cities will have a population of more than 1 million[19]. The scale of the sector is evident from its share of employment generation as well. Employing 51 million people, the industry is the second largest employing sector in India[20]. Indian initiatives like the Smart City Mission are driving modernized and technology-driven urban planning. Under the Union Budget of 2023-24, the Urban Infrastructure Development Fund received Rs. 10,000 crores in outlay to create urban infrastructure in Tier 2 and Tier 3 cities. While there are no decisive estimates on C&D waste generation in India, it is safe to say that the sector generates very high amounts of waste. Furthermore, India recycles only 1% of this waste. Efforts are thus required to step up a CE in construction[21]. Push towards circularity in the sector is growing, however. Green building certifications and standards like GRIHA and LEED are gaining popularity, as mentioned in Section 2. The CoE can take up targeted actions to further circularity in the construction sector, by establishing value retention approaches through C&D waste utilization, adding the CE angle to Indian missions, driving policy research, and supporting technological development and innovative solutions in the space.
3. **Textiles**- The Textile sector is one of the oldest industries in India contributing approximately 2% of the GDP and 18% of manufacturing in 2017-18[22]. Apparel is one of the major finished products of the sector. According to the Economic Survey of 2020-21, India is the 6th largest apparel and textile exporter of the world, with the EU and the USA being major trading partners[23]. The country has been witnessing continual and extensive growth in the Apparel and Textile (A&T) industries due to rapid urbanisation, increasing disposable income, increasing customer base and retail penetration. The Indian Textile industry is expected to grow from USD 140 billion in 2018 to USD 223 billion by 2023. The A&T sector contributes significantly to the country's economy in terms of manufacturing, employment, exports and GDP contribution. With respect to job creation, the industry directly employed 45 million people and 60 million in allied sectors under the 'Make in India' campaign[24]. Despite the economic benefits it brings, the industry is subject to severe environmental implications throughout its value chain. The total greenhouse gas emissions from textile production currently stand at 1.2 billion tonnes annually[25]. The Indian textile sector needs a systematic, human centred transition to a circular economy that is needed for the textile and apparel industry for better environmental and social performance, as well as to improve competitiveness and improve market access. The CoE can play a leading role in this regard.

[19] "Construction: Industry Scenario" https://www.investindia.gov.in/sector/construction#:~:text=The%20construction%20Industry%20in%20India%20is%20expected%20to%20reach%20%241.4,sectors%20with%20linkages%20across%20sectors
[20] "Construction" https://www.makeinindia.com/sector/construction
[21] "India recycles only 1% of its construction and demolition waste: CSE" https://www.downtoearth.org.in/news/waste/india-recycles-only-1-of-its-construction-and-demolition-waste-cse-73027
[22] "Textile and Apparel" https://www.investindia.gov.in/sector/textiles-apparel
[23] "Textile Industry & Market Growth in India" https://www.ibef.org/industry/textiles
[24] "Textiles and Garments" https://www.makeinindia.com/sector/textiles-and-garments
[25] "Textile companies to draw up plan to cut emissions" https://economictimes.indiatimes.com/industry/cons-products/garments-/-textiles/textile-companies-to-draw-up-plan-to-cut-emissions/articleshow/93170701.cms

11. Institutional and Governance Framework for the CoE

11.1 Proposed Institutional Architecture

The suggested institutional architecture of the CoE is based on an "apex-network" approach. The apex centre can be housed in the Resource Efficiency Cell at the Ministry of Environment, Forests and Climate Change (MoEFCC). Alternatively, a separate National Resource Centre can be established in the honourable Prime Minister's office which will act as the apex. The network consists of a set of host institutes which are selected using a structured approach and have the flexibility to expand overtime to meet the growing and expanding service offerings of the CoE. The processes and evaluation criteria to be followed in the selection of appropriate host institutes is laid out in the Guidance Manual that supplements this study.

A two-segment architecture has been proposed, which is depicted in Figure 18 and 19. Figure 20, 21 and 22 present sample architectures using the apex and network model for the priority sector elaborated in Section 10.5, namely plastics, construction and textiles.

The first segment focuses on direct engagement with the government, which has been depicted in Figure 18. Here, the network consists of government bodies and line ministries, with whom the Apex Centre engages directly through dialogues, discussions to support policy formulation and design of policy instruments. The role of each of the proposed government bodies that are part of the network is elaborated here.

- Ministry of Finance (MoF): To technically guide the development of financial schemes including those for creating circular infrastructure.
- Ministry of Environment, Forests and Climate Change: To guide the preparation of strategic action plans that are multi- sectoral, and in some cases, focus on specific themes e.g., resource efficiency, implementation plan for extended producer responsibility framework.
- NITI Aayog: To guide the development of national level multi-sectoral policies and schemes/programs on Circular Economy.
- Line Ministries: To mainstream circularity in policies and schemes/programs across different stages of the life cycle of products and materials, to facilitate inter-ministerial coordination and to build regulatory/policy sandboxes by working with various ministries.
- Sub-National Government Bodies: To push the circularity agenda at the sub-national level through engagement with sub-national governments and local nodal agencies and to identify areas for opportunities such as recycling facilities, circular construction, digital technology integration in resource management.

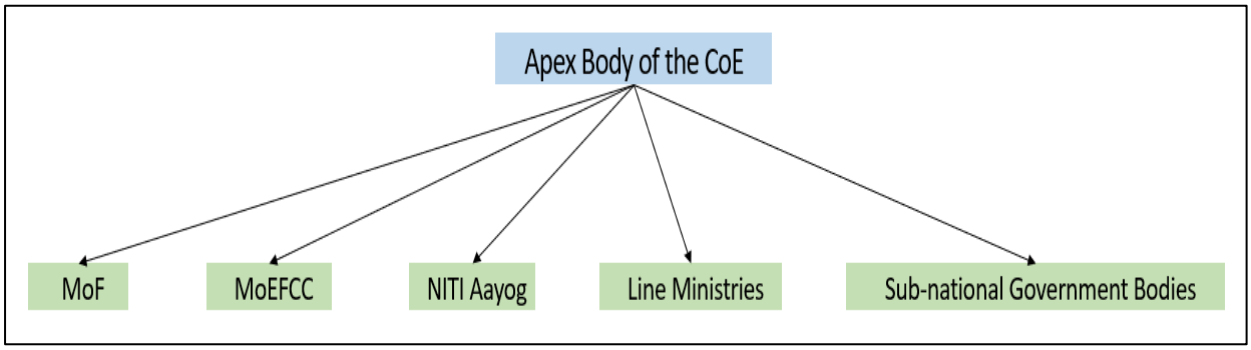


Figure 18: Segment 1 of the Architectural Model of the CoE-: Direct Engagement with Government

The second segment focuses on engagement with institutes having expertise in different domains relevant to provide a holistic approach to fostering circular economy using a life cycle perspective.

Figure 19 shows the various types of institutions that will form part of the network under this segment. Each of these institutes can be termed as a "**nodal host institute**".

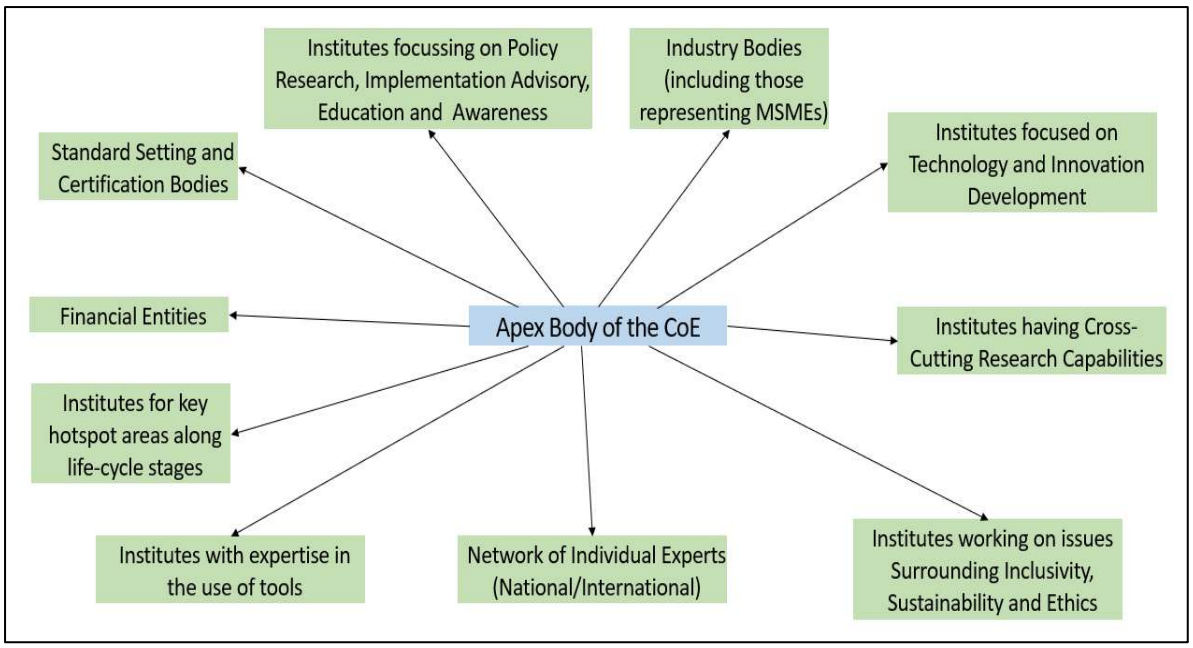


Figure 19: Segment 2 of the Architectural Model of the CoE: Network of Apex and Nodal Host Institutes

The proposed apex and nodal host institute network is aligned to the service offerings of the CoE. A prospective list of nodal host institutes has been presented in the Guidance Manual document.

To begin with, selected priority sectors and life cycle stages could be identified to constitute the initial network of nodal host institutes. The network will expand over time. Given that the institutional architecture of the Centre involves engaging with a number of bodies, the task of managing the network can be challenging. It is extremely important to have familiarity between the institutes of the network to ensure smooth coordination amongst the nodal network institutes. Strong governance will be also hold great importance.

Sample CoE networks for the chosen priority sectors are presented here.

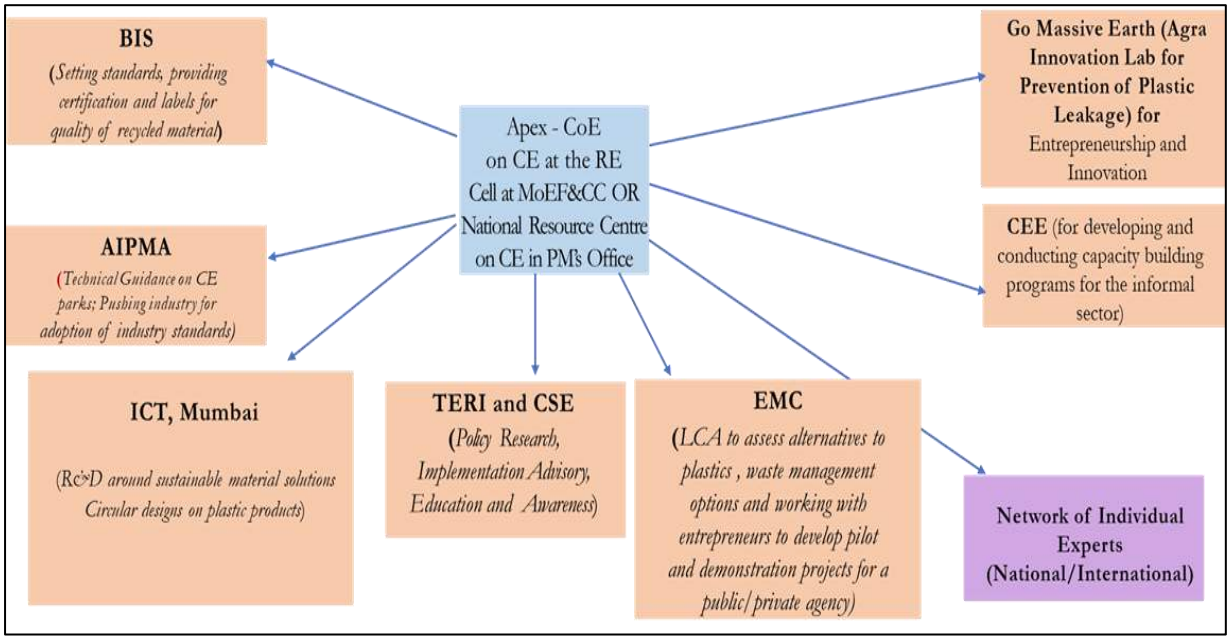


Figure 20: Architecture of CoE that could look at Plastics as a Priority sector to provide service on sectoral strategy

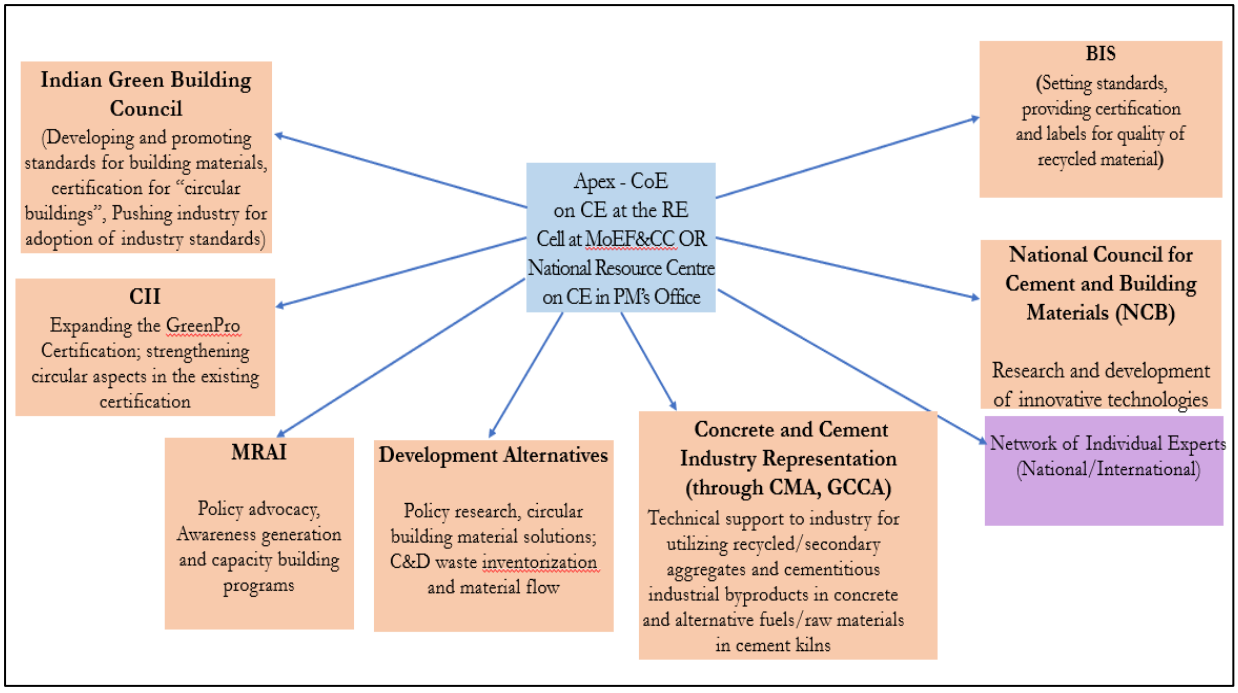


Figure 21: Architecture of CoE that could look at Construction as a Priority sector to provide service on sectoral strategy

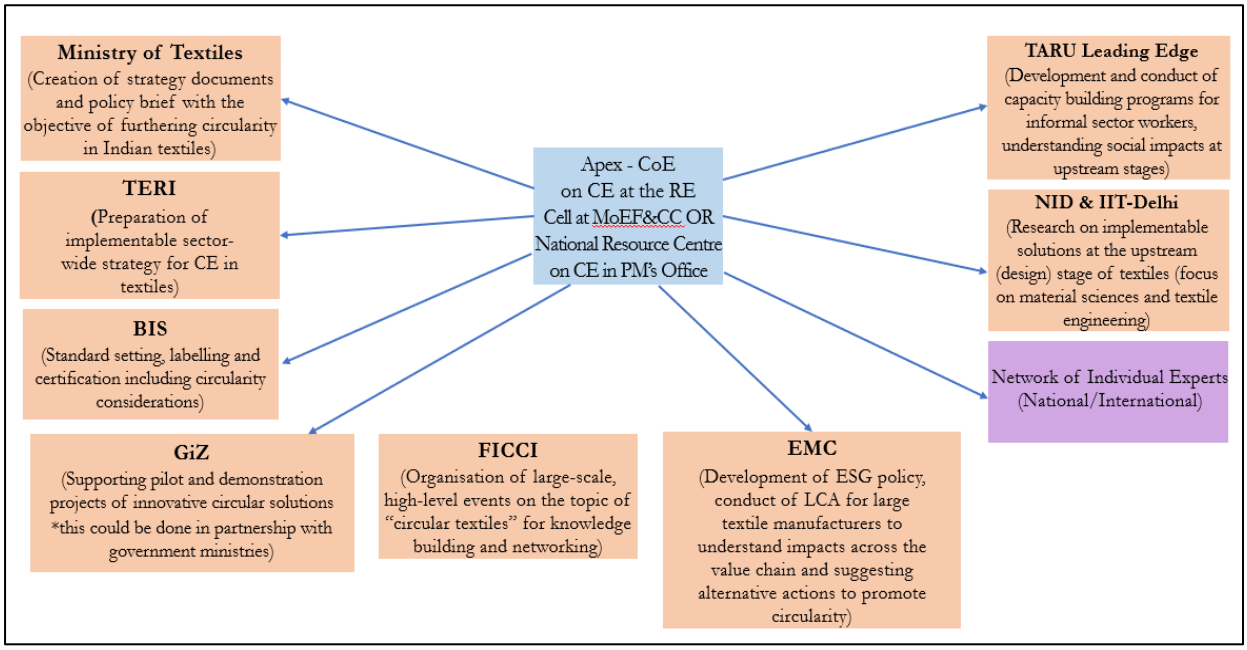


Figure 22: Architecture of CoE that could look at Textiles as a Priority sector to provide service on sectoral strategy

11.1.1 Recommended Location of the Centre

Given the proposed architecture, a "clicks and mortar" model would work best for the CoE. This involves deciding a central physical location for the apex body and dedicated physical set ups within the nodal host institutes. In a case where it is difficult to establish a physical space for the CoE within a nodal host institute, a virtual mode can be considered. The location of the network can thus follow a hybrid model. To prepare for and deliver the services, access to the host nodal institutes laboratories and libraries would be enabled.

11.2 Networking Model

The CoE is envisaged to provide a networking solution. A sample framework that can foster networks is presented in Figure 23

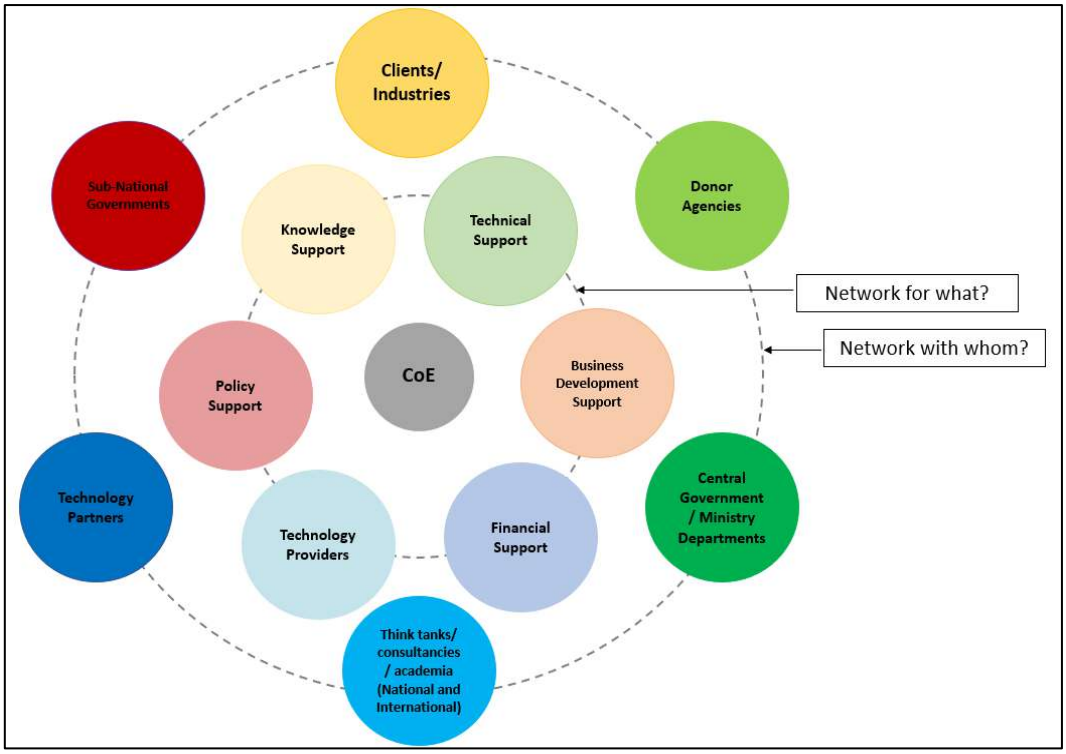


Figure 23: Networking Model for the CoE

The CoE can harness the strength of the network that it builds to provide tangible solutions for the CE approach. For instance, if the domain of technology is considered, the CoE will have in its network R&D institutions that focus on the development of new circular technologies, incubation labs that find solutions on how a particular technology can be made implementable, industries that incorporate these technologies in their circular transition, and government ministries that can implement policies around technological acceleration. The CoE can leverage the strength of its network and connect relevant nodes to one another, thus providing a holistic and overarching inclusion of technology into CE. Furthermore, the CoE can also identify areas (or entry points) where there will be a need for technological development in the future. This sort of macro-level analysis can be fed into nodal host institutes having a technology or innovation wing, thus ensuring that the CoE is future ready.

11.3 Governance Structure

The CoE needs to be agile, innovative, and well-governed. In order to ensure that the CoE achieves its objective, it is of utmost importance to keep red tape and bureaucracy at the minimum. The CoE's inner governance structure must be clearly laid out. There should be clearly defined accountability and role structures in the Center.

- The Apex body of the CoE will have the main objective of oversight, coordination, guidance, and management. The apex body of the Centre will remain lean and act as an overlooking authority providing the technical guidance required to facilitate work amongst the host network
- The network of host nodal institutes could bring in the thematic/sectoral focus, expertise on tools, and experience on services. Rather than a vertical hierarchy, these will function more as horizontal partnerships, supporting and helping strengthen each other's work.
- Appropriate contractual arrangements are to be signed between the Apex and nodal host institutes.

Infrastructure and Administrative Requirements

Human Resources

- In Year 1, the apex body is proposed to have a technical staff strength of 5-6 members, and an administrative staff of 2-3 members. 8-9 experts in total are proposed to be positioned at nodal host institutes.
- In Year 2, the strength at the apex body is proposed to increase to 11-12 technical staff and 3-4 admin staff, with a total of 16 experts at nodal host institutes.
- In Year 3, the strength at the apex body is proposed to increase to 15-16 technical staff and 5-6 admin staff, with a total of 20 experts at nodal host institutes.
- Having 3–5-year contracts instead of long-term commitments could be a good strategy. Skilled experts can be pulled in from cross-sectional fields.
- The Head of the CoE should come from academic/professional background with no less than 15 years of work experience.
- The founding team of the CoE should be composed of members who have combined overall experience of minimum 30+ years in the field of research & innovation and capacity building. Members of the team should individually have an experience of no less than 5 years in the specified or allied subjects. At least 2 of the core team members of the CoE must have 10+ years of experience in the focus subject or its allied fields

Infrastructure

- There should be a physical space within the Apex and at the host nodal institutes dedicated to the functioning and activities of the CoE
- For work related to the CoE's projects, access to digital libraries and other technical infrastructure like laboratories within the nodal host institutes should be open.

Steering Committee

- The CoE will be annually monitored by a suitably appointed Steering Committee which will also provide strategic direction and have oversight on the finances of the CoE.
- The Steering Committee can follow a MRV framework to track progress against set targets.
- The Steering Committee can also recommend exit and entry of nodal host institutes if progress is not satisfactory and aims and key performance targets are not met.
- Stringent external renewal/continuation evaluation is to be performed in year five that looks into outputs, outcomes and (expected) impact of the CoE.

Stakeholder Platform

- The CoE could establish a Stakeholder Platform, that enables steering and coordination of nodes, helps in gathering insights into work done in sectoral areas and the sector-specific tools that are in use today.
- All key stakeholders can be members of the Platform.

Roles and responsibilities of the stakeholders mentioned above are more clearly laid out in Figure 24.

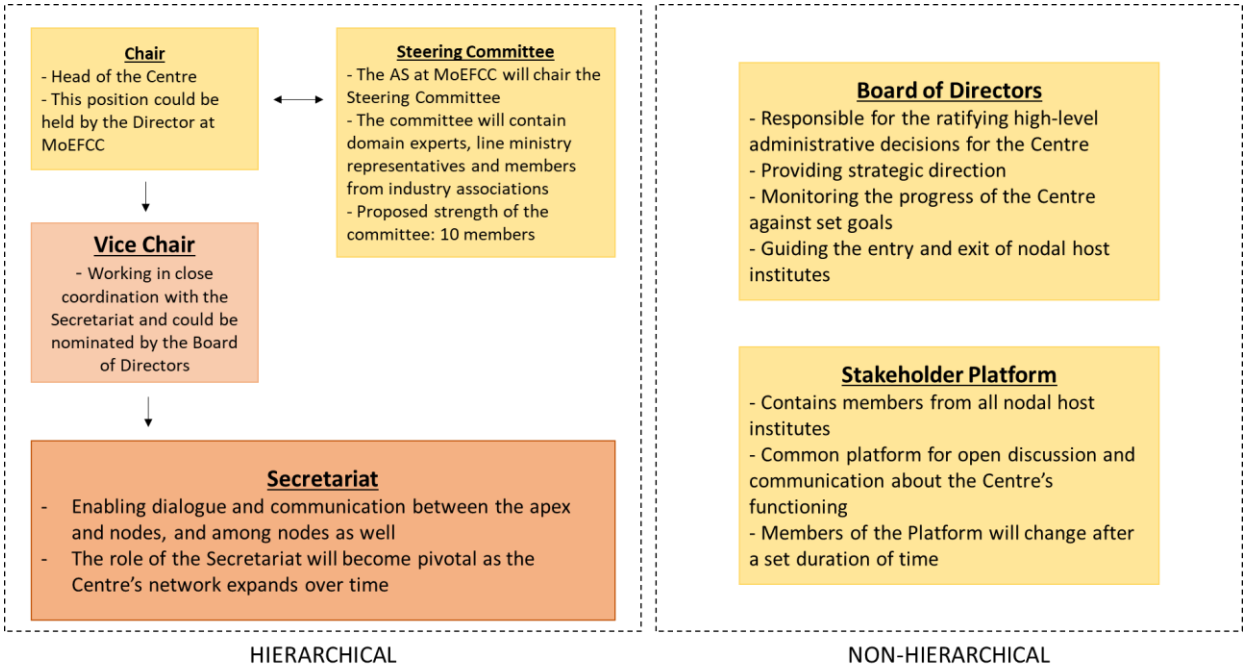


Figure 24: Governance Structure of the CoE

11.4 Roll-Out Plan for the Services

The prioritisation of services and sectors done in Section 10.5 was basis the relevance and urgency in Indian context of these services and with an objective to provide the CoE with a suggestive direction in starting the services. A structured roll-out of the 11 services and 3 sectors has been attempted in Table 7. The roll-out of all priority services has been spanned over a period of 3 years. The motive behind this time frame was to allow a structured and phased out service provision plan with important activities to begin operations in the immediate time frame after the CoE is established. Preparatory activities will be undertaken before each service is rolled out.

Boxes marked in green indicate the kickstarting of a particular service/sectoral effort. This includes figuring out logistics, setting project timelines, estimating costs, etc. Since all services and sectors cannot be kickstarted from Year 1, a stepwise approach has been followed, with activities having the utmost urgency marked to kickstart from the first year. Boxes marked in yellow indicate that work is in progress for the project, thus showing a developmental stage. Boxes marked in blue indicate that work is likely to have completed certain important milestones and is reaching maturity. This would also make it safe to assume that the stage of the activity marked with blue is when it is likely to start yielding revenues. Boxes marked with grey indicate activities that are kickstarted together. As mentioned in Section 10.5, Prioritised service 3: "Preparing sectoral strategies in reaching 2070 net-zero target through the CE approach" and the priority sectors are interlinked in nature. Thus, these activities will be rolled out jointly.

Table 7: Roll-Out Plan for Services

Type of Activity ↓	Elaboration of Prioritised Service/Sector ↓	Year 1	Year 2	Year 3
Prioritised Services	*Coordinate and work with local and state governments to foster circularity at sub-national levels*			
	Build regulatory/policy sandboxes for testing policy instruments by working with various line ministries			
	Preparing sectoral strategies in reaching 2070 net-zero target through the CE approach	CE in **Plastics** sector kickstarted through sectoral strategy	CE in **Construction** sector kickstarted through sectoral strategy	CE in **Textiles** sector kickstarted through sectoral strategy
	Designing financing models/instruments to foster a transition to CE			
	Measure a nation's progress on CE			
	Lead and guide setting up of industry bodies that will facilitate focused and structured approach to key CE aspects, such as a Remanufacturing Council			
	Leading and guiding the development of and delivering need-based innovative training modules including those for senior government officials			
	Technical Guidance to setting up of circular economy parks/ Industrial parks integrating circularity and development of ESG policy			
	Create innovation spaces (IS) like fab labs, makerspaces, hackerspace, living labs, and coworking spaces to strengthen innovation capacities			
	Drive and support supply chains in becoming more circular			
	Provide technical assistance for developing and implementing circular economy-based pilot and demonstration projects			
Target Sectors	*Plastics*	CE in Plastics sector kickstarted through sectoral strategy		
	Construction		CE in **Construction** sector kickstarted through sectoral strategy	
	Textiles			CE in **Textiles** sector kickstarted through sectoral strategy

11.5 Service Delivery Model

The CoE could provide some services directly through its apex body, like designing and conducting awareness generation programmes and "Training of Trainers" workshops. A majority of the identified services will be delivered through the expertise of the nodal host institutes. For instance, a nodal host institute with experience and expertise in the area of resource efficiency technologies, could conduct Cleaner Production Opportunity Assessments. An institute specializing in design could provide services on

design for sustainability for plastic packaging. The CoE may also outsource certain services which will command a management fee (between 10-30%).

Some services can be provided through government or regulatory agencies or financing institutions. For instance, setting standards for recycled content with BIS, working with financial institutions/investors for facilitating access to finance for circular pilot projects/demonstration projects. Setting up Standard Operating Procedures for (common) circular infrastructure is another service that a regulatory body could provide for the CoE. National and international partners could pitch in by identifying and setting up Circular Business Models and Enterprises.

11.5.1 Modes of Service Delivery

The identified services can be delivered through different mediums, which are highlighted in Figure 25.

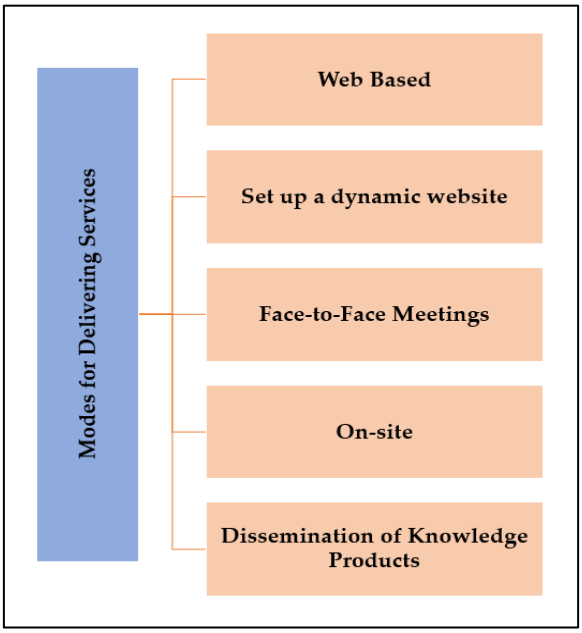


Figure 25: Modes of Service Delivery

11.6 Top level view of the Centre of Excellence on Circularity in India

The previous sections clearly suggest that a CoE can provide assistance in bringing CE into policy formulation, supporting design of the specific policy instruments, and also enabling in the actual implementation of the policy through the key service buckets identified in the previous section. The provision of the services will integrate dialogues, discussion, and research. Figure 26 presents a schematic describing a top-level view on circularity.

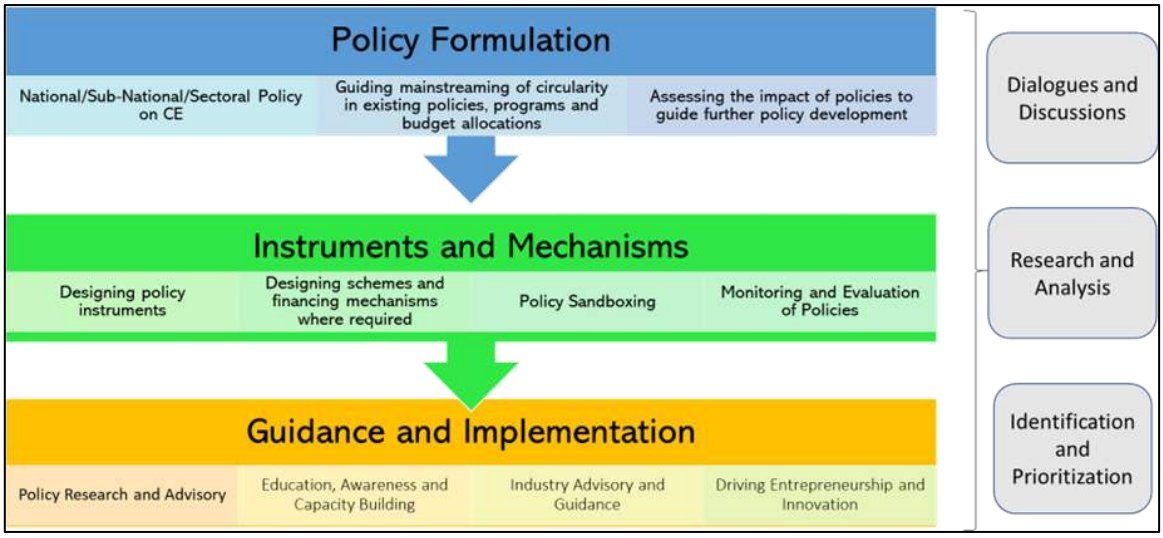


Figure 26: Top-Level View of the CoE on Circularity

11.7 Cross Cutting Enabler of Service Buckets-Partnerships and Collaboration

It was observed that the offerings of the CoE under each of the four service buckets mentioned in Section 10.2 could be strengthened by collaborating and partnering with the right institutions and organisations. Hence, "**Partnerships and Collaborations**" was identified as a cross cutting enabler.

11.7.1 Nature of Partnerships and Collaborations

The partnerships and collaborations that the Centre initiates could be in the form of:

1. Tie-ups- For example with incubators, entrepreneurs, and support organisations
2. Collaborative research exploring CE in materials and related technology
3. R&D centric tie-ups for circular products and solutions
4. A comprehensive and extensive data repository with contributions from industry players and associations
5. Collaborations with social partners who are directly impacted by the demerits of a linear economy (for instance, waste workers) in order to design inclusive circular strategies and solutions

11.7.2 Scope of Partnerships and Collaboration

The CoE can focus on building national partnerships and collaborations in the initial years post its establishment. Upon reaching a certain degree of maturity in operations, the CoE can extend its reach to the international domain. This would open avenues and opportunities for:

- Drawing learnings from international best practices for policy
- Co-development of circular solutions with recognised global institutes
- Engaging in feasible models of technology transfer
- Channelizing global investment in Indian circular business models
- Fostering CE in global supply chains by guiding circular trade
- Promoting innovation through knowledge exchange

12. Financial Plan and Sustainability

12.1 Financial Landscape

To succeed in the long-term, the CoE should identify its funding sources and build a network of CoEs across India (both new ones and expansion of existing ones). This will require a significant amount of money. Not just for their set up, but also for their operation and maintenance in the long run. There is also a need for long-term investment in CoE for research, innovation, and sustainability. The CoE should look

at running itself in a financially sustainable manner over time (say within 3-4 years) and not depend solely on government grants.

In the presence of national and international competitors, it is important to invest in the quality of services that it delivers. Some funding would also be required to support and spread awareness of the need and role of CoE. Availability of funds and created opportunities will not only attract excellent human resources but also create jobs for the new and emerging researchers.

Figure 27 presents the Financial Landscape for the proposed CoE.

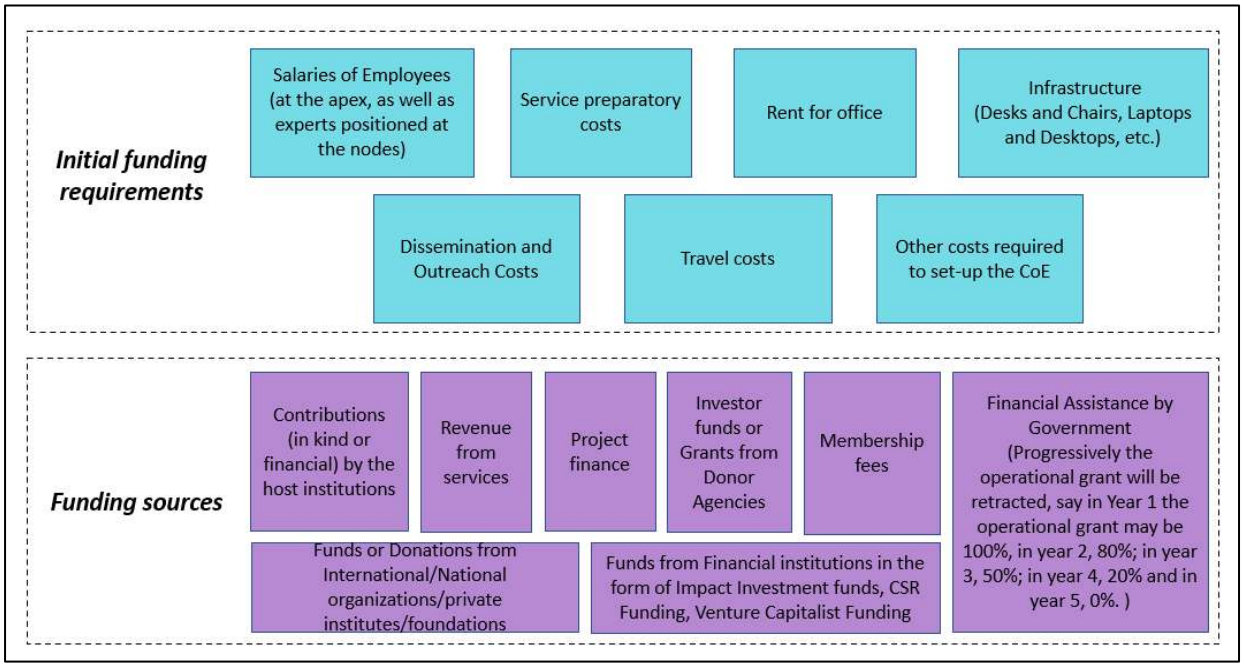


Figure 27: Financial Landscape for CoE

The CoE will receive funding from various sources, as mentioned in Figure 27. The funds from the line ministries will constitute a key source here. These funds received by the CoE will flow through the apex body to the concerned nodal host institutions. Figure 28 presents a structured approach describing the flow of funds within the CoE's network. It will be the responsibility of the Chair in consultation with the Steering Committee to decide the proportions of funds that each node will receive. This will be discussed in the form of a quarterly plan which will be prepared by the Chair and Vice Chair, which will require approval from the Steering Committee to be finalized.

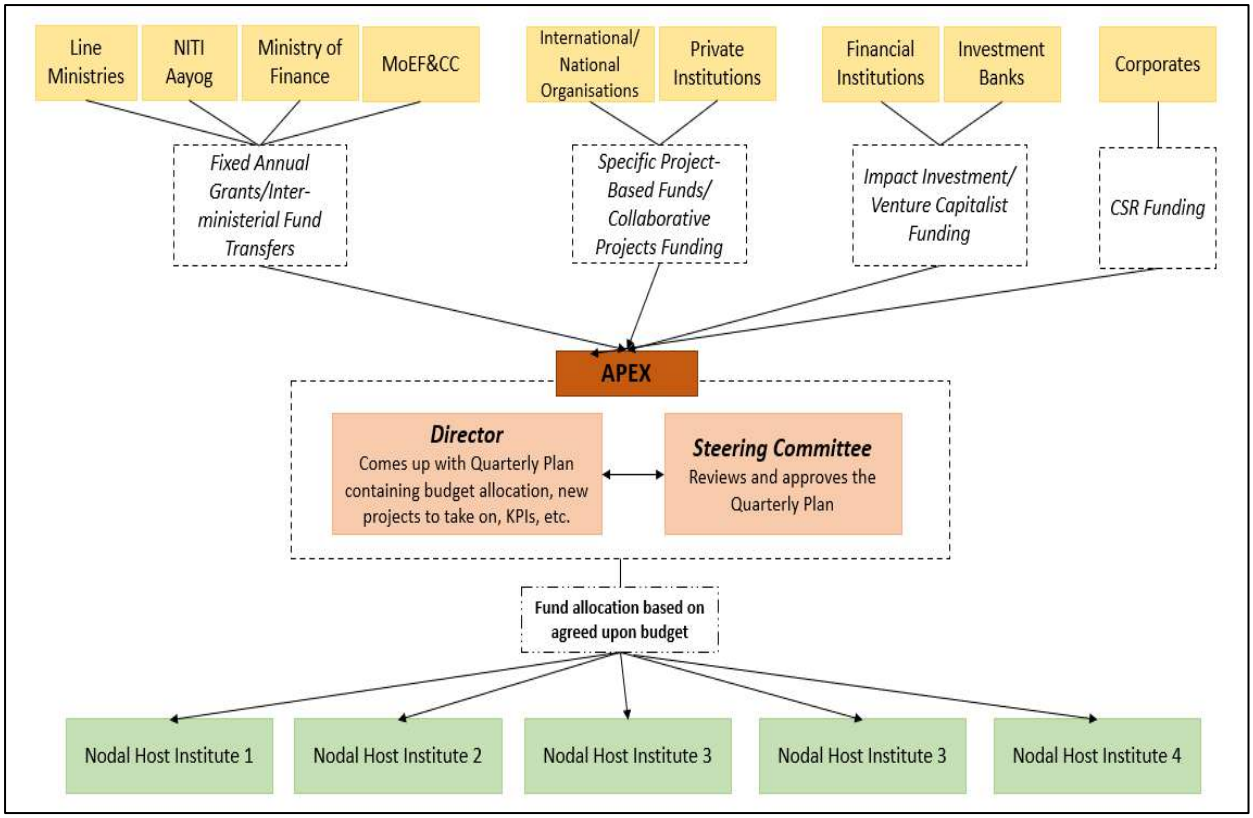


Figure 28: Structure of Funding Sources

12.2 Revenue/Income Generating Services-Models

The possible revenue/income generating service models are presented in Table 8.

Table 8: Revenue/Income Generating Models

Revenue Model	Description	Examples
Fixed Fee Based Model	Service is offered against a specific fixed fee. Fee escalation is solely dependent on scale and complexity of service.	Any advisory /policy research/ knowledge product preparation/accreditation services/capacity building programs
Performance Based Model	Performance fee is only payable by client if the service engagement is a success. Also known as Success Fee.	Assistance in getting financial support from Banks/ Impact funds
Fixed fee + Success fee - Mix Model	Small fee is charged upfront. Later once the service engagement becomes successful, a performance fee / success fee is paid. Fee escalation is solely dependent on scale and complexity of service.	Facilitating Brokering/Technology Transfer Resource efficiency and circular economy demonstration projects
Associate Model	When Host Institutes bring in clients to the Centre, against this, they receive a percentage as 'finding fee'. Plus, they receive a fixed remuneration dependent on their involvement in the provision of such services	Consultancy assignments

Professional Fees Model	CoE may offer certified training of trainer program. The revenue is generated in three forms in such a model: Stream or Revenue (SoR)1: Enrolment fee – the candidate pays a lump sum amount for enrolment into the program against enrolment, course content, classroom teaching, site visits etc. SoR2: Exam fee – the candidate pays for exam venue and cost towards hiring examiners / invigilators SoR3: Recertification fee – a period of validity may be decided for each certificate, beyond which the candidate has to reappear in the exams and pay the exam fee or pay a certain fee to renew his/ her certificate. This will become a recurring revenue source for the CoE	Circular Economy certification that is like a catalytic enabler for upskilling and reskilling professionals wishing to boost their career in circular economy space
Subscription Model	The CoE may allow membership from individuals, industries and other institutions. A membership fee may be charged against such membership. The members in turn, may enjoy the benefits of the services offered by CoE at a much-exempted price. This will become a recurring revenue source for the ECAC.	Membership program for MSMEs
Contract Research and IPR Model	The CoE may be hired by third party agencies for conducting research on their behalf. Also, CoE may develop patents around innovative services or products and enjoy the IPR associated.	Professional fees
Fund Manager's Fee Model	If CoE is entrusted with a fund, say for implementing circular economy-based pilot projects, CoE may charge a certain percentage as fund manager's fee, to be accrued on the interest of such principal amount. This fee usually varies between 0.5%-1% of the total principal amount. This may or may not include brokerage commissions.	Fees from Impact Funds

12.3 Estimating the costs and potential revenue for the CoE

This report aims to follow a comprehensive approach towards designing a framework for the CoE on Circularity. Hence, it becomes crucial to estimate the costs incurred due to the establishment of such a Centre. A cost calculation exercise was undertaken in this regard, and an attempt was made to arrive at a ballpark figure on how much the CoE would cost in its first three years post establishment. It is important to note figures presented in this exercise are suggestive and based on certain assumptions. Furthermore, the cost has been calculated for the Apex body of the CoE only, as it is assumed that in initial stages, service delivery support extended by nodal host institutes will be in the form of in-kind contributions. Once the CoE is well-established and financially sustainable through its revenue generating sources, a fixed percentage of the gains in profits can be allocated to each of the nodal institutes, while the remaining can be retained by the CoE to supplement its functioning.

To estimate the overall cost for the CoE, various **cost heads** were identified. These include the **salary costs, initial service preparatory costs, rents, infrastructure, travel** and **outreach costs**.

The major element of operating cost is the remuneration paid to the Staff that manages and delivers services of the CoE. With increase in the staffing of the apex over the years, the cost incurred to meet the remunerations of the staff will show an increase year-on-year. The apex body of the CoE will need to bring

a fresh set of experts on board, who will be permanently positioned at the apex. These staff members will be involved in the provision of some services first-hand but will also coordinate with host institutes and oversee the service provision by these institutes. Host institutes will provide one dedicated senior expert for the provision of targeted services. The cost calculation considers the salaries of one expert from each of the nodal institute. Additional staff and experts from the nodal institute may be involved as per the service requirements and their professional fee would be covered through the revenue generated from the service.

Service preparatory costs are the cost attributed to preparation of materials/ know how / expert consultation etc. required before delivering the services.

Rent paid for Office Space and Capital and Operating cost (or rental) of miscellaneous infrastructure that are essential for setting up the CoE have also been included. In Year 1, it is assumed that the rentals are waived by the apex and nodal institutes. Second year onwards rentals will be levied. The exercise refrains from calculating rent for Years 2 and 3, as the amount will vary on a case-to-case basis.

The estimated costs basis certain assumptions is presented in Table 9.

Table 9: Estimation of Cost incurred by the CoE (First 3 Years)

Cost Heads	**Assumptions**	**Year 1**	**Year 2**	**Year 3**
1. Salaries	The apex body of the CoE will have a total of 19 staff members over 3 years. However, as staff is employed in a phased manner, Year 1 will have- 1 head/director, 2 senior staff members, 3 junior staff members and 2 admin staff. The head/director will receive 36L as annual salary, senior staff will receive 30L as annual salary, and junior staff will receive 18L as annual salary and admin staff will receive 10.8L as annual salary. Each host institute will have one senior expert, whose salary will be funded to begin with @30L per year and there will be 8 host institutes to begin with in first year	₹ 4,11,60,000.00	₹ 9,48,00,000.00	₹ 16,42,80,000.00

2.Initial Preparation Cost & Contract Cost	The CoE could start with provision of 5 key prioritized services (4 sector agnostic services and one sectoral focussed service). The preparatory costs have been mapped between INR 5 lakhs and 8 lakhs. A similar composition will be followed for year 2 and 3. The CoE will provide 9 services by year 2, and 11 by year 3. However, preparatory costs will only be incurred for fresh services.	₹ 34,00,000.00	₹ 34,00,000.00	₹ 21,00,000.00
3. Rent for Office	In first year, the CoE Apex operates out of the MoEF&CC Office and for the nodal institutes in the network, existing available space if provided free of cost for the first year. In the subsequent years, rental amount would be charged, which will be determined on case-to-case basis.	₹ 0.00	***will vary on a case-to-case basis.**	***will vary on a case-to-case basis.**
4. Infrastructure	The staff members will need technical (laptops/desktops) and physical (desks and chairs) infrastructure. The cost of a laptop has been taken as Rs. 60k, one desk as Rs. 6k, and one chair as Rs. 5k.	₹ 11,36,000.00	₹ 9,94,000.00	₹ 6,39,000.00
5. Travel	A lumpsum amount of Rs. 10,00,000 will be required for all travel related to the CoE in the first year.	₹ 10,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00
6. Outreach Events and Workshops	Outreach and knowledge dissemination to stakeholders about the CoE will need to be done in the first. 2 workshops, 1 physical and 1 online will be conducted every month. The cost of organising the physical workshop has been taken as Rs. 2L and online	₹ 25,20,000.00	₹ 25,20,000.00	₹ 25,20,000.00

	workshop cost has been taken as Rs. 10k. Creation and maintenance of website and server and establishing and running an IT based knowledge Network between stakeholders (stakeholder platform) cost is taken to be a lumpsum of Rs. 10 lakhs			
7. Cost towards subscription of Data bases and software	This would be helpful in preparing knowledge products to guide technical inputs and building capacity of stakeholders. It is being estimated as a lumpsum cost	₹ 10,00,000.00	₹ 10,00,000.00	₹ 10,00,000.00
Sub-total of Costs for CoE in Years 1, 2 and 3:		**₹ 5,02,16,000.00**	**₹ 10,37,14,000.00**	**₹ 17,15,39,000.00**

In this costing model, grant/subsidy could be included in four ways:

- As a Grant in Aid to CoE to make it financially feasible
- As a Technical Assistance (TA) to develop internal capacity of Staff member or to purchase infrastructure,
- As a Subsidy to lower the service delivery fees (for e.g. providing training to MSMEs at lower fees) or
- As a Grant in Aid to meet initial preparatory costs.

Potential revenue for the CoE from some key services for the first three-year period is presented in Table 10. These revenue estimations are aligned to the priority services and sectors identified in Section 10.5. In addition to this estimated revenue, there would be other services that will be offered over the years. Newer sources of revenue would also emerge that would increase the total revenue generation of the CoE.

Table 10: Estimation of Revenue from some key services (First 3 Years)

	Number of assignments			**Per assignment cost**	**Expected revenue generation**		
	Year 1	**Year 2**	**Year 3**		**Year 1**	**Year 2**	**Year 3**
State Level CE Action Plans	5	8	10	₹ 25,00,000.00	₹ 1,25,00,000	₹ 2,00,00,000	₹ 2,50,00,000

Ministry level policy support including regulatory sandboxing	5	8	8	₹ 30,00,000	₹ 1,50,00,000	₹ 2,40,00,000	₹ 2,40,00,000
Knowledge partnership with CE parks	5	5	5	₹ 18,00,000	₹ 90,00,000	₹ 90,00,000	₹ 90,00,000
Sectoral level standards and benchmarks on resource efficiency and circularity	4	6	8	₹ 18,00,000	₹ 72,00,000	₹ 1,08,00,000	₹ 1,44,00,000
Capacity building and training programs	3	5	8	₹ 10,00,000	₹ 30,00,000	₹ 50,00,000	₹ 80,00,000
Inclusive engagement with the informal sector through preparation of model MoUs with the urban local bodies or private sector	5	10	15	₹ 8,00,000	₹ 40,00,000	₹ 80,00,000	₹ 1,20,00,000
Sub-total (of potential revenue generation)					₹ 5,07,00,000	₹ 7,68,00,000	₹ 9,24,00,000

13. Monitoring Framework

13.1 Monitoring of the Functioning of CoEs

A framework of assessment to review the functioning of CoEs and keep a check on the quality is crucial.

Once funded, evaluations can be conducted through annual financial and operational reviews, mid-term evaluations focusing on certain outputs, and final evaluations focusing on results and impacts. Results may be used to inform future funding decisions. CoEs may be subject to a reduction or increase in funds during the funding term depending on performance.

Along with this framework, a monitoring mechanism to ascertain the delivery by each institution in fulfilling the functions of CoE. In case of performance below standards or any other issues pertaining to funds utilisation, the identified CoEs can be derecognised.

13.2 Key Performance Indicators

The key performance indicators could be categorized into Output and Impact based.

The output based KPIs include:

- Number of circular economies focused project proposals submitted
- Number of state/local action plans/roadmaps on CE prepared/initiated
- Number of trainers (individual or institutes) accredited
- Number of publications
- Number of projects initiated through collaboration with other institutes
- Expansion in links and partnerships between universities, research institutes, the enterprise sector and the public sector
- Number of requests for services received
- Number of registrations in CE-related learning platforms
- Number of Stakeholder Consultation workshops organised

The Impact based KPIs include

- Total investment in CE-driven businesses (in crores)
- Total investment in R&D for CE (in crores)
- Total investment in circular technologies (in crores)
- Total investment in (common) circular infrastructure (in crores)
- Revenue growth of CE start-ups ('x' years after establishment)

13.3 Efficiency and Effectiveness of CoE

It would be important for the CoE to ensure a balance between efficiency and effectiveness. To ensure efficiency, the focus should be on first order learning on a routine basis which is an incremental conservative process that serves to maintain stable relations and sustainable existing rules (March 1991, Burton et al 2011). Effectiveness, on the other hand, refers to second order learning with new rules and knowledge (Burton et al 2011 13). A balance between the two is likely to contribute towards both the demand and supply side of CoE.

The CoE also needs to build trust in service delivery and regularly update their customers, upgrade their services to meet changing pace and build trust in delivering what is promised for, can also enhance sustainability.

CENTRE FOR EUROPEAN POLICY STUDIES

CEPS is a leading independent think tank in Europe with focus on policy research covering a wide range of areas including circular economy. It is a non-profit international association under the Belgian law (AISBL), governed by its statutes (dated 11 April 2006). CEPS fellows are encouraged to participate in public debate. The Centre achieved the 1-star Ecodynamic Organisation Label accreditation in March 2022

Year of Establishment: 1983

Core Mission: To conduct state-of-the-art policy-oriented research, addressing the challenges facing Europe.

Governance

CEPS has a Board of Directors and two management committees: Research and Operations. Specific units cater to different Domains like energy, and economic policy. The Head of Research decides the research topic under each of the respective Domains

Board: Includes independent personalities with broad research and policy experience. The Board provides the strategic direction to the organisation and supervises the work of the management team and the financial performance of the organisation.

The Centre has a Chief Executive Officer, Director of Research and Research staff (more than 50 in capacity)

CEPS offers different kinds of membership and attracts small amounts of grants, e.g., from Central Banks. The Centre relies on a broad and stable membership base to support their mission and to serve as a crucial sounding board to test the feasibility of our policy recommendations. Membership is extended towards corporates, institutions and individuals.

Official Points of Contact

Email id: info@ceps.eu
Website: https://www.ceps.eu/about-ceps/
Annual Report 2021: https://annualreport.ceps.eu/wp-

Services

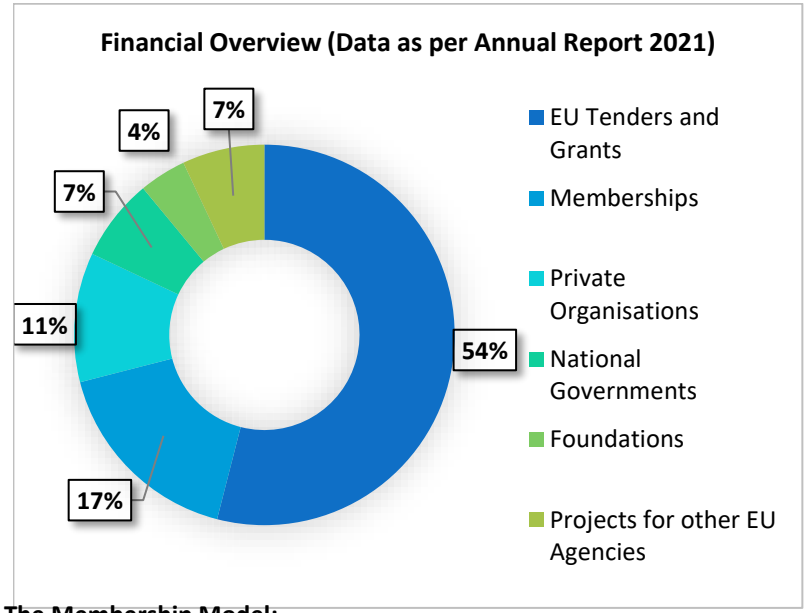
CEPS offers knowledge exchange, provides insights on and potential solutions for EU policymaking through:

- Research projects (through bidding process)
- Research publications
- Task Forces
- Regular events (online and offline) such as discussion forums, webinars and seminars, workshops, networking receptions
- Flagship events
- Ideas Lab

Areas of Focus/Current Service Provision Areas

- Circular Economy Business Models
- Traceability across circular value chains
- Waste Management- Electric and electronic equipment & agri-food chain value chains

Financial Outlook



EU Tenders and Grants -Largest source of revenue generation (54%)

Membership- Second largest source of revenue generation (17%)

The Membership Model:

- Contains 3 types of membership- Corporate Membership, Institutional Membership & Individual membership. Each type has a membership fee.
- Members provide expertise and practical experience and act as a sounding board for CEPS policy proposals.

LEIDEN-DELFT-ERASMUS CENTRE FOR SUSTAINABILITY

Leiden-Delft-Erasmus Centre for Sustainability is an independent interdisciplinary academic research centre.

The centre was founded by three universities, Leiden University, Delft University of Technology and Erasmus University Rotterdam to work together having a common goal of the circular economy.

Year of Establishment: 2012

Core Mission: To accelerate the transition to a circular economy in order to achieve a sustainable society

Funding

- Co-funded by the three universities.
- Revenue from research projects

Official Points of Contact

Email id: Dr Arnold Tukker (Professor of Industrial Ecology, Leiden University): tukker@cml.leidenuniv.nl

Website: https://www.centre-for-sustainability.nl/about-us

CML Institute: https://www.universiteitleiden.nl/en/science/environmental-sciences

Centre for Sustainability
Einsteinweg 2,2333 CC
Leiden, Netherland

Knowledge and Innovation Hubs

The Centre is very student focused and delivers research through three knowledge and innovation hubs. The Hubs operate within open research formats connecting Master Students, Researchers, Municipalities, and Businesses.

- **Cities Hub:**
  - **Core themes:** Circular Urban Economy, Integrated Urban Development following an Area-Based Approach, Doughnut Economy for the Zuid-Holland region
  - The Hub's work is focused on SDG11 (Sustainable Cities and Communities)
  - Facilitates practice-oriented research and education
  - Provides the platform to collaborate with LDE researchers
- **Agrifood Hub:**
  - **Core themes:** Circular horticulture, protein transition & sustainable value chains, digital foods and the global south
  - Looks at the complete value chain of the agri-food system, from soil to breeding, growing, processing, logistics, retail, food service, and the consumption of food
- **Industries Hub:**
  - **Core themes:** Electronics, Automation, Healthcare, Bio-Economy, & Renewable Energy
  - Brings together expertise in Industrial Design Engineering, Industrial Ecology and Supply Chain Management from the partnering universities

Every Hub has its own coordinator who helps to formulate the scientific research themes. Thesis themes form the framework in which the master students can conduct their master thesis research.

Student Boards organize events like the Master Thesis Market, in-house days or business challenges with companies, lectures, and movie nights, across four cities - Leiden, The Hague, Rotterdam, and Delft.

Governance

- **Board**: The board consists of a Scientific Director & a Vice Director.
- **Daily Management Team**: This team includes a Centre Manager, a Program Manager for Interdisciplinary Education and a Communications and Knowledge Manager
- **Hub Teams**: Each hub has a Scientific Chair, a Vice Scientific Chair, a Scientific Coordinator and a Student Assistant.
- **Student Board**: An active committee consisting of students (Bachelors and master's level) from each of the LDE universities spread over cities.

Institutional Structure

- There is no physical space or separate physical infrastructure created.
- Respective university representatives for the Centre meet every few weeks to discuss the plan of activities for the Centre

CIRCULAR ECONOMY RESEARCH CENTER (CERC)

Circular Economy Research Center (CERC) is an independent research institute that focuses on the circular economy. It was established by the Ecole des Ponts Business School. It is one of the 231 signatory parties to the Declaration of the Circular Plastics Alliance, which is an initiative under the European Strategy for Plastics (2018). The CERC is also participating in five EU Horizon 2020 funded projects with a direct link to the Circular Economy.

Year of Establishment: 2017

Core Mission: To strive for excellence and have acted in supporting the circular economy transformation process through education, training, and research.

Governance

The CERC team consists of a Director, a Senior Research Fellow, a Research Fellow, a Project Coordinator and a Communication Officer.

Official Points of Contact

Email ID: Ushma Upadhyaya (Communication Officer): u.upadhyaya@circulareconomyalliance.eu
Website link: - https://pontsbschool.com/faculty-research/circular-economy-research-center-cerc/#

Paris Campus:
6 place du Colonel
Bourgoin
75012 Paris - France

Services

- **Research**: CERC actively participates in EU funded research projects by the Marie Skłodowska-Curie RISE action. Under Horizon 2020, CERC participated in the following five projects:
  a. **CE-IoT:** CE-IoT aims to develop an innovative framework for the interplay between Circular Economy and IoT (Internet of Things).
  b. **IDEAL CITIES:** IDEAL-CITIES aims to provide a novel, open and extensible platform to enable secure, resilient acquisition and sharing of information to improve the well-being and inclusivity of citizens, producing a more effective response to crime or other emergencies to make citizens safe & secure. IDEAL-CITIES will form an exploitation plan assessing the potential availability and a strategic conclusion for each of the business imperatives of the Smart City Value Chain.
  c. **SmartShip:** SmartShip aims to bring together Information and Communication Technologies (ICT) of focused Universities, Research Institutions and Companies oriented in the maritime sector to build a holistic integrated ICT-based framework for the sustainable, individualized and completely automated energy management of ships.
  d. **Bio-Phoenix:** BIO-PHOENIX aims to develop a bio-inspired paradigm for reconstructing nearly extinct complex software systems based on a novel computational DNA (co-DNA)-oriented systems modelling approach. The co-DNA will encapsulate logic and program code and will enable the use of analogues of biological processes for transmitting, transforming, combining, activating, and deactivating it across computational and communication devices.
  e. **I-BiDaas:** I-BiDaaS aims to empower users to easily utilize and interact with big data technologies, by designing, building, and demonstrating, a unified solution that significantly increases the speed of data analysis while coping with the rate of data asset growth, and facilitates cross-domain dataflow towards a thriving data-driven EU economy.
- **Events**: CERC has participated and supported several prominent events in the domain of circular economy. Some include:
  f. Presentation of research findings to the World Economic Forum's session, *Circular Economy's Frontier of Knowledge* in 2018
  g. Co-Chairing the *1st Workshop on Smart Circular Economy* collocated with IEEE DCOSS 2019
  h. Publicity partner for *Circular City Week* held in New York in 2020
  i. Speakers in the policy panel at the *Harvard Circular Economy Symposium* 2020

Research Partners

Multiple renowned universities and companies have partnered with CERC to conduct valuable research.

Some of CERC's research partners include the University of Cambridge, Bournemouth University, the Foundation of Research and Technology- Hellas (FORTH), the University of Manchester, Deloitte Belgium, Atos and many more.

PRODUCT STEWARDSHIP CENTRE OF EXCELLENCE

The Product Stewardship Centre of Excellence was founded by a consortium containing UTS Institute for Sustainable Futures, the Australian Industry Group and Cox Inall Dentsu in partnership with the Australian Government through the Department of Agriculture, Water, and the Environment. A grant through the National Product Stewardship Investment Fund facilitated its inception.

Year of Establishment: 2020

Core Mission: To accelerate the uptake of product stewardship in Australia by mentoring, educating, and activating stakeholders across product and material supply chains.

Governance

- **Team:** The Centre team consists of a total of 9 members- 4 Directors, 2 Principal Advisers, 1 Director of Communications, 1 Senior Adviser and 1 Business Engagement Adviser.
- **Specialist Advisers:** In addition to core Centre staff and associates, a group of Specialist Advisers is involved in projects, whitepapers, training, tools, and information resources across diverse areas of technical, environmental, commercial and legal expertise. Specialist advisers are engaged on a project-to-project basis.

Policy & Regulation in Australia

The Recycling and Waste Reduction Act 2020 provides regulations for voluntary, co-regulatory and mandatory product stewardship schemes. Voluntary schemes can operate independently of the Government or apply for accreditation.

Currently, in Australia, eight regulated and one voluntary accredited product stewardship scheme are in operation. Furthermore, 18 plus are unaccredited schemes and 13 are in development.

Services

The Centre provides services under four core areas:

- **Networking:** The Centre's Product Stewardship Network is a forum for organisations, including governments at all levels, developing and implementing product stewardship initiatives, programs and schemes to meet, share knowledge, learnings, experiences and connect with like organisations
- **Training and Executive Development:** The Centre runs a series of webinars, executive leadership courses and master-classes for decision-makers, executives and product stewardship practitioners in partnership with Australian Industry Group.
- **Mentoring Schemes and Business:** The Centre provides support and guidance to improve, develop and implement stewardship schemes, by bringing together and making available a panel of expert advisers.
- **Excellence and Awards**

Service areas covered by Specialist Advisers include Design, innovation, and alternative stewardship approaches, reuse, repair, recycling, and resource recovery, sustainability strategy and environmental management among many others.

2021 priorities

- Building networks and tools to support schemes, manufacturers, brands, retailers, distributors and industry associations to accelerate product stewardship
- Establishing training and executive development programs
- Establishing the Excellence in Product Stewardship Awards Program
- Creating and promoting compelling case studies showcasing stewardship solutions
- Reporting to the minister on product stewardship priorities
- Identifying new stewardship measures and interventions, including circular design processes to facilitate waste avoidance
- Encouraging voluntary schemes to become government accredited
- Engaging and educating businesses

Finance

The Centre operates independently through funding received from grant programs, membership fees, service fees and other sources.

Official Points of Contact

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John Gertsakis (Director): John.Gertsakis@uts.edu.au / john.gertsakis@uts.edu.au
Website link: https://stewardshipexcellence.com.au/
Annual Report: https://stewardshipexcellence.com.au/wp-content/uploads/2022/07/COE-Annual-Report-2021.pdf

THE BIOMIMICRY CENTER

The Biomimicry Center is a joint partnership between Arizona State University (ASU) in the USA and Biomimicry 3.8 (B3.8), that facilitates biomimicry education and research endeavours locally and globally.

The Center transcends traditional academic and institutional boundaries, engaging faculty, staff and students from numerous disciplines.

Year of Establishment: 2014

Core Mission: To enhance the ability to address a variety of sustainability challenges using methodologies inspired by natural systems.

Governance

- **Core Team**: The core team consists of 2 Co-Directors and 1 Manager. The Co-Directors oversee the Centre's educational programme and provide strategic direction and ideation to the Centre's research and outreach initiatives. The Manager handles the business and operational responsibilities for the Centre regarding outreach, education and research.
- **Advisory Board**: Board consists of 11 experts from renowned universities and companies having a solid background in biomimicry.
- **Affiliate Faculty**: More than 40 members from across the world are connected to the centre.

PO Box 873505
Tempe, AZ 85287-3505
(480) 727-0478

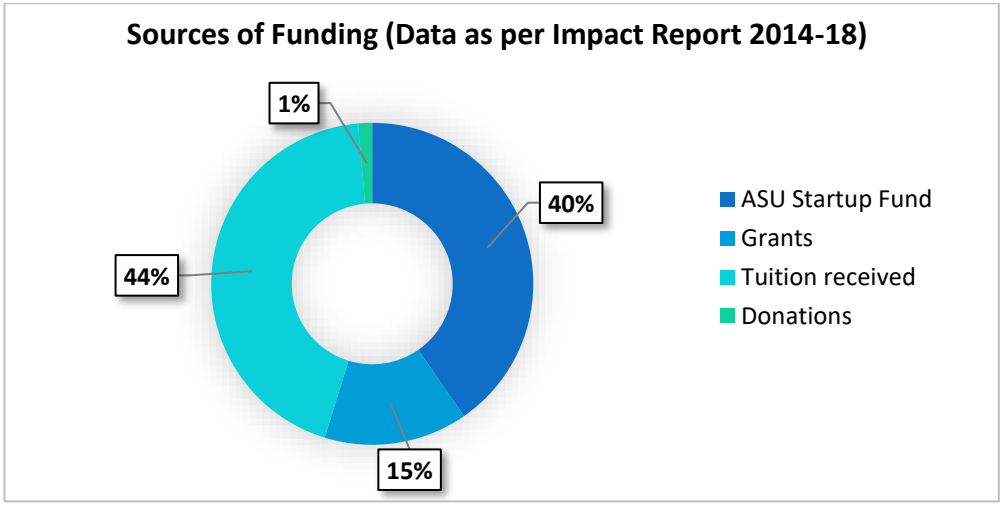
Services

- **Research Support:** The Center actively collaborates with academic institutes & corporates to grant or fund unique projects on biomimicry centre platform.
  The research conducted by the Centre is related to activities such as company research into biomimicry technologies, peer-reviewed articles exploring biomimicry methodologies and company sponsored research.
- **Education:** The Center offers educational programs for students and professionals across disciplines to learn how to create sustainable solutions.

Partnerships

Interdisciplinary partnerships include (but are not limited to) the Herberger Institute for Design and the Arts, College of Liberal Arts and Sciences, School of Sustainability, W. P. Carey School of Business, Ira A. Fulton Schools of Engineering, and School of Life Sciences.

Finance



Official Points of Contact

Email ID: Dayna Baumeister (Director): dayna.baumeister@asu.edu
Mary Kivioja (Manager): mary.kivioja@asu.edu
Website: https://biomimicry.asu.edu/
Impact Report (2014-18): https://biomimicry.asu.edu/wp-content/uploads/2018/11/TBCImpactReport14-18.pdf

THE UNIVERSITY OF AKRON BIOMIMICRY RESEARCH AND INNOVATION CENTER (BRIC)

The University of Akron (UA) Biomimicry Research and Innovation Center (BRIC) is an internationally recognized leader in the field of biomimicry.

BRIC is dedicated to connecting artists, businesspeople, designers, engineers and scientists to catalyse biomimicry-based innovation.

Year of establishment:

Core Mission: To become a driver for sustainable economic development in Northeast Ohio and beyond.

Governance

Four BRIC Principal Investigators and 32 core faculty members.

Finance

The Centre operates through funds received undergraduate and fellowship programs, biomimicry consulting services and other sources.

Official Points of Contact

Email ID: Peter Nowakowski (BRIC, Principal Investigator): phn@uakron.edu
Trisha Brown (Co-Director, Great Lakes Biomimicry): trishabrown@glbiomimicry.org
Website link: https://www.uakron.edu/bric/index.dot
Fellowship:
https://www.uakron.edu/bric/docs/Biomimicry%20Fellowship%20Program%20Info%20Packet_Oct%202019_rev2.pdf

Akron, OHIO 44325

Services

BRIC is in a strategic partnership with Great Lakes Biomimicry, which facilitates the co-delivery of the following services:

- **Professional Education:** Sessions range from lunch-hour presentations to half-day and two-day training programs and introduce the concept of biomimicry and industry-specific examples, emphasize the quantitative and qualitative value of implementation, provide training in how to apply biomimicry, and outline options for building capacity.
- **Innovation Services:** The client identifies a product, process or system design challenge, and front-end biomimicry consulting is provided.
- **Biomimicry Fellow Sponsorship Opportunities:** UA doctoral students each dedicate up to 20 hours per week to advancing biomimicry initiatives within their sponsoring organizations. Intellectual property originated, conceived or made as part of the Biomimicry Fellows' activities with the sponsors is owned by the sponsors.

BRIC independently delivers the following services:

- **Biomimicry Design Challenge Sponsorship Opportunities:** UA students enrolled in a one-semester Biomimicry Design Challenge course work on a sponsor-identified challenge.
- **Research and Tasking Services:** Allow an organization access to the intellectual expertise of BRIC faculty and staff.

Grad-School Fellowship

- The Biomimicry Fellowship Program was launched in 2012 by BRIC in collaboration with Great Lakes Biomimicry.
- Biomimicry Fellows are UA doctoral students who are supported through industrial assistantships with organizational sponsors, rather than through teaching assistantships or research grants.
- Over the course of a typical five-year doctoral program, Biomimicry Fellows dedicate up to 20 hours per week to advancing biomimicry initiatives within their sponsoring organizations.

Undergraduate Certificate in Biomimicry

- The Undergraduate Certificate in Biomimicry is designed to give students training and experience in the theory, methods, and practice of seeking inspiration from living systems to solve technical challenges.
- The Centre provides the following courses (worth 9 credits each):
  - Biomimicry Foundations
  - Technology-Based Startups
  - Biomimicry Design Challenge

CENTRE FOR SUSTAINABLE MATERIALS RESEARCH AND TECHNOLOGY

Centre for Sustainable Materials Research and Technology (SMaRT) was founded by ARC Laureate Fellow, Professor Veena Sahajwalla at the University of New South Wales (UNSW).

SMaRT works with industry, global research partners, not-for-profits, local, state and federal governments, on the development of innovative environmental solutions for the world's waste challenges.

Year of Establishment: 2008

Core Mission: To lead research programs that foster innovation and promote collaboration with industry and end-users to ensure the translation of scientific

Governance

- SMaRT has a Managing Committee that acts as an overarching umbrella, looking after the operations of the 3 SMaRT Hubs.
- A Hub's team generally consists of a Senior Research Fellow, an Associate Professor, a Research Associate, a Research Operation Manager and a Research Assistance.

Finance

The Australian government provides fixed funding, The Centre operates through government grants and funding (public funding schemes), collaboration fees via industry partners and other funding from private entitites.

Some Collaboration Partners

Moly-Corp (Australian Steel Manufacturer), Bradken (Mining equipment parts manufacturer and provider), Dresden (Eye-wear manufacturer and seller)

Official Points of Contact

Email ID: Farshid Pahlevani (Senior Research Fellow): f.pahlevani@unsw.edu.au
Veena Sahajwalla (Professor): veena@unsw.edu.au
Website: https://www.smart.unsw.edu.au/

Services

- **Research Programs:** The SMaRT Centre brings together the distinctive research capabilities of UNSW's academics and a track record of delivering research and technology suitable for rapid implementation. The research aims to foster the development of sustainable materials technologies and help industry and other stakeholders achieve better business and environmental outcomes.
- **Technology and Product Offerings:** The Centre employs its 'micro-recycling science' to research innovative approaches and technologies to reform various waste streams into value-added materials and products. Some of SMaRT's renowned technologies include:
  - Green Steel: Leveraging high temperature reactions in electric arc furnace (EAF) steelmaking to transform waste tyres and plastics in the production of high-quality steel.
  - Microfactorie Technologies: Technologies that use various, discreet modules to transform problematic waste materials, such as glass, textiles and plastics, into new value-added materials and products, such as engineered green ceramics for the built environment and plastic filament as a 'renewable resource' for 3D printing.
  - Surface Modification: A range of technologies related to improving the performance of hard surfaces. Using waste materials as layers, the Centre has been able to modify various hard surfaces such as steel with these new layers for improved outcomes of those surfaces.
  - Thermal Disengagement Technology (TDT): A micro-recycling technique to separate materials in complex polymer-laminated metal packaging waste. Dubbed Green Aluminium, an outcome of TDT can transform aluminium into a clean and green metal, allowing it to be extracted in a way that means it can be used as a high-quality material for manufacturing, while minimizing residual waste.

SMaRT Hubs

- **Sustainable Communities and Waste (SCaW) Hub:** The SCaW Hub is part of the second phase of the Australian Government's National Environmental Science Program (NESP). This hub is hosted by UNSW and led by SMaRT's founder. The Hub's main functions include coordinating research on reducing the impact of plastic and enhancing sustainable people-environment interactions, developing ways to minimise impacts of hazardous substances and pollutants, and delivering cutting edge technical capabilities, particularly in the fields of waste and materials processing.
- **ARC Micro-recycling Research Hub:** The Micro-recycling Hub is a five-year national program of research and development aimed to transform Australia's waste and resource recovery industry by equipping it with advanced manufacturing capability with a focus on small-scale manufacturing. The Hub is focusing on recovering valuable materials from waste batteries (with 90% going to landfill) and other wastes to help create national materials sustainability and accelerate efforts to reduce emissions and decarbonise for the future.
- **ARC Green Manufacturing Research Hub:** The ARC Green Manufacturing Research Hub, housed at the UNSW was launched by the Federal Government of Australia in 2015. The Hub's primary focus was on mixed waste plastic, textiles and metals. Creating a common space for manufacturing industries, the Hub investigates the transforming behaviour of waste materials under high temperature conditions. The Hub's work was concluded in 2020 with insightful research into the high temperature transformation of waste rich in plastics and metals.

CENTRE FOR RENEWABLE ENERGY SYSTEMS TECHNOLOGY (CREST)

CREST is the largest and leading UK sustainable energy research centre and a leading European academic group. The Centre delivers original research on the most progressive renewable energy technologies in collaboration with industry and international academic networks.

It is also the first centre in the UK to offer a postgraduate degree in renewable energy systems technologies (REST).

CREST is a member of the European Renewable Energy Centres Agency - a prestigious network of over 40 of the top renewable energy research centres.

Year of Establishment: 1993

Core Mission: To encourage cultural acceptance of new energy sources and continue to shape the sustainable energy landscape, supporting innovation, resourcing policy development, and increasing knowledge through proactive dissemination.

Governance

- The research team at CREST has Research Associates, PhD Research Students and Laboratory Research Managers
- The academic team at CREST has Lecturers, Professors and Readers

Official Points of Contact

Email ID(s): Dr. Ali Abbas (Research Associate): a.abbas@lboro.ac.uk
Alison Flitten (Center administration): a.c.flitten@lboro.ac.uk
Website: https://www.lboro.ac.uk/research/crest/about/

CREST Holywell Park
Loughborough University
Science and Enterprise Parks
LE11 3TU

Research Groups

The Centre conducts research in the following domains/groups:

- **Aeroelastic Design:** Research into multidisciplinary fields regarding on- and off-shore wind turbines in order to provide high values outcomes that will contribute to reduce the cost of energy generated by wind turbines further.
- **Applied Photovoltaics:** Research interests include characterization of PV system components under controlled laboratory conditions, Detailed modelling of the solar resource and PV system design to predict energy output and full life-cycle cost of PV electricity, etc.
- **Energy Storage:** Research into technologies which will be required in future sustainable energy systems, with particular focus on in thermal energy storage (TES); thermo-mechanical energy storage methods such as compressed air energy storage (CAES) and pumped thermal energy storage (PTES); and electrochemical batteries.
- **Green Hydrogen:** Research into developing low-cost methods of producing green hydrogen.
- **Multiscale Energy Systems:** Predicting impacts of energy systems technologies by using a range of analytic techniques that utilize both empirical and simulated datasets.
- **Power Electronics for Energy Grids:** Research enabling an effective way to connect renewable energy sources, energy storage and other low-carbon technologies to the electricity network for the provision of a clean energy system.
- **Renewable Energy for Development:** Laboratory facilities to research, develop, design and test components, equipment, systems and appliances to help improve energy access and improve livelihoods and well-being in developing countries and other locations

Research Facilities

- **Angela Marmont Renewable Energy Laboratories (AMREL)**

CREST has many laboratories dedicated to the research of renewable energy systems, including PV, wind, and energy storage. This includes the materials used within PV devices as well as the characterization of both solar cells and modules. Research capabilities span into thin film processing, silicon wafer processing, characterization, solar molecules, energy storage and wind energy.

- **Accredited PV measurement and calibration lab**

This first of its kind laboratory was accredited to ISO/IEC 17025:2017 for the calibration of photovoltaic cells, modules and pyranometers. Work done in the lab covers I-V curve measurements, special responsivity measurements and irradiance sensor calibration.

FRAUNHOFER CLUSTER OF EXCELLENCE CIRCULAR PLASTICS ECONOMY (CCPE)

The cluster of excellence was formed by a network of institutes within Fraunhofer-Gesellschaft for setting the course for transition from a linear to circular economy in the context of plastics. The network combines competencies of the following institutes:

1. Fraunhofer Institute for Applied Polymer Research (IAP)
2. Fraunhofer Institute for Chemical Technology (ICT)
3. Fraunhofer Institute for Material Flow and Logistics (IML)
4. Fraunhofer Institute for Environmental, Safety-, and Energy Technology (UMSICHT)
5. Fraunhofer Institute for Structural Durability and System Reliability

Year of Establishment: 2018

Core Mission(s): To research the fundamentals to achieve a knowledge-based circular plastics economy, to optimize the value chain of plastics by circular principles and to develop and design circular products.

Virtual Institute

The cluster of institutes that form the Fraunhofer CCPE are consolidated as a single virtual institute. Fraunhofer UMSICHT invites stakeholders from industry and science to help shape this virtual institute for a circular plastics economy and to collaborate on solutions within the research cluster.

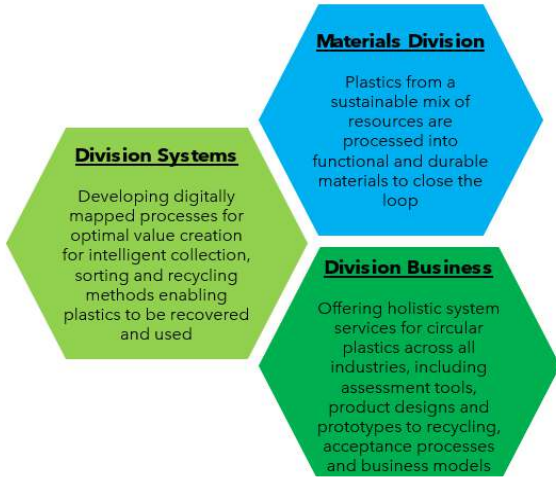
CIRCONOMY® Hubs

Fraunhofer proposes building a Germany-wide network of CIRCONOMY® hubs. In each hub, Fraunhofer institutes and their partners from business, science, politics, and society are dedicated to a different mission to contribute to a circular economy. Innovations in the space of sovereign value-added cycles, climate neutrality, circularity, and bioeconomy

Office of the Cluster
Fraunhofer Institute for Environment, Safety and Energy Technology (UMSICHT)
Osterfelder Straße 3 46047
Oberhausen, Germany

Structure and Governance

The Cluster operates under 3 divisions and each division has 2 research departments functioning under it.



The research departments under the Materials Division are:

- Circular Polymers
- Circular Additives and Compounds

The research departments under the Division Systems are:

- Business and Transformation
- Application and Demonstration

The research departments under the Division Business are:

- Circular Logistics and Sustainability
- Advanced Recycling

Governance: The Cluster is managed by a Director oversee the workings of the entire Cluster, a Head of the office works under the Director, and a Marketing Head. The Management Board has of Directors of the member institutes of the Cluster.

Services

- **Circular Assessment of Molecules, Materials, Products:** Done through a Circular Economy Assessment done by the Systems and Business divisions in collaboration.
- **Development of Circular System Solutions together with Industry Partners:** Done by the Materials and Business Divisions in collaboration.
- **Circular Prototypes for Molecules, Materials and Product Design:** Done with the help of product design studies conducted by Division Systems Team.
- **Products, IP, Spin-Off, Business Models and Participation Processes:** Done with the help of market studies, product development, market acceptance done by Systems and Business divisions in collaboration.

Official Points of Contact

Email ID: Prof. Dr.-Ing. Eckhard Weidner (Director): weidner@vtp.rub.de
Dr.-Ing. Hartmut Pflaum (Head, Fraunhofer CCPE): hartmut.pflaum@umsicht.fraunhofer.de
Kristiane von Imhoff (Marketing Head): kristiane.von-imhoff@umsicht.fraunhofer.de

Website: https://www.ccpe.fraunhofer.de/en/about-fraunhofer-ccpe.html

CENTER FOR THE CIRCULAR ECONOMY

The Center for Circular Economy has been set up by a New-York based investment firm Closed loop Partners to accelerate the transition to a circular economy. The Centre's expertise spans the full lifecycle of a product, connecting upstream innovation to downstream recovery infrastructure and end markets. Their work spreads across brands, industries, sectors and countries to facilitate systematic change.

Year of Establishment:

Core Mission: To accelerate the transition to a circular economy in which materials are shared, re-used and continuously recycled.

Governance

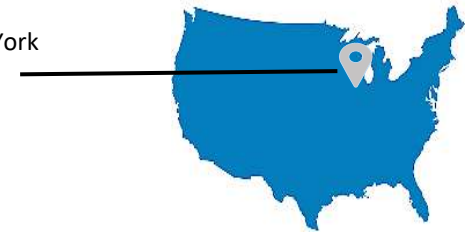
The team is comprised of former industry CEOs, CFOs, heads of government agencies and fund managers with an average of 20+ years of operational and investment experience. The team also has MBA interns that contribute towards projects.

Official Points of Contact

Email ID: Kate Daly (Managing Director): kate@closedlooppartners.com

Website link: https://www.closedlooppartners.com/the-center/

888 7th Ave, 10th Floor, New York
NY 10106



Services

- **Research:** The Center's research is aimed at creating investment roadmaps on circular trends, challenges, and opportunities across sectors.
  Some of the recent research work done by the Center includes:
- Landscape Mapping of the Molecular Plastics Recycling Market: Work done under this project involved mapping out the scope and landscape of technologies that could significantly advance the transformation of post-consumer plastics into the building blocks for new materials and countless end uses. The outcomes were captured in a report published in 2019.
- Navigating Plastic Alternatives in a Circular Economy: Research under this project is aimed at unpacking the opportunities and challenges within the industry's move toward alternative materials, considering sustainable sourcing of feedstocks and end-of-life recovery pathways. Focus was on with a focus on bio-based plastics, biopolymers and compostable products and packaging.
- A Data Visualization Tool Identifying Opportunities to Recapture Plastic in the US & Canada: The tool guides investors, brands, entrepreneurs and policymakers to make data-driven decisions that drive toward a circular future. The tool also shows a map shedding light on the diversity of plastic waste, breaking down the volumes of plastics by type and the flows by country, state and province.
- **Collaborations:** The Center collaborations with brands, investors, NGOs, and industry leaders to identify, test and scale solutions that solve material challenges and advance the circular economy.
  Some valuable collaborations include:
- Composting Consortium (with PepsiCo): A collaboration across the composting value chain to advance composting infrastructure & recover compostable packaging and food scraps.
- Consortium to Reinvent the Retail Bag (with CVS Health, Target and Walmart): A collaboration across retail sectors that aims to identify, test and implement innovative new design solutions that more sustainably serve the purpose of the current retail bag.
- NextGen Consortium: A collaboration across leading brands, industry experts and innovators to bring fully recoverable hot and cold fiber cup systems to a global scale. NextGen Consortium is founded by Starbucks and McDonald's, and the Center is the Managing Partner for the Consortium.
- Food Waste Repackaged: A partnership between the Center for Circular Economy and the Sustainable Packaging Coalition to raise awareness about packaging's role in food waste and spur innovations for food packaging that will help prevent food waste. The project is being implemented in multiple phases.

CENTRE FOR SUSTAINABLE DESIGN (CfSD)

CfSD is housed at the University for the Creative Arts (UCA) located in Farnham, Surrey, UK. The Centre has led and participated in a range of high-quality research projects and has organized more than a hundred conferences, workshops and training courses focused on sustainable innovation and product sustainability.

Year of Establishment: 1995

Core Mission: To develop and disseminate an understanding of present and future sustainability impacts and solutions related to innovation, products, technologies, services and systems through projects, training, events, networks, and information.

Governance

- **Team**: The team consists of the director, project coordinator, PhD researcher supported by senior administration and two senior associates.
- **Advisory Board**: The advisory board is awaiting to be announced.

Sectors

CfSD has developed considerable experience in global manufacturing industries e.g., electronics, information and communication technologies (ICT) and sustainable building products working with partners in Europe, North America and Asia

Official Points of Contact

Email ID: Martin Charter (Director): mcharter@uca.ac.uk / mcharter@ucreative.ac.uk

Website: https://cfsd.org.uk/about-us/

University for the Creative Arts,
Farnham Campus,

Services

- **Research**: CfSD offers consultancy service based on its competence areas. Areas of expertise include sustainable consumption and production (SCP), 'producer responsibility', product policy, eco-innovation, eco-design, design for remanufacturing, eco(packaging) design, marketing, procurement, supply chain management, product-service systems (PSS) and new business models.
- **Projects:** The Centre has directed or been partner in a range of European Community & UK-funded research and knowledge transfer projects. Some of the projects that the Centre has worked on are:
  - Farnham Repair Café
  - Sustainable Supply Chains through Innovation
  - Closing the Loop on Electronic Products and Domestic Appliances
  - Centre of Excellence in Sustainable Innovation and Design
- **Training:** CfSD has delivered trainings to both public and private sector organizations in the areas of sustainable innovation; sustainable product design and development; and sustainability & marketing. A unique feature of the courses are the GreenThink! © and Open Green© training processes developed by Martin Charter.
- **Network:** CfSD has launched a range of Knowledge Transfer Networks covering eco-design, green electronics, environmental management and eco-innovation (eco-i net). eco-i net brings together stakeholders in the eco-innovation system with a particular focus on low carbon and sustainable building technologies, including events and an online community that can be accessed.
- **Events:** CfSD has organised and co-organised conferences in Europe, North America and Asia covering sustainable innovation and product sustainability. In addition, events have been organised with partners on new or emerging issues e.g., major European and Asian conferences on sustainable consumption & production (SCP), eco-design and product-service-systems (PSS). CfSD organises the internationally recognised 'Sustainable Innovation' series of conferences.
- **Resources:** The CfSD website is recognised as a key global resource on sustainable innovation and product sustainability. A range of high-quality content is open access.

Areas of Competence

The Centre has two core areas of competence:

- **Sustainable Innovation**
  - Understanding the policy and business implications of sustainable innovation
  - Working with companies to develop sustainable solutions
- **Product Sustainability**
  - Understanding the organisational, management, development, and design implications of product sustainability
  - Working with companies to develop and deliver Programmes

SWEDISH LIFE CYCLE CENTER

Hosted by Chalmers University, the Swedish Life Cycle Center is a center of excellence and collaboration platform for academia, research institutes, industry and government agencies. It was originally founded as Competence Centre for Environmental Assessment of Product and Material Systems, CPM, as a joint effort between Nutek (later VINNOVA), Chalmers University of Technology and a range of international companies.

It fosters competence-building and knowledge exchange in advancing and applying the life cycle field by following a multi-disciplinary and collaborative approach.

Year of Establishment: 1996

Core Mission: To work for the integration of the life cycle perspective into processes and decision making in industry, government policy and other parts of society.

Official Points of Contact

Email ID: Sara Palander (Director): sara.palander@chalmers.se
Maria Rydberg (Project Manager): maria.rydberg@chalmers.se
Anna Wikström (Project manager, Parental leave): anna.wikstrom@chalmers.se
Website: https://www.lifecyclecenter.se/organization/
Annual report: https://www.lifecyclecenter.se/wp-content/uploads/AnnualReport_2021_slutversion.pdf

Chalmers University of Technology
Dept. of Technology Management and Economics
412 96 Göteborg, Sweden

Services

- **Publications**: The Center publishes journals, reports, conference papers and research projects.
- **Databases**: Several databases for life cycle assessments are provided by the Center. Some of them include:
  - CPM LCA Database: Provision of LCA data in the CPM LCA Database. The database is developed within the Swedish Life Cycle Center and is a result of the continuous work to establish transparent and quality reviewed LCA data.
  - The Life Cycle Data Network: Aimed at providing a globally usable infrastructure for the publication of quality assured LCA dataset. Datasets under this network support Policy development and application, Environmental Footprint activities and European Commission Life-Cycle based projects.
  - The Global LCA Data access network (GLAD): GLAD aims towards "a global network comprised of independently-operated and interoperable LCA databases, connecting multiple data sources to support life cycle assessment in a way that facilitates sustainability-related decisions".
- **Training**: The Cente provides short, 2-day courses that helps organisations to develop application-based approaches to life cycle thinking. Additionally, a PhD course has also been designed to provide an in-depth orientation of LCA.
- **Tools & Support**: The Center has developed various tools on LCA internally. Some of them are:
  - DANTES, a data analysis tool for environmental sustainability
  - The EPS System (Environmental Priority Strategies in product design): A systematic approach to choose between design options in product and process development.
- **Expert Group**: In 2013, European Commission launch Single Market for Green Products (SMGP). It established two methods to measure environmental performance i.e., the Product Environmental Footprint (PEF) and the Organisation Environmental Footprint (OEF). In connection with the launch of the SMGP, a seminar within the Swedish Life Cycle Center resulted in the establishment of an expert group for PEF/OEF methodology discussions. The expert group supports the Swedish representatives in the EF Steering Committee and the Technical Advisory Board.

Governance

The permanent organization consists of a Board (each Partner represented), Preparatory Board, Scientific Advisory Group and a Technical Secretariat (run by a Director, Project Manager(s)) and a Scientific Director. Committees, working groups, expert groups and project groups are established by the Board.

Finance

The Center is financed jointly by partners and Chalmers University of Technology. Some funding comes from Swedish financing agencies.
From June 2020, Swedish Life Cycle Center is managing the project Innovation cluster for the life cycle perspective, funded by the Swedish Energy Agency and Swedish Life Cycle Center partners.

CHATHAM HOUSE

Chatham House is an independent policy institute and a trusted forum for debate and dialogue. Their research and ideas help people understand the changing world.

Currently, Chatham House is examining a new form of international cooperation, engaging diverse global actors, and exploring different tools and technologies to deliver its mission.

Year of Establishment: 1920

Mission: To help governments and societies build a sustainably secure, prosperous and just world.

Services

- **Research:** The institute conducts quality research and publishes independent and peer reviewed research papers.
- **Events:** Chatham House events offer unique access to thought leadership, best practice and insight from world leaders, policy influencers and academics, via delivery through webinars conferences and simulations.
- **Publishing:** Chatham House's published literature is a source of policy recommendations and ideas.
- **Expertise**: Chatham House provides authoritative commentary on world events through our network of policy experts. They inform public discourse by briefing governments, media and the general public using clear analysis and accessible, multimedia content.
- **Leadership**

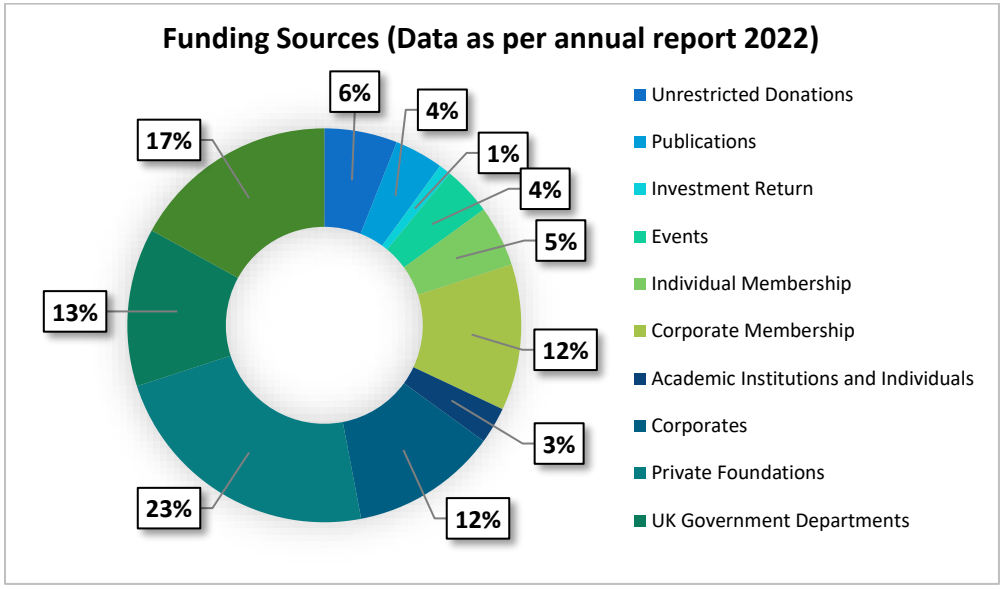
Work around Circular Economy

Two departments, namely the Environment and Society Programme & Sustainability Accelerator of Chatham House, work jointly on fostering the circular economy through valuable research and publishing white papers and organizing events and conferences surrounding the topic.

Governance

- **Patron:** Her Majesty Queen Elizabeth II served as a patron. She confers on Chatham House the benefit of her formal support through the institute's Royal Charter, although she has no official governance responsibilities.
- **Presidents**: Three presidents underpin the institute's independent, non-partisan voice on international affairs.
- **Council**: Oversees the operation and management of the institute by its charter and bylaws. Council members are drawn from and elected by the institute's membership followed by executive leadership.
- **Panel of senior advisors**: The panel of senior advisers was founded in 2008 to provide us with an experienced sounding board for policy conclusions and help to communicate ideas at the highest levels internationally. The panel is consisting of a total of 29 members.
- **Panel of young advisors**: The panel guides the institute on new and existing initiatives that aim to engage upcoming generations internationally. Panel members also contribute to strategy and share ideas with the Council and Executive Leadership Team. The panel is consisting of a total of 21 members.

Finance



Official Points of Contact

Email ID: Dr Patrick Schröder (Senior Research Fellow, Environment and Society Programme): PSchroeder@chathamhouse.org
Sir Robin Niblett KCMG (Director & Chief Executive): adorant@chathamhouse.org
Website: https://www.chathamhouse.org/
Annual report: https://www.chathamhouse.org/sites/default/files/2022-07/CHHJ9381-Annual-report-WEB-220712-FINAL.pdf

MISTRA

Mistra is an active research financier organisation which is responsible for developing the area of environmental strategic research and contributing to solving important environmental problems in society.

Year of Establishment: 1994

Mission: To invest in strategic research that drives the transition to a fossil-free and sustainable society and strengthens Sweden's competitiveness.

Governance: Board

- The board consists of ten members. Two of these are appointed by the government, of which at least one must have relevant financial competence.
- Of the other members, two are appointed on the proposal of the heads of authorities at the Research Council, the Research Council for Working Life and Social Sciences, the Research Council for the Environment, Rural Industries and Community Development and the Agency for Innovation Systems. Two members are appointed based on proposals from universities and colleges.
- Three members are appointed on the proposal of the King. Academy of Sciences, Royal the Academy of Engineering Sciences and Royal The Academy of Forestry and Agriculture, while the last member is appointed by Mistra's board.

Official Points of Contact

Email ID: Anna Joborn (CEO): anna.joborn@mistra.org
Thomas Nilsson (Program Manager): thomas.nilsson@mistra.org
Website: https://mistra.org/
Annual Report: https://mistra.org/?s=annual

Broad Research for Social Benefit

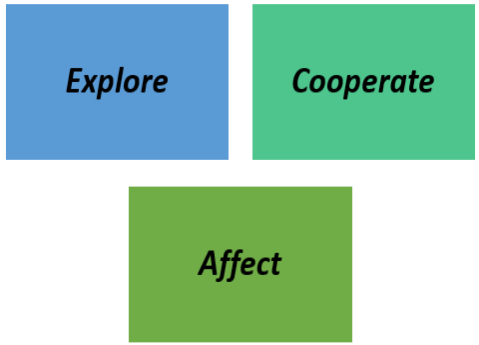
- Every year, Mistra invests SEK 200 million in various research initiatives where collaborations take place between scientific disciplines, as well as between research and companies, authorities, and other actors.
- Mistra's investments aim to:
  - Create strong research environments of high international class.
  - Solve important environmental problems.
  - Strengthen Swedish competitiveness.
  - Be valuable to users.
- The results must contribute to the work for sustainable development. In order for the research to be put to practical use, users and other key people are involved in the research.

Long Term Investment

- Mistra finances around twenty major research initiatives. The contract period is usually four years, but most programs are granted a second period after an evaluation. This means that most Mistra investments have eight years to reach results.
- The research takes place at universities, colleges, and research institutes in Sweden and in some cases abroad. But also, a number of large and small companies and organizations are connected to Mistra's research.
- Researchers who get their research funded by Mistra must publish their results in a form that makes them free to read and download from the Internet. This can be done either by the researchers publishing directly in journals that apply open access or by archiving already published articles in freely accessible databases.

Priorities

The organization has set clear priorities to be achievable by the year 2030.



- Importance laid on exploratory aspects of research by expanding the “idea development” stage to more actors.
- Creation of strategic collaborations that strengthen the quality of research and enable knowledge and learning to benefit society.
- Research is put to practical use in the form of processes, products, services, and management tools. The research also delivers scientific data and expertise to decision-makers in both national and international contexts.

CIRCULAR INNOVATION LAB

Circular Innovation Lab is a Danish think tank, based out of Copenhagen, on a mission to accelerate the global transition to a circular economy. They collaborate with national governments, UN agencies, and international organisations to create circular economy solutions that drive the transition to a circular economy forward.

Year of Establishment: 2018

Mission: To shed light on circular economy practices that replace today's linear business model practices to create long-lasting positive impact on our society and environment.

Governance

- The Lab is headed by a CEO and a COO.
- They also have a strong Global Advisory Board. Members are imminent personalities with a vast experience in the CE domain. People from the Ellen McArthur Foundation, Chatham House, and The Finnish Innovation Fund Sitra are part of this Board.
- The Lab has many UN organisations for Partners, including UNDP, UNCTAD and UNIDO. Other Partners include Global Environment Faculty, Nordic Circular Hotspot, and European Plastics Pact.

Official Points of Contact

Email ID: info@circularinnovationlab.com

Website: https://www.circularinnovationlab.com/

Services

- **National Circular Economy Roadmaps:** The lab collaborates with governments around the world to develop CE roadmaps. These roadmaps are a strategic tool and provide concrete solutions for promoting comprehensive change in developing countries towards a circular economy. Each roadmap is tailored according to country requirements and contains a vision as well as goals and tangible action points that supports the adoption and implementation of CE solutions.
- **Research & Recommendations:** The lab provides tailored research services to help understand client organization's opportunities through benchmarking studies, policy analysis, and research case studies. Some of the recent projects undertaken include:
  - Benchmarking study for CE roadmap practices for the Government of Vietnam
  - CE and International Trade: Opportunities & Challenges for India
  - Study on Items Shipped for Reuse and EPR Fees
- **Capacity Building:** The lab offers workshops and training material based on organisation-specific needs. Focus areas include material selection, product re-design, circular loops and flows, circular business models, material journey mapping and many more.
- **Government and Policy:** Some recent projects in the domain include:
  - Global Benchmark Review for CE legislations
  - A Global Map for an Inclusive CE

Approach

The Lab follows a four-step approach towards fulfilling its mission.

1. **Situation Analysis:** They assist in developing alignment and buy-in of a circular economy-centric project.
2. **Stakeholder Mapping & Engagement:** They facilitate workshops towards incorporating circularity thinking in design.
3. **Co-Design and Research:** They work with project teams to develop innovations that realize circularity from scratch.
4. **Recommendations:** They organize collaboration programs to support existing innovations in the circular economy sector.

Industries of Focus

- Textiles
- Plastics
- Electronics
- Food

MAHINDRA TERI CENTRE OF EXCELLENCE (MT CoE) FOR SUSTAINABLE HABITAT

The Mahindra TERI Centre of Excellence (CoE) for Sustainable Habitat was established through a memorandum of understanding signed between Mahindra Lifespaces & The Energy and Resources Institute (TERI). The CoE is located at TERI's Gwal Pahari Campus in Gurgaon and has been operational since June 2018.

The CoE is developing a repository of innovative materials and technologies in context of the Indian building sector and climates.

Year of Establishment: 2016

Core Mission: To build a greener urban future by developing innovative energy-efficient solutions tailored to the Indian climate

Governance

- The Joint Advisory Committee (JAC) and Joint Implementation Committee (JIC) look after the Centre's functioning. The members of the committee are from TERI and Mahindra life spaces.
- The Technical Advisory Committee (TAC) has been formed by on-boarding leaders/practitioners who provide technical oversight to the CoE's research.
- The Centre also has in place a Joint Implementation Committee and a Core Working Committee.

Material Testing Facility

The MT CoE lab, an SVA-GRIHA 5-star rated facility, has received the accreditation for testing thermal properties of building materials from National Accreditation Board for Testing and Calibration Laboratories (NABL). A well-organized state-of-the-art facility offers testing services for thermal characterization of opaque and non-opaque building construction materials. The material testing facility at the MT CoE has so far tested more than 150 construction materials, including over 30 emerging building materials.

Official Points of Contact

LinkedIn ID: Arvind Subramanian (Managing Director & CEO): https://www.linkedin.com/in/arvind-subramanian-24aba63?lipi=urn%3Ali%3Apage%3Ad_flagship3_profile_view_base_contact_details%3BMbqU6xEuTI6273Tq3Ok3SQ%3D%3D
Website URL: https://mahindratericoe.com/index.php

Services

- **Material Performance Testing:** The CoE provides testing of the thermal properties of materials in a real time environment to improve credibility of research findings and identify suitable solutions for the building sector. Testing methods in research facilities include TPS 500 S, Guarded Hot Box (GHB) Emissometer. In addition, the online material database tool provides tested thermal properties of traditional and innovative building materials.
- **Thermal Comfort & Integrated Daylight:** MT CoE's work on thermal comfort and integrated daylight systems is devoted to creating the knowledge base, research and guidelines, policy frameworks, and user-friendly toolkits that promote sustainability in the building sector. The Centre develops design guidelines, prescription guidebooks, a design-based tool; Eco-Niwas Samhita design aider and flyers for achieving better thermal comfort and daylight at low cost in Indian residential buildings.
- **Sky modelling:** Understanding sky conditions helps to design appropriate daylighting measure for the building, i.e., anything that would allow for natural light to enter the building for the occupants' purposes. This service provision is the first of its kind in India. It is likely to help us predict with certainty, what kind of standard sky conditions prevail on our current location of data recording The Centre has begun analysis of the recorded data, by conversion of sky scan patterns to CIE (International Commission on Illumination, France) standard sky formats.
- **Visual Comfort:** The Centre is developing resources such as guidelines for glare indices in buildings, policy brief on visual comfort for residential building, and conducting occupant visual comfort survey for residential buildings, findings from which will help formulate design guidelines for developers, architects and practitioners. The research findings will be beneficial to policy makers, planners and architects.
- **Sustainable Use of Water in Habitats:** The Centre's exercise on sustainable water use in habitats is envisioned to look at a holistic way of managing water (water efficiency, conservation and management) within a premise for sustained availability for all its consumers. Work done in this domain involves sustainability city-level assessment, building-level water audits, and web-based tool is likely to generate awareness among relevant stakeholders.
- **Toolkits:** Some toolkits provided by the Centre include:
  - The WATER (Water Availability and Treatment for Efficient Reuse) Calculator
  - Eco-Niwas Samhita Design Aider
  - Building Materials Database and Tool

Leading by Example: The CoE Facility Building Features

The Centre's building structure is a near zero-energy building and integrates some innovation design ideas to make it sustainable and energy saving. Some features include:

- Effective Daylight Integration
- Energy Efficient HVAC and Lighting Appliances
- Use of locally sourced materials
- Drought resistant plant species for water savings
- Water savings through low-flow CP and sanitary fixtures

CII SOHRABJI GODREJ GREEN BUSINESS CENTRE

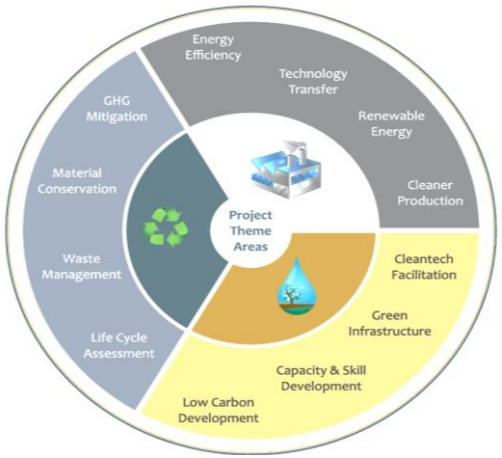
CII-Sohrabji Godrej Green Business Centre (CII-Godrej GBC) was set up as CII's Developmental Institute on Green Practices & Businesses, aimed at offering world class advisory services on conservation of natural resources. The Green Business Centre in Hyderabad is housed in one of the greenest buildings in the world and through Indian Green Building Council (IGBC) is spearheading the Green Building movement in the country.

Year of Establishment: 2004

Core Mission: To accelerate the transition to a circular economy in order to achieve a sustainable society

Services

- Energy Management
- Green Buildings
- Green companies
- Renewable Energy
- GHG Inventorization
- Green Product certification
- Waste Management
- Cleaner Production Process



Official Points of Contact

Email ID:
Mr. K S Venkatagiri (Executive Director): k.s.venkatagiri@cii.in
Mr P V Kiran Ananth (Senior Counsellor): kiran.ananth@cii.in

Website URL: http://www.greenbusinesscentre.com/aboutus.php
http://www.greenbusinesscentre.com/pdf/Partners_CII_Godrej_GBC.pdf

Research Work

The Centre has published valuable research in the following domains:

- **Low-Carbon Technology Roadmap for the Indian Steel Sector (in partnership with WBCSD, IEA AND NCB):** This research was conducted in two phases. The roadmap provides guidelines and a possible transition path to reduce the cement intensity of the industry by over 46%.
- **Green Power Market Development Group (in partnership with WRI supported by Shakti Sustainable Energy Foundation):** This initiative aims to rapidly scale up renewable energy uptake by commercial and industry energy consumers in their overall energy consumption.
- **India GHG Program:** This Program was launched in 2013 with the aim to facilitate effective GHG management in the Indian industry. It brings together internationally recognised GHG accounting tools and methodologies in a common platform that facilitates national-level benchmarking of GHG emissions.
- **Sustainable Recycling Industries (SRI):** The SRI project was set in motion with an aim of identifying alternative mechanisms for handling of BFR (Brominated Flame Retardants) plastics, and developing technical standards for handling, transportation, and destruction of BFR plastics. A pilot take-back mechanism for facilitating segregation was also created.

Partner Contributions

- **Government of Andhra Pradesh**- The GoAP had allotted 5 Acres (over 20000 square metres) of land to CII, free of cost, for the construction of the CII – Godrej GBC building at Hyderabad, the capital of Andhra Pradesh.
- **Godrej & Boyce Mfg. Co Ltd** - The house of Godrej is highly committed to establishing CII – Godrej GBC in India and has sponsored the construction cost of the CII – Godrej GBC building to an extent of Rs. 50 million (USD 1 Million).
- **USAID** - USAID is a technical partner in the establishment of CII – Godrej GBC and is involved right since its conceptualization in March 2000

Key Achievements

- 7.83 billion sq. ft green building footprint.
- 1950 Detailed Energy Audits carried out
- 6548 Projects registered green building projects.
- 3588 million (Rs) annual recurring energy saving realized
- 327 GreenCo Rated Companies
- 2200+ Products Certified under Green Product (GreenPro) certification

CENTRE OF EXCELLENCE IN ENVIRONMENTAL ECONOMICS

Madras School of Economics (MSE) has been designated as a Center for Excellence in Environmental Economics by the Ministry of Environment, Forests and Climate Change (MOEFCC). The main objectives of the Center are to do research on issues of national importance along with providing teaching and training support to students, technicians, economists, non-economists, industry and disseminate the relevant and latest information in the field of environmental economics. The Centre's work is portrayed and disseminated through a website which is developed in-house by MSE's team.

Year of Establishment: 2002

Core Mission: To assist the Ministry in environmental policy formulation, along with carrying out research projects in environmental economics and enabling the dissemination of knowledge of latest developments in the field through capacity building.

Projects Completed by the Centre

- Economy-wide Impacts of Pollution in India: Meta Analysis
- Preparation of Base Paper on Green Economy
- Coping with Pollution in India with Eco-Taxes: Integrated Approach Consistent with GST Regime
- Trade and Environment - Environmental Requirements and India's Exports of Leather and Leather Products
-

Official Points of Contact

Email ID: Ushma Upadhyaya (Communication Officer): u.upadhyaya@circulareconomyalliance.eu
Website URL: - https://pontsbschool.com/faculty-research/circular-economy-research-center-cerc/#

Services

- **Assistance in Environmental Policy**
- **Research**
  Designing economic instruments and other measures to supplement the existing regulatory structures of domestic environmental policy, for instance, levy of taxes on polluting inputs and outputs such as fuels, automobiles, coal, etc.
  Conducting cost-benefit analyses and related techniques (for instance, environmental risk assessment) to check the economic feasibility of environmental solutions.
  Focusing on international policy issues, like trade and global environmental issues.
- **Capacity Building**
  The Centre aims to disseminate latest developments in the field of environmental economics through different mediums, such as:

  - Preparation of dissemination papers
  - Curriculum Development
  - Training Programmes
  - Visiting Researcher's Fellowship
  - Green Newsletter
  - Collaboration with other Institutions

Finance

- The Centre is fully supported & funded by MOEFCC.
- Other organizations such as British High Commission, the World Bank, UNDP, World Resources Institute, Global Development Network, GIZ, South Asian Network for Development and Environmental Economics, Asia Pacific Network for Global Change Research, International Science Council of Asia and the Pacific Region, Department of Science and Technology, etc. provide funds for academic projects. The Centre completed 15 projects funded by different national and international organizations in a 10-year period since its inception in 2002.

Governance

- The primary responsibility for managing the CoE lies with the Member-Secretary. This position is rotating between seasoned faculty at MSE. Once a faculty member has served his/her period as a Member-Secretary, they serve as a part of the Steering Committee.
- The Steering Committee oversees the work of the CoE and is chaired by the Additional Secretary of the MoEFCC. The Steering Committee met twice a year between 2002-2007. Since then, an annual meeting is conducted to discuss and approve the workplan and budget.
- Faculty members working in the area of environmental economics spend a part of their time on CoE related activities.
- Additional staff is recruited to work on specific research projects.
- Maintenance of accounts, fund management and auditing are done by the administrative team at MSE.
- Permanent team consists of 8 members – Director & Professor (1), Professor (2), Associate Professor (2), Assistant Professor (1), and Honorary Professor (2).

CENTRE OF EXCELLENCE IN E-WASTE MANAGEMENT

The Centre of Excellence (CoE) in E-Waste Management has been established to create a self-sustaining ecosystem capable of processing India's e-waste. It is a joint initiative by the Ministry of Electronics and Information Technology, the Indian government in partnership with the Government of Telangana and the industry. The CoE facilitates the creation of physical infrastructure and a knowledge hub for the development of cost-effective technology for E-waste recycling and dissemination of E-waste solutions from dismantling to recycling to precious metal separation

Year of Establishment:

Core Mission: To lead transformation by creating a conducive e-waste management environment which nurtures innovation, entrepreneurship, and capacity building.

Governance

The CoE team consists of seven members.

The overarching authority of the Centre is with the Director and Principal Investigator. The team also consists of a Scientist and Coordinator.

There are five other Scientists.

Official Points of Contact

Email ID:
Dr S. Rajesh Kumar (Scientist & Coordinator): rajesh@cmet.gov.inc
Dr R. Ratheesh (Director & Principal Investigator): ratheesh@cmet.gov.in
Website URL: https://www.coeonewaste.com/about-us.html

Areas of Expertise

- **PCB Recycling:** Centre for Materials for Electronic Technology (C-MET), Hyderabad Laboratory has developed an environmentally friendly technology for recycling electronics waste and established pilot plant facilities for providing services for processing PCBs from e-waste (100kg PCB/day).
- **Lithium-Ion Battery (LIB) Recycling:** The CoE is developing cost-effective hydrometallurgical as well as pyrometallurgical methodologies for the recycling of LIBs.
- **Extraction of Rare Earth Elements from Permanent Magnet:** The objective of this activity is to extract rare earth elements (REE) like Neodymium (Nd), Dysprosium (Dy), Praseodymium (Pr) etc., from discarded permanent magnets, using hydrometallurgical methods like leaching, solvent extraction followed by calcination.
- **Solar Cells:** Centre for Materials for Electronic Technology (C-MET), Hyderabad laboratory, as a part of the CoE mission has initiated R&D activity to develop commercially sustainable recycling technology for end-of-life silicon solar modules to recover various metals including toxic and valuable materials.
- **Refurbishing of E-Scrap:** The CoE works within the guidelines laid by E-waste Management Rules, 2016 released by the Ministry of Environment, Forest and Climate Change, Govt of India. It works with state governments and facilitate roll out of various initiatives under the state E-waste policies. These may include setting up of collection, dismantling and recycling units or driving shift towards refurbishing.
- **Skill Development:** Skill development programs aim to empower informal E-waste recyclers in the country and to nurture start-ups.
- **Testing and Services:** The CoE is affiliated with a quality chemical testing facility set up by C-MET for the analysis of e-waste and related products/materials/devices/systems. The facility quantifies the banned substances under the Restriction of Hazardous Substances (RoHS) directive. This practice is aimed to help the Micro, Small and Medium Scale Entrepreneurs (MSMEs).

Key Services

- Hosting a physical lab facility to create a prototype for addressing the various domestic needs in the field of E-waste management.
- Incubation Centre to enable start-ups to develop their ideas.
- Providing training to empower the Indian electronics and electrical industries on the E-waste Management Rules (2016) through RoHS facility available at C-MET.

CII-ITC CENTRE FOR SUSTAINABLE DEVELOPMENT

The CII-ITC Centre of Excellence for Sustainable Development was established as a not-for-profit, industry-led institution. The institute evolved with a tremendous trajectory starting with the incubation phase of introducing business services, right through augmenting manpower capacity since 2013, eventually scaling up to the highest rung of strengthening work on macro-economic issues with both domestic and global policy interventions. The CoE has created its brands – CII-ITC Sustainability Awards, Sustainability Submit and Climate Action Programme.

Year of Establishment: 2006

Core Mission: To catalyse innovative ideas and solutions, in India, and globally, to enable business, and its stakeholders, in sustainable value creation.

Governance

The team consists of 39 members.

- Counsellor (4)
- Associate Counsellor (10)
- Executive (4)
- Executive officer (1)
- Project Associate (2)
- Deputy head (1)
- Deputy Director General (1)
- Senior consultant (1)
- Senior manager (1)
- Consultant (6)
- Deputy Director (1)
- Administration (1)
- Senior Counsellor (4)

Intervention Areas

- **Circular Economy**: The Centre has completed a study on "Resource Efficiency in the Steel and Paper Sector: Evaluating the Potential for Circular Economy".
- **Climate Action**: The Centre looks at climate change as a strategic risk to business and offers services related to reducing business's vulnerability to climate change via, climate change risk and opportunity assessment services, GHG inventorization, carbon neutrality services and sequestration studies.
- **Biodiversity & Nature**: The Center offers services such as biodiversity assessment, natural capital profile, green belt development and many others related to specific intervention areas.
- **Resilient Business & Society**: The Centre is actively engaging with development bodies like the UN and UNDP, the Indian government, foreign embassies, civil society organisations and academic institutions to strengthen and understand the ecosystem around business and human rights.

Advisory Service

Advisory Services provided by the Centre include:

- Integrated Management Systems
- Sustainability Strategy & Reporting
- Sustainable and Green Supply Chain
- ESG Mapping and Improving Benchmarking on ESG
- Integrating Plastic use Protocol in EMS SUP-free certification
- Clean Energy and Energy Mix
- Waste Management (Zero Waste to Landfill)
- Comprehensive Audits – Safety, environment, energy, water, fire etc.
- Facilitation of statutory environmental compliances

Official Points of Contact

Email ID: Seema Arora (Deputy Director General): seemad.arora@gmail.com

Website URL: https://sustainabledevelopment.in/about-us/

Annexure 2: Proceedings of all Meetings

Sr. No.	Meeting Details	Conducted on Date
1.	1st Bilateral Discussion (CEPS)	22nd July 2022
2.	2nd Bilateral Discussion (SM@RT)	5th August 2022
3.	3rd Bilateral Discussion (LCC)	19th August 2022
4.	1st Stakeholder Consultation Meeting	15th September 2022
5.	3rd Bilateral Discussion (CII-ITC-CESD)	6th October 2022
6.	4th Bilateral Discussion (ILO)	6th October 2022
7.	5th Bilateral Discussion (CEEW)	6th October 2022
8.	6th Bilateral Discussion (HICCER)	7th October 2022
9.	7th Bilateral Discussion (DMF Angul)	10th October 2022
10.	8th Bilateral Discussion (Mahindra Group)	14th October 2022
11.	1st Reference Working Group Meeting	20th October 2022
12.	9th Bilateral Discussion (ICCE)	21st October 2022
13.	10th Bilateral Discussion (HCL Technologies)	21st October 2022
14.	11th Bilateral Discussion (ECube Investment Advisors)	3rd November 2022
15.	12th Bilateral Discussion (Circulate Capital)	3rd November 2022
16.	Focussed Group Discussion with Experts from Academia	21st November 2022
17.	13th Bilateral Discussion (IIT Madras)	29th November 2022
18.	2nd Reference Working Group Meeting	12th December 2022
19.	3rd Reference Working Group Meeting	21st February 2023
20.	PAGE Inter Agency Meeting	9th March 2023

EMC & CEPS (Centre for European Policy Studies)

Date: 22nd July 2022

Time: 3:30 PM - 4:20 PM IST

EMC's Work

Project Objective:

- Creating a framework for the establishment of a Centre of Excellence on circularity in India
- The project is supported by UNITAR
- Building a network of institutes- one apex body and a chain/network of other institutes

Flow of Work:

- Identification of existing CoE targeting Circular Economy in India and globally
- Shortlisting and review of selected CoE
- Gathering key learning from the review
- Identifying necessary inputs to create frameworks for India based on international experience
- Creating factsheets for relevant institutes

Findings so far

- CoEs are mainly concentrated in Europe
- There is currently no CoE devoted to circular economy in India. There are however, guidelines given by the Ministry of Skill Development and Entrepreneurship on how to build a CoE
- For most CoE, the most common service provided is research
- Missing services: innovation, upcycling, recovery of rare earth materials, business incubation (these might be covered by as research topics by departments established within institutions, but there is no dedicated entity that has its core focus as aforementioned topics)

Discussion with Mr. Vasileios

- CEPS is a centre focused on EU policies - an EU policy think tank

Key Services offered by CEPS

- Research
- Policy analysis
- Recommendations for policy based on targeted research
- Coverage of a wide range of policy domains

Partnerships

- CEPS partners with different kinds of stakeholders- governments within a EU are major stakeholders, along with companies that seek guidance and research on niche topics of interest, and other research institutions

- CEPS sometimes partners with institutes outside of Europe as well, but their main focus lies in the EU policy domain

Challenges faced during establishment/ day-to-day challenges

- Acquiring new projects
- Presence in policy debates is required for CEPS given the kind of work that they do- which is an added pressure
- Building networks

Willingness to pay of the users

- Question does not really apply to public sector stakeholders as the tenders floated usually come with legal price obligations
- For companies and/or businesses, users are willing to pay as long as the relevance of the service provided is high with respect to fulfilling the company's objective
- "SBDs are the best option"

Outreach Program

- CEPS's strategy is mainly word-of-mouth publicity and digital marketing
- They organize regular events and conferences that showcase their work
- They have a very huge reach on social media- where they have managed to build most of their network
- Focus on hybrid events

Governance Structure

- Specific units are set up to cater to different domains, like migration, energy resources, economic policy, green transition, etc.
- There is a Board of Directors which is rotating- oversees the work of the centre
- Under the Board, there are two committees - Research and Operations
- Committees have senior research fellows and heads that look after the functioning and are also responsible for bringing in new members to the committee

Key factors to keep in mind when setting up a CoE

- Have a clear focus in mind
- Who are your primary stakeholders and what do you primarily wish to target as a service? Public-sector oriented research or private sector advising?
- If the CoE wishes to target both, make sure to design objectives in a way that they cater to all stakeholders equally
- Focused results for different stakeholders
- Hybrid mode of delivery

*CEPS has some publications and research pertaining to rare earth materials.

The Institute of Environmental Sciences (CML) at Leiden University and Pforzheim University are doing dedicated research on rare earth recovery.

EMC & SM@RT (Centre for Sustainable Materials Research and Technology)

Date: 5th August 2022

Time: 12:38 PM to 1:40 PM

Meeting Attendees from SM@RT: Anirban (Microfactory Engineer and Head of Microfactories), Fashid (Senior Research Fellow and Project Leader), Veena (Professor, Scientist, Inventor of E-Waste Microfactories)

Discussion with the SM@RT Team:

Q: What does funding look like for SM@RT?

(Answered by Veena)

- The Australian government is one source of financial assistance for SM@RT.
- However, Australian schemes need tangible proof that the institution is equipped with the expertise that is required to carry out the work proposed.
- Expectation from the government regarding collaboration with industry and impact assessment
- Need for making a case as to how the centre's work is competitive
- SM@RT's scope assesses both- research as well as the outcomes of the research that they conduct. They also have clear and defined pathways on how to achieve the needed outcomes.
- Public funding requires a track record that is innovative and impact oriented
- It is crucial for a centre like SM@RT to not see research and implementation as different things (also a suggestion for our CoE).
- Australian schemes generally require institutions to not only have industry collaborations but also work on establishing best practices based on implementation of the research conducted.
- It is vital to track self-progress and keep a check on whether the institution's outcomes are being achieved.
- A lot of schemes also look at what institutions made of the financial assistance provided to them in the past.

Q: How do you build industry connections as a centre?

- Fashid: There is always a gap between research and industry. That is where SM@RT comes in. We show that the research we conduct has tangible outcomes that can be implemented by industries in fulfilling their growth targets.

Q: At what stage is communication with industries brought in?

- Fashid: As early as possible. Inception meetings of projects often include potential industry/other collaborators. They are also kept in the loop throughout. SM@RT ensures a dynamic interaction between the centre and relevant stakeholders.

Q: Does SM@RT collaborate with industry associations as well?

- Anirban: Absolutely. SM@RT focuses on engagement at numerous levels, creating an orbit of industries, community organisations, small and medium-scale organisations, individual businesses and entrepreneurs. Collaboration does not necessarily have to be limited to industry. Any entity that can benefit from the deployment of SM@RT's technologies and insights can be a collaborator.

- Relationship building happens at the institutional as well as personal level. Having personal connections helps in getting deeper insight into how the collaborating entity functions and what their needs are.
- SM@RT thus aims to build relationships via a holistic approach.

Some of SM@RT's industry partners:

1. Moly-Cop (Australian steel manufacturer)
2. Bradken (Mining equipment parts manufacturer and provider)
3. Dresden (Eye-wear- manufacturer and seller)

Q: How does your governance structure function?

(Answered by Veena)

- SM@RT has a Managing Committee that acts as an overarching umbrella (looking after the overall functioning of the centre).
- The organisation conducts its research under 3 hubs:
    a. Sustainable and Communities Waste Hub
    b. ARC Micro Recycling Research Hub
    c. ARC Green Manufacturing Hub
- Each hub has different expectations, reporting requirements, KPIs and milestones.
- SM@RT has a multi-faceted approach, focusing on holistic KPIs and not following a narrow approach centred solely on academic research.
- It is extremely crucial to design a well-defined governance structure from the beginning.

Q: One of the recommendations that EMC plans to put forth in the framework for the CoE on Circularity is collaboration with existing CoE, within the country's borders and internationally as well. Would SM@RT be willing to be part of such a collaboration?

- Veena: SM@RT would be happy to collaborate with India regarding this. However, any kind of contribution from SM@RT's end has to be funded.
- SM@RT would also need clarity on the scope of the collaboration:
    - Is it only research-oriented?
    - Is it technology deployment?
    - How is it going to be funded?
- Anirban: Demonstrating technologies to local businesses and inspiring them is very important. However, the success of SM@RT's technologies is context specific and there are chances that they are unfit for the Indian landscape. Hence, having an institution like the CoE on Circularity can provide a platform to support this kind of demonstration by means of a pilot project.
- Piloting the technology in India can grow the network of collaboration, and also make sure that the benefits gained are fuelling long term, sustained growth.
- There is thus a complete process behind setting up a microfactory in a new region.
- Given this background, SM@RT would be happy to act as a technology partner for the centre.

Q: Recently, the aspect of in-house management of building waste post demolition is gaining traction in India. Has SM@RT developed a microfactory technology that deals with Construction and Demolition (C&D) waste?

(Answered by Veena)

- Depends on the composition of the C&D waste- C&D waste in itself is a very vast domain
- SM@RT does have technology, but it has to be appropriately channelled to make an impact
- If appropriately channelled, SM@RT technology can help in creating value-based products from rubble and close the loop in the construction sector.

SM@RT's existing collaborative work with India:

Australia and India plastics research project

The India – Australia Industry and Research Collaboration for Reducing Plastic Waste is a three year collaboration with partners in both India - the Council of Scientific and Industrial Research (CSIR), Development Alternatives and The Energy and Resources Institute (TERI) – and Australia - the University of New South Wales (UNSW), the University of Technology Sydney (UTS) and CSIRO. Through key activities, this collaboration works closely with industry, government and community stakeholders to evaluate the economic and policy implications of transitioning to a circular economy for plastics.

EMC & LCC (Life Cycle Centre, Sweden)

Date: 19th August 2022

Time: 10:30 AM to 11:30 AM IST

Meeting Attendees: Sara Palander (Director, Swedish Life Cycle Centre, Dr. Shilpi Kapur (Vice President, EMC Pvt Ltd), Jidynasa Ghag (Research Assistant, EMC Pvt Ltd), Sharvari Lowalekar (Research Assistant, EMC Pvt Ltd)

Background

- Chalmers University of Technology (henceforth referred to as CUT) houses the Swedish Life Cycle Centre (henceforth referred to as LCC) which is a Centre of Excellence and a collaboration platform for academia, research institutes, industry and government agencies. It fosters competence-building and knowledge exchange in advancing and applying the life cycle field.
- LCC was established in 1996, and it is one of the very few institutions worldwide that solely focuses on Life Cycle Thinking, which is a reason why EMC has shortlisted it as a relevant CoE to get in touch with.
- Currently, LCC is developing an operational plan with structured thematics areas to work with under LCA

(https://www.lifecyclecenter.se/wp-content/uploads/2022_2_Operational-plan-10_2022-2024-1.pdf)

Initial Questions that Sara had for us

1. What target audience is the CoE in India planning to target? What kind of collaborations are you looking at?

- Important to have a thorough understanding of target groups and assign specific service outcomes for each audience.
- LCC has different target provisions for different audiences

2. How do the different audiences collaborate with each other?
3. How do you define the "value added" by each of the services that you offer?
4. Have you been in contact with FICCI for LCA?

Discussion with Sara

Q: Regarding the work that LCC does around policy research and implementation, is the Centre the one that proposes ideas and moves first, or do stakeholders approach the Centre?

- Both, our aim is to create a meeting space and facilitate a dialogue between the government and different agencies
- Roughly 3 meetings are conducted annually
- LCC does not set the agenda, they give importance to listening to the needs of the participating bodies and their common needs
- LCC's strategy to ensure success is maintaining a neutral stance

Q: How are training services on LCA provided at the Centre?

- Training is provided for professionals
- It is conducted by research experts in the field
- CUT has PhD programs in LCA which are supported by LCC

Q: Does LCC collaborate with other institutions focussing on LCA?

- Yes, LCC is involved in work with UNEP's Life Cycle Initiative and FICCI
- The collaborations are more on the lines of knowledge sharing
- Enriching capacity building
- However, the Centre is also involved in some common projects
- LCC also collaborates with large enterprises, often based outside Sweden

Q: What is LCC's relation with CUT? What is the institutional structure of the Centre?

- The Life Cycle Centre is hosted by Chalmers
- Chalmers is like a legal partner of the Centre (Sara is employed by CUT, not LCC)
- It is a part of strategy for LCC to be a part of a university- it increases credibility and visibility
- The close connect is also great for knowledge building
- Does CUT have a significant say in the functioning of LCC?
    - Not exactly. However, Chalmers is like a backbone in decision making.
- Does LCC come under the CUT governance structure? (Is governance the same for both?)
    - No, LCC has its own governance structure.
    - They recently came up with the position of Scientific Director, a year ago.
    - 3 people, working as Technical Secretariats
    - These three head the Centre, and their role has more to do with coordination- administrative and strategic planning tasks.

- Project Functioning Details:
    - All projects that LCC undertakes have to have at least 2 academic partners and 3 business partners
    - This unique way of working with a big consortium ensures success

Q: What does funding look like for LCC?

- LCC functions on a very small budget, based largely on engagement and participation
- They are also funded to a certain extent by Swedish financing agencies
- Of the 3 Technical Secretariats:
    - 1.5 are funded by partners (unsure about this, Sara's voice was unclear due to poor connectivity
    - 1.5 are funded through external sources of finance

Q: What are some of the challenges that you face while running/expanding the Centre?

- Having multiple target groups/audiences
    - Deliverable timelines do not match for researchers and partners
- Not having a strengthened framework of funding
- Sara will write a well drafted email on this point

Q: How do you achieve the dissemination of the work you do? (Expanding outreach)

- This is another challenging area
- LCA and LCT is a very narrowly scoped discipline, and although it is needed for almost all industries today, outreach is difficult
- Use of social media, newsletters
- Arranging scientific conferences (2 have been conducted already, 1 is planned to happen within the next two years)
- Use of partner network to share work
- LCC has created a series of TED Talks- "Life Cycle Talk" (1 already created, and 2 upcoming)
    - How green is your business?
    - How to achieve sustainable consumption
    - What value does Social LCA (S-LCA) add?

Q: Do you do work around O-LCA? Does the concept have scope of being provided as a service according to you?

- LCC does not look into O-LCA yet as it does not provide added value to their audience- most partners are more interested in product-level analysis
- However, it could be a good field to explore
- Suggestion: Take a look at what the European Commission is doing on O-LCA
- Only a few companies have adopted and tested the O-LCA model:
    - ABB (Sweden and Switzerland)
    - P&G (conducted pilot study around O-LCA)

Q: Would LCC be open to collaborating with the CoE in India?

- Most definitely
- Sara was very keen on building a network of exchange

Q: Are there any selected sectors where LCA can play a key role in policy analysis and proposal?

- Some sectors mentioned by Sara:
    - Construction
    - Textiles
    - Plastic intensive industries
    - Transport
- The European Commission has pinpointed 5 sectors

LCC is trying not to have a sector-centric approach as it paves the way to competition among sectors. The focus is on building a neutral space for collaborations.

1ST STAKEHOLDER CONSULTATION

Date: - 15th September 2022

Time: - 12:30 PM to 2:10 PM IST

Background

India is on an unprecedented path to development with rising per capita income and increasing urbanization. This economic growth is coupled with resource consumption that is expected to lead tosignificant stress on available resources in the future. There is, however, an opportunity to improve resource use efficiency as well as bring in circularity through modernization using appropriate technologies. In this context, circular economy (CE) strategies will greatly help to decouple economicgrowth from material consumption and waste generation, thereby making India more competitive, self-reliant, and future ready.

India boasts of a wealth of research capacity, both nationally and sub-nationally, with the potential to play a transformational role in bringing CE approaches into the real economy. At present, there is no clear 'go-to' institution with the mandate to undertake SDG 12 (Sustainable Production and Consumption) related research and to provide policy advice. Simultaneously, there isemerging domestic willingness, investment, and experience across industry to adopt new practices that are more closely aligned with SDG 12 targets and circularity.

This calls for a need to have a Centre of Excellence (CoE) or a network of CoE with a focus on resource efficiency and circular economy for specific sectors / waste streams. It is expected that the framework and guidance on establishing a CoE on Circularity will contribute to aligning India's economic policies and investments more closely with SDG12 and the country's 2070 net zero target.

The United Nations Institute for Training and Research (UNITAR) and the United Nations Environment Programme (UNEP) are supporting a study on preparing a framework for the establishment of Centreof Excellence (CoE) on Circularity in India. This work falls within the framework of the one-UN Partnership for Action on Green Economy (PAGE). The Ministry of Environment, Forests and Climate Change (MoEFCC) is the lead ministryfor PAGE in India and convenes the National Steering Committee for PAGE.

Welcome Remarks

While setting the context of the consultation, Mr. Angus Mackay & Mr. Atul Bagai welcomed the participants

and stressed the need for such an initiative and elaborated on the objective of the stakeholder consultation. It was highlighted that the study would lead to the development of a guiding framework for establishment of Centre/s of Excellence on circularity, which would also be useful in the implementation of national sectoral action plans on circularity. It was underscored that the development of a guidance framework and following establishment of CoE/s on circularity in India is a timely initiative and could be a unique and profound outcome of the G20 summit to be held under India's Presidency in 2023. The G20 summit also provides an opportunity to expand the horizon and deliberate on establishing such Centre/s globally, for advancing the progress on SDG 12

on Sustainable Consumption and Production and other related SDGs aiming for resource use efficiency and green economic growth.

Furthermore, Mr. Naresh Pal Gangwar gave additional insight into the working plan of India's presidency at the G20 summit. India's contribution to the CE theme under G20 will span one year, and work will start December 2022 onwards. Mr. Gangwar also spoke about the involvement of 11 government ministries in developing strategies, policy frameworks and guidance documents for strengthening the circular economy. Additionally, light was shed on the importance placed on the CE by our honorable Prime Minister. In this context, the role of such a Centre of Excellence which can provide the necessary policy research and implementation support was brought to the forefront. Mr. Gangwar also stressed the need to finalize a guidance manual laying down the framework for the establishment of such a Centre, and the network of institutions that could take part in it within the next year.

Presentation by Dr Prasad Modak

The presentation delivered by Dr. Prasad Modak had the aim of providing a brief background to the project and the ongoing work. Dr. Modak spoke about the need, role, and timeliness of a Centre of Excellence (CoE) on Circularity, with a specific focus on the Indian context. He further went on to discuss the existing models of CoE's in India and the possible architecture of the CoE on Circularity. The objective, scope and work plan of the study was also discussed. Dr. Modak then spoke about the review of existing CoEs targeting circularity across the globe, conducted as part of the project, and the learnings obtained from the review. Emphasis was laid on the importance of the life-cycle perspective, sectorial focus and some emerging issues and tools for the CoE to consider. In addition, a suggestive institutional architecture was proposed and the financial sustainability of the CoE was discussed.

Views and Suggestions by Stakeholders

Michael Bucki

- The general idea and thought process of the framework is sound, and visionary.
- Regarding the structure, the CoE must be a network of expertise since the scale of work is not achievable by a single entity. The steering of such a structure must be carefully thought through.
- Emphasis should be placed on strong leadership, along with bringing in expertise through a network ("nodes" structure).
- It is imperative to place climate, especially biodiversity, at the core of the agenda.
- In the long run, the circular economy will be about a bio-based industry, and hence, focus should also be on the integration of agroforestry, agriculture, agro-ecology, organic waste management, etc. which provide major indications on renewable resource use, water, ecosystems, and the myriad of natural resources.
- The EU is keen to support this project with the expertise of its member states and with the guidance

of GIZ through its ongoing EU-REI Project.

- A working group dedicated to CE and RE could provide a platform to meet all member states at once.

- Piloting of actual "circular moon shots" in concrete sectors, at state or National scales, wouldbe act as high added value. For example, eco-labelling or modernization and electrification of public transports from a radical CE perspective, or the extent to which construction, packagingmaterials and chemical fertilizers could be substituted by regenerative, bio-based waste and materials.

Dr. Ajay Deshpande

- The progression of the CoE is being looked at from a thematic point of view, but it is also essential to integrate a programmatic point of view.
- Work has already been initiated by NITI Aayog on a sectoral basis, and the relevant industries should follow a programmatic approach. This will help in sharing success stories, goodpractices and bringing in competitiveness.
- Regarding the structure, it is important to provide the individual nodes of the network the opportunity to interact with one another.
- The "Wheel and Spoke" model could also be considered, which is mainly used in the software industry (though some waste management companies are also exploring the same) It is designed to work with smaller initial teams, which then scale upwards and build value faster.
- Regarding finance, the CoE should aim to work towards becoming self-sustainable.

Dr. Nallapaneni Manoj Kumar

- Dr. Nallapaneni pointed out synergies of the ongoing work with that being undertaken by HICCER – Hariterde InternationalCouncil of Circular Economy Research is seen.
- Establishing synergies between institutions within the network and laying down a sound financial model could be some challenges that the CoE could face.
- The financial strategy that HICCER is following is to be self-sustainable. There is focus on impactinvestment funding and CSR funding.
- One potential funding opportunity is CSR funds that could be channelized to thedifferent nodes of the CoE network.
- Mapping the outcomes of the nodes to key performance indicators will be important.

Nandini Kumar

- Instilling the principles of CE into curricula for engineering, technology, science-based coursesat a higher education level is the only way to form a complete understanding of circularity amongst people.
- It is thus highly recommended that academic institutions be part of the network.
- Experience in implementing CE strategies on ground in industry shows that metrics can be tricky to dealwith.
- Suggestion for sectoral implementation: Start from tightening consumption and consequentlywork through the value chain.
- Inclusion of standards and certifications is crucial in building a CoE framework.

Shailendra Singh

- The government could consider establishing a separate ministry for Circular Economy.
- It is crucial to pay attention to the consolidation of the different principles of CE: reuse, remanufacture, refurbish, recycle, restructure.
- The kind of services the CoE would provide depends on the vision it follows, and the vision should be deeply embedded within the broader goals of climate change and sustainability.
- Climate change is central, and the CoE can become a tool to deliver on the bigger goal of climate change mitigation.
- It will be helpful to target the most emissions intensive industry segments first (cement, transport, etc.).

Prabhjot Sodhi

- It will help to identify what are the assets/factors that have led to better consumption patterns and resource use in the past.
- Key focus should be on the whole ecosystem of consumption in the Indian economy, that hasbeen a major characteristic of our growing economy.
- It is important to pay attention to reparability, rural-urban consumption patterns and systems.
- Regarding the structure, it would be impactful to place the CoE as a national resource centre for CE in the PM's office.

Dr Reva Prakash

- The EU has established a CE Stakeholder Platform, that enables steering and coordination of groups, helps in gathering insights into work done in sectoral areas and the sector-specific tools that are in use today.
- The CoE in India could draw learnings from this platform.
- It is also important to include training focused on Resource Efficiency and Circular Economy in the framework of CoE.

Akanksha Tyagi

- Setting up an eligibility criterion for the selection of host entities will be important.
- It will be very helpful to have an MRV framework in place to ensure monitoring and tracking of progress against set targets.

Dr Vijay Habbu

- Involvement of sociologists and anthropologists in discussions will be insightful, as they can bring in an angle of understanding from the religious and social perspectives that continue to govern the behaviour of the Indian masses.
- Education is the way to instil a circular lifestyle within people. CE should thus be ingrained in academics.

Kavya Raman

- It is crucial to highlight and clearly define the scope of job creation and related skill requirements that will arise out of such a Centre.
- Focus on the kind of employment opportunities that the CoE creates and how the CoE can enable

skilling will also need to be highlighted.

- Identification of incentives and subsidies for certain sectors that enable CE related employment generation is necessary.
- The Centre should focus on eco-labelling to drive demand creation.
- The Centre could also provide detailed courses on circular design.
- There is a dire need for documentation of best practices related to CE from rural areas.
- The Centre should facilitate collaboration with social partners who are directly impacted by a linear economy (e.g.: waste workers, fishing communities) and involve them in strategy and solution building towards circular economy.

Mukesh Gulati

- Creation of a sub-centre (a node) that focuses on clusters and value chains of MSMEs which then connect to larger enterprises can be investigated.
- Regarding finance, a strategy could be to bucket services into ones that are purely public goods and those that can make money and channelize funds accordingly.
- Regarding services provided by the CoE, the focus could also be on:
  - providing action research
  - channelizing funds to the right institutions from the right donors
- Regarding human capital, having 3–5-year contracts instead of long-term commitments could be a good strategy. Skilled experts can be pulled in from cross-sectional fields.
- Regarding governance, it will be viable to make all vital stakeholders Board members. These stakeholders can pool an initial amount of funds to kick-start operations.

Patrick Schröder

- Regarding the structure, building a CoE Hub which combines a range of institutions is an option to consider.
- The CoE can act as a Centre that provides policy assistance, as one of its key thematic services. In this context, a challenging yet important task will be to separate policy from politics.

Professor Anju Singh

- Pilot projects are needed to portray how the CE will benefit the Indian economy.
- Insights into how pilots can be scaled up and replicated and hence become a vehicle for profit generation is something the CoE can work on.

Atul Bagai

- The ongoing district level initiative on CE in Angul will provide a practical basis and will also help in understanding what kind of services are required from the CoE.
- It will be beneficial to draw insights from the Angul project and integrate them into the framework.
- The CoE could provide guidance on looking at eco-labelling from a regulatory point of view.

Subhasis Samal

- Will be happy to have a bilateral discussion to gain further insight on the work being done on CoE and share experiences from the Angul project.

K. D. Bharadwaj

- CE is broad and involves all central ministries.
- Coordination on policy advisory services will be extremely challenging in terms of putting them into actual practice. This needs to be addressed right at the outset as to how this CoE will be placed administratively and the kind of ownership structure it will have.
- Ensuring functionality and materiality in terms of outcomes is crucial.

Next Steps:

- Bilateral meetings with selected stakeholders are being organized to gain more insight into specific aspects
- The bilateral meetings will lead to a set of recommendations that will be detailed out and integrated as key inputs to the study objectives and are expected to provide a visible contribution to the completion of the study
- As per the indication by Mr. Michael Buki, a proposal to the EU could be initiated in order to learn and gain from the experience and expertise of its member states
- Proceedings of the consultation and presentation to be shared with attendees
- Proceedings will be shared with MoEFCC for necessary guidance

EMC & CII-ITC-CESD

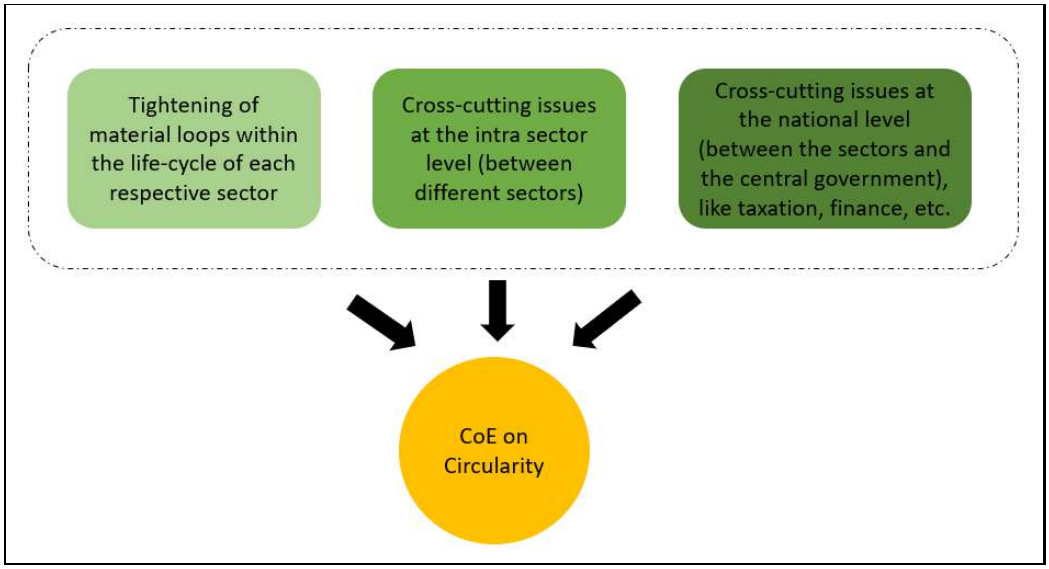
Date: 6th October 2022
Time: 11:00 AM to 11:45 AM IST
Participants: Ms. Nandini Kumar (Consultant, CII-ITC Centre of Excellence for Sustainable Development), Mr. Shourjomay Chattopadhyay (Trainee, CII-ITC Centre of Excellence for Sustainable Development), Dr. Shilpi Kapur (Vice, President, EMC Pvt Ltd), Ms. Sharvari Lowalekar (Environmental Specialist, EMC Pvt Ltd)

Key areas of focus for the discussion:

- Does CII see itself as a part of the network of institutions that the CoE plans to set up?
- Some learnings that CII has, which can help EMC at both the conceptualization stage and framework development stage of the CoE

General Remarks by Nandini:

- Circular Economy, being not just a discipline but a way of life, cannot be fostered in the atmosphere of siloed thinking.
- Breaking siloed thinking requires a multidisciplinary kind of centre, which houses skillsets of a multitude of domains in one place.
- The current proposed architecture of the CoE which involves creating a network of host institutes with one apex body has the danger of falling prey to siloed thinking.
- A way to tackle this is to consider adopting a sector-wise approach. Many aspects need to be tackled when looking at circularity from a life-cycle perspective. These aspects often tend to be material-based, for example, centric to steel, plastics, etc. This is where sector-based thinking comes into play.
- Where to position the Centre in the Indian landscape?



- The Centre should be placed somewhere in the middle, coordinating between national level needs (with respect to policy guidance and implementation, for instance) and minute material level needs that are sector specific.
- "Meat in the sandwich"
- The Centre should thus be equipped with the capabilities of addressing both industry and policy needs.

Would CII be willing to be part of the host institute?

- Nandini pointed out that she is not in the position to comment on this.
- A potential issue could be the overlapping of themes between the existing CII Centres with the CoE on Circularity. This arises because the circular economy cannot be compartmentalised.
- The Centre would thus require personnel having specialised knowledge, people who know what it means to put CE principles into practice. CII has built such a team over the years and would be happy to offer its expertise.

According to you, what kind of services should the CoE provide that would specifically cater to industries?

- Understanding the needs of industry stakeholders requires detailed discussion with companies belonging to different sectors.
- Figuring out the entire life cycle of the company with the help of all departments and pinpointing to "hotspots" where tightening the material flow is possible is one way to understand service requirements.
- Buy-in of the CEO is especially important in this regard.
- Given the strong policy stick in India, it is also a good idea to get the Finance Ministry on board (looking at aspects of standards and certifications that could help enforce certain aspects of the CE within industry).

Discussion on Slide 18: "Landscape of the CoE: Life cycle perspective, Sectoral focus, Emerging Issues and Tools- for CoE to consider": Inputs by Nandini

- The progression of the thought process behind this slide has considered the various topics related to CE (SPP, circular design, etc.).

- It would perhaps be more helpful to look at things from the materials perspective.
- Thinking from the grassroot will make interconnections more evident, hence, materials should be the starting point.
- Bring in finance specifically and explicitly in the landscape.
- "Tools" for CE would come into picture later into the future, they may not be relevant right now.
- Make labelling, certifications, and standards a separate bucket, do not include it under "Tools".
- Make Circular Business Models an important part of the landscape.

Discussion on Slide 19: "Architecture of the CoE: Network of Apex and Host Institutes": Inputs by Nandini

- There is a danger of all the pink boxes (nodal host institutes) becoming siloed.
- A possible way to combat this is by creating working groups.
    - Multi-stakeholder working groups that could function at the apex body level
    - Members could include members of industry, corporates, different levels of government to provide a common platform for discussion
    - The needs of all stakeholders could be addressed jointly due to such a group
    - The members may be revamped after specific periods of time
    - Initially, the focus of the working group would be on the fulfilment of broader goals, which can be made sharper over time

Discussion on Slide 21: "Financial Sustainability of the CoE": Any broad services categories that you could suggest, additional to what has been proposed?

- It is extremely imperative that the learnings and outcomes of the Centre are embedded into the Indian curricula.
- This can be done by establishing tie-ups with universities and academic institutions.
    - It is relatively easier to converse with private (deemed) universities, directly set up meetings with the Dean of Curricula
    - For government aided institutions, syllabus modifications have to be taken up with UGC
    - There will be a need for experts who can deliver modules on Circular Economy, and the qualifications and requirements of such faculty will need to be identified
    - Thematic/subjects within CE that can form part of knowledge building will need to be mapped out
    - Introduction of basic terminology at the school level would be a good idea
- Box: Action Plans and Roadmaps
    - Coming up with roadmaps for all levels of the government is complicated as one will have to be mindful that the thought process addresses the peculiarities of each level, but is also integrated across local, regional, and national levels.
- Resource Efficiency (RE) is a huge low-hanging fruit and India is currently very equipped (both from skillsets and infrastructural point of view) to tap the benefits of RE.
- Awareness should be considered as a separate service category. However, the Centre may not be able to make the general public the direct end user. Awareness building as a service thus has to be in the form of "Training of Trainers".
- Labelling as a service area:
    - Labelling should be tackled from two perspectives:
        a) Individual
        b) Technical

    - Using professional agencies belonging to the private sector
    - Looking at labelling based on behavioural aspects
    - "There is no point in reinventing the wheel. The focus should be on integrating new aspects into the existing structure."
- Standards and Certifications as a service area:
    - These must be ISO/BIS specific
    - Education and training for ISO/BSI as audience
- Training and knowledge building for ISO/BSI personnel is imperative. The current thought process is still very linear, and standards are framed with that thinking in mind. Furthermore, the modification process is painfully slow. Instilling CE thinking can help in changing mindsets and the fast movement of reforms in the standards.
- Integrate CE into training for civil services courses (IAS, IPS, IFS, etc.)
- Thus, education and training as a broad service category should cater to:
    - Personnel who set standards and provide certifications
    - Personnel in the civil services

What is the funding model like for CII Centres?

- The Centres are like departments within a university, they are not legally separate entities.
- Every Centre is supported by a private entity (Mahindra and ITC, for instance). The private player is often in the name of the Centre itself. The nature of the funding varies (can be grant based, project based, etc.)
- Most of the finance is through project-based funding
- Some funding comes from the EU in form of separate contracts. These contracts do not conflict with the supporting agency. The authority of deciding the sources of finance rests with the Centre.
- There is a small amount of funding from the government (mostly project based, no aid).
- Size of the CII-ITC-CESD team: 35 members

EMC & ILO

Date: 6th October 2022
Time: 3:00 PM to 3:35 PM IST
Participants: Ms. Kavya Raman, ILO Consultant, PAGE Program, Dr. Shilpi Kapur (Vice, President, EMC Pvt Ltd), Ms. Sharvari Lowalekar (Environmental Specialist, EMC Pvt Ltd)

Key areas of focus for the discussion:

- How the proposed CoE could look at fostering social aspects of CE

General Remarks by Kavya

- Based on the themes sent over email, internal discussion with the ILO team would yield more solid inputs.
- The link between CE and jobs: ILO is currently actively involved in the domain of "Green jobs", a new field of employment opportunities. The organisation is looking at whether decent work guidelines, criteria social protection and safeguards are incorporated into the jobs in the environmental sector- solar, wind, etc.
- Since green jobs are in new fields, there is scope to integrate these into policy.

- There is also a lot of potential to integrate CE into green jobs, throughout the life cycle. There are new opportunities opening in the domain of recycling, which largely involve the informal sector. Fostering a circular economy thus goes hand in hand with integrating the informal sector in a just way.
- It would be imperative to integrate Circular Design as one domain within the Centre's landscape from the very beginning, as this area is where India is currently lacking (was a suggestion at Stakeholder Consultation as well)

How does the ILO framework function?

- For social processes, any policy inputs are validated through a tripartite process (the government, the employer and worker organisations).
- For instance, work in the Renewable Energy space would include involvement of 3 entities:
- government ministries (MeiTy, Ministry of Power)
- employer organisations
- trade unions
- The outcome that comes from negotiation is a common solution which is applicable to all three entities, which is then proposed by ILO

Do you have suggestions on how to make the social integration of CE more structured, more efficient, in terms of a service provided by the CoE?

- Waste management project at ILO: Figuring out ways in which waste workers can included in the whole process - more training into social security, occupational safety and hazards- and integrating these aspects at the municipality level sensitization
- Work also surrounds the creation of conducive policies
- Scope of the project: Pune and Ahmedabad
- Connecting workers via capacity building
- Kavya will put us in touch with Pallavi, the Project Lead, who will be able to provide further insights.

Could you give us more details about your work surrounding Green Jobs?

- The domain of green jobs is quite new for ILO India, work on this is much more streamlined in the work done by ILO internationally.
- Work spans the textile sector (Jharkhand) and renewable energy sectors.
- The nature of the project is desk based and includes consultation-based research.
- Some concrete aspects where work is being done:
    - Assessments around policy readiness with respect to green jobs and just transition
    - Making data available to understand the impact of these transition
    - Geographical and demographic estimates as to the jobs that will be created
    - Accurately predicting green jobs and future trends
- The users of the outcomes are all the tripartite constituents, but mainly for the government, Ministry of Environment, Ministry of Energy, Labour Ministry.
- The official outcome is yet to be finalized, but from the research done so far, it is evident that there is a sizeable gap in understanding what type of jobs will be created in the "green" domain, what are the geographical hotspots where the jobs will be created

- There is need for more on-the-job training and platforms that spread information about these kinds of jobs.

EMC & CEEW

Date: 6th October 2022
Time: 12:30 PM to 1:15 PM IST

Key areas of focus for the discussion:

- Recommendations on the architecture of the CoE on Circularity
- The role CEEW could play for the Centre
- Recommendations on important service areas that the CoE could cater to

Inputs given by Akanksha during the Stakeholder Consultation:

- Setting up eligibility criteria to determine the selection of host institutes
- Setting up a strong MRV framework to monitor performance and track progress

General Remarks by Akanksha

- The broader (and narrower) focus of the CoE must be clearly defined.
- The overarching concept of Circular Economy will remain the same, but how it applies to and impacts different sectors is where variation will arise.

Discussion on Slide 18: "Landscape of the CoE: Life cycle perspective, Sectoral focus, Emerging Issues and Tools- for CoE to consider": Inputs by Akanksha

- With respect to the general landscape and focus areas of the Centre, any additional recommendations will be given by the CEEW team after internal discussion and brainstorming.
- It is crucial to have **industry representation**. Industry stakeholders must be part of the host institute itself.
- Forming **a tri-party consortium** of industries, R&D firms and think-tanks at the apex level will be a good set up to tackle innovation and scalability.
- It is a very good thing that the framework is looking at "Water" as a separate sector. At CEEW too, circularity is looked at from both the biotic and abiotic perspectives (clean energy, solar, wind tech, etc.)

What services would CEEW provide as a collaborative barter with the CoE?

- CEEW has the expertise and capacity of working in multiple domains and would be happy to be of assistance.
- The think-tank can provide guidance in the form of:
    - Technical guidance (policy research and recommendations, academic research)
    - Fostering industry collaborations (this is CEEW's forte, as one of its major areas of work involves creating seminal knowledge pieces and driving impact on scale. For instance, CEEW is supporting steel industry to transition to green hydrogen based on its detailed technoeconomic analysis for the sector.)

- CEEW also investigates how the knowledge pieces that it creates can be actually implemented. This involves:
    - Identifying off-takers
    - Parties to reach out to propose change
    - facilitating coordination between industry, policymakers, and other relevant stakeholders
    - Providing policy landscaping and insights
    - modelling exercises like financial, energy, etc.

- Does CEEW need collaboration with other parties to achieve its objectives? - Not to a large extent, a lot of the expertise comes internally. Collaborations are sought out for new sector ventures.
- It is too early to commit whether CEEW can be part of the network that the CoE will build.

Discussion on Slide 21: "Financial Sustainability of the CoE": Any broad services categories that you could suggest, additional to what has been proposed?

- Pilot demonstration could be included in a different grey box, separate from "Partnerships and Collaborations"
- Lens and scope of pilot demonstrations pertaining to different sectors needs to be established
- A service under the "Metrics and Indicators to measure and monitor" could be tracking the solutions available ("are we ahead of the curve?"), research on how well innovative solutions are being captured by policy. Policy makers thus need to be an integral part of this process.

Any suggestions on the funding model that the CoE should follow?

- At CEEW, we reach out to philanthropic organisations (like Bloomberg, Ellen McArthur Foundation, Shakti, etc.) for project-based funding.

Do you think there will be willingness to pay in the market for the services that the CoE is set out to offer? Any suggestions to help gauge market sentiments and demand?

- The only way to understand industry needs is to involve them in the process.
- A good starting point would be to map out issues and understand the policy structure surrounding them- this could add value and create some indication of WTP.
- Thus, developing a thorough understanding of the gaps that persist between industries and coming up with offerings that address these gaps would create demand.
- Some product examples
    - **Consolidated database** creation: A consolidated database for the waste management sector, for instance, could involve developing a waste estimation model based on statistical and projection-based tools, which would map out the potential waste generation in the future. Another domain could be mapping out recycling technologies, their current status, the geographical spread of their supply chain- all in the form of one integrated tool.
    - Creating **policy summaries** that can provide an accurate picture of the current policy landscape and help industries in their decision-making processes. It can also help members of the government by giving them a direction on integrating circularity in policy.

EMC & HICCER

Date: 7th October 2022
Time: 11:00 AM to 11:45 AM
Participants: Dr. Nallapaneni Manoj Kumar (Founder, HICCER), Shilpi Kapur (Vice, President, EMC Pvt Ltd), Ms. Sharvari Lowalekar (Environmental Specialist, EMC Pvt Ltd)

<u>Key areas of focus for the discussion:</u>

- What should the purpose of the Centre be?
- What kind of services should the Centre provide? (In this regard, suggestions on service areas that do not overlap with the current services being provided in the Indian context would be appreciated)
- Would HICCER be willing to contribute to the CoE network? If so, what kind of services would HICCER provide?

General Remarks by Dr. Nallapaneni

- Research done by Dr. Nallapaneni which led to the founding of HICCER:
  - While conducting the surveys for his PhD dissertation, Dr. Nallapaneni found that a broader context of circular economy thinking from a general audience to a highly skilled audience was missing (example of the range: student in a Tier 3 college to an IIT level professor).
  - Everyone was found to have a different view on CE, relating it mostly to sustainable production and consumption, further from a chemical engineering and waste management point of view. The general conception hinted towards product-centric thinking.
  - Most of the sample interviewed (faculty + students) did not know that CE was a concept in existence.
  - Dr. Nallapaneni also interacted with a few of the well-established CE organisations based in Europe (Centre for Industrial Ecology, Yale; NTNU, Norway; Shanghai University, China). These organisations think of CE from the social sciences point of view. They were unaware about the technical side of CE, what technologies can drive the transition to a circular economy.
  - Based on the market landscape, Dr. Nallapaneni came up with a unique model, answering the following questions:
  - What business models are required for the transition?
  - As a result of this thought process, HICCER's outline was formed focussing on a generalised layout. This layout was further leveraged to individual departments within education systems.
  - The Centre provides **circular economy centric education, research, consultancy, and advocacy**. It aims to appear as a research and think-tank organisation, not an academic institute.
  - All business models propagated by HICCER are considered as centres within HICCER.
  - Further brainstorming led to the formation of "actionable sections" (Circular Cities, Circular Start-ups, Circular Villages ESGfy X, Historical Evidence of CE, Island CE, Mission Circular India, Women in CE, Young Minds in CE).
  - HICCER was established in India to enable circular thinking across Indian academic institutions. Given the difficulties of instilling circular thinking within the Indian population, the Centre links CE with its historical evidence in India's culture. This was imparted in an educational setting.
- Currently, HICCER is concentrated on developing a framework that can be applied to every critical infrastructure aspect.
  - How can we drive India towards carbon neutrality while making use of existing infrastructure sectors?
- A lot of research was done of critical infrastructure sector classification in a global setting, to gain more context. 16 classifications were recognized, which are being followed by the US and some European countries. They divide all resources from a technological and social impact point of view. The method followed to decentralise these sectors makes it easy to propose and implement positive change.
- The same thought process was utilised in the Indian setting, but work is being done using existing infrastructure sectors, which is the aim of the "Mission Circular India" (MCI) actionable section.
- Phase 1 of MCI: country level, phase 2: city level (will be implemented with assistance from Circular Thematic Research Groups housed in different academic institutions in India)
- HICCER wanted to promote a "CoE on Circularity and Resilience" - currently an MoU has been signed with few Indian institutes, which will help in the Phase 2 of MCI. The outcome will be city-level circularity reports for India. HICCER is also focussing on state-level analysis, which will involve hotspot identification, interaction between state and central government and interaction with NITI Aayog for policy framing.

Are you working with the State government for the state-level circularity action reports?

- HICCER is currently working with individual people housed in different ministries, not the state government as an entire entity.
- Did not receive enough support from the state government, hence the analysis scope was twisted to cater more to the academic institutions.

What is the focus of the current work being done: An All-India report on circularity?

- Baseline assessment for every infrastructure sector in India
- Review of existing policies and how these policies can be tweaked, and a circularity angle can be brought in
- Example: looking at the water sector would mean looking at where all water is being used in India- country wide data collection on resource availability and how it is being channelled for different functionalities (industrial, agricultural, domestic, etc.), potential technologies to facilitate wastewater reuse and the related policy support, rainwater harvesting system- how can it be harnessed.
- The report after completion is pushed to the government (PMO office)

What is the nature of the universities that you are in interaction with?

- Mostly private universities and a few IITs and NITs through personal connect and research collaborations 4
- Public universities did not show much interest.

What is the organisational structure of HICCER?

- HICCER is a physical entity registered in Kerala, 3 years old.
- Currently, there are 5 full-time and 16 interns.
- HICCER has hired one intern for each infrastructure sector.
- Thematic working groups consist of students from universities who want to work in the field of CE. HICCER launches projects where these students are taken on as team members. These projects go to the Mission Circular India report.

What is the financing model for HICCER?

- It is very difficult to finance things at the moment.
- Initially, a self-finance model was followed. Eventually, the centres within HICCER started generating revenue through memberships and registrations.
- The model followed to establish CoEs on Circularity and Resilience in different institutions was fixed intake of bachelor-level, masters-level, and faculty (representing STEM fields) to contribute to the Centre. These members will pay fees, and HICCER will provide a top-up diploma course on CE. This course can be taken along with ongoing degree courses.

Academic Courses offered by HICCER

- The top-up diploma mentioned in the section above. Currently, the diploma is open only to individuals who have signed an MoU with HICCER, but the program will go mainstream soon. The course is online, with faculty taking classes. The faculty members are the Governing Council Members of HICCER (32). These Council members are esteemed faculty at universities around the globe.
- Executive course on CE in India will be launched in Delhi with OP Jindal University. It would be a 20-hour course, with 6 (3 hour) modules. The outcome of the course is circled around a pre-assessment and post-assessment model to track learnings.

- Hence, HICCER is mainly focussed on training, research, and capacity building.

Accreditation Program (ATOCE) given by HICCER
https://hiccer.com/atoce-accreditation

- HICCER provided accreditation for 3 conference programs (1 in Turkey, 2 in India)
- The marketing plan for the rolling out of the accreditation program was to provide it together with the Centres of Excellence. The parties collaborating with the CoE will receive an accreditation and their progress will be tracked over time. Failure to adhere to the standards would lead to revoking of accreditation.
- 4 types of accreditations ATOCE (C, E, R, P)
- Focus on school-level awareness building as well.
- Accreditation is not provided to any corporates at the moment.
- HICCER is looking for who can partner with it to provide accreditation.

Does HICCER collaborate with target groups to roll out activities/programs?

- The collaborators participate in the activity and guide the conduct of the activities

Given your expertise, could you suggest the service areas that the CoE on Circularity in India should focus on?

- HICCER's model is centric to individual business entities. It will not be able to provide services that have applicability at the national level.
- The right kind of advocacy is crucial. Data, research, and impact driven advocacy. HICCER provides this research and wants organisations to take the findings forward.
- The CoE should engage with existing centres and use its position to implement the outcomes of pre-existing and valuable research.
- The Centre should also specifically partner with academic institutions (colleges, tier 3 universities, etc.) to instil learnings pertaining to CE at a pan-India level.
- The CoE should, under its "Networks and Collaboration" arm, be able to connect other Centres of Excellence to institutions which are beyond their reach. Foster a bottom-up approach.

- HICCER is only in relation with UNEP and UNITAR as a collaborator to provide guidance.

Any global Centres that EMC should look at to draw learnings from?

- Nordic Circular Hotspot (https://nordiccircularhotspot.org/) - Their conceptual framework can have applicability in the Indian context.
- CIRCULÉIRE, Ireland https://circuleire.ie/ - National platform for circular manufacturing - framework is somewhat related to HICCER, but focused on government level- engagement with ministries
- HICCER is also bidding for projects in the following areas:
    - Research and development
    - "Proof of concept": How research centres conduct research- developing a conceptual understanding and related hypothesis around a proposed idea- these projects are conducted by pooling the expertise of multiple organisations

EMC & DMF ANGUL

Date: 10th October 2022
Time: 5:30 PM to 6:20 PM IST
Participants: Subhasis Samal (DMF Angul), Deepan (DMF Angul), Dr Shilpi Kapur (EMC Pvt Ltd), Jidnyasa Ghag (EMC Pvt Ltd), Sharvari Lowalekar (EMC Pvt Ltd),

Presentation by Subhasis on the work done around CE in Angul District, Odisha

- Angul is the industrial capital of Odisha and is a major hub for coal extraction and coal-based resources.
- Name of the programme- GRACE: Governmental Response for Achieving Circular Economy (and Resource Efficiency). The ad-hoc partner at the start of GRACE was UNEP, India.
- The objective of the programme is to model a replicable model that could help in achieving scalable circular and green economic growth.
- The project was started in 2021 during the second wave of the Covid-19 pandemic, with a stakeholder's orientation.
- Based on the proceedings on the orientation, prioritizations were made. This led to the formation of 6 verticals under the project.
- Furthermore, a taskforce was developed with experts all over India to take forward work under each parallel.
- 2 projects were conceptualised under two verticals:
    - Water and eco restoration of abandoned mines
    - Development alternatives for infrastructure and allied services
- An MoU was signed with UNEP, making them the official Program Technical Partner of GRACE.
- Organisational structure of GRACE:
    - Chair (District Magistrate) and Co-Chair (Country Head of UNEP) at the apex level
    - The Taskforce of CE and RE- works under the Chairs- consists of Regional Officers and State Pollution Control Board members. The taskforce acts as a regulatory body as well.
    - Under the Taskforce, line departments, urban & rural local bodies, and industry's function.
- Verticals finalised under the program (in line with NITI AAYOG's draft of CE):
    1) Plastic
    2) Electronics
    3) Textiles
    4) Aluminium Steel
    5) Infrastructure
    6) Water Management
    7) Eco-Restoration of Abandoned Mines
- Some interventions needed for all parallels:
    - Capacity Building
    - Skilling
    - Auditing
    - Procurement support
    - Finance
- Some projects launched under GRACE:

- Cycloo: Retail space dedicated to sale of products and services involved in closing the loop. Promoting sustainable production and consumption. Some brands launched under Cycloo include: Attaware (edible cutlery), Phool (incense stick made out of flower waste).
- Circular Hub: Train and educate entrepreneurs by giving them a common place to foster CE and RE. Investment will be done by entrepreneurs.
- Vehicle Scrappage Unit: Joint venture with Mahindra & Mahindra in order to set up a vehicle scrappage unit in Angul (beneficial because the district is centrally located).
- Rural FSTP: India's first rural Faecal Sludge Treatment Plant, being set up as a pilot project in Angul.
- MESH: Micro Enterprise for Sanitation and Health. Angul has developed "modern toilets/e-toilets". The business model for these toilets is such that it is receiving enough .

https://www.dailypioneer.com/2021/state-editions/e-toilets-launched-in--angul-municipality.html

- WASH in Schools and Tide Turner Campaign: All schools in Angul are WASH compliant.
- Solar Grid Project: Aim to run the whole city via solar power. The city Tacher coming under the National Clean Air Program is selected for this project.
- E-Mobility: Project will be made concrete in November. Focuses on deployment of EVs in Angul. E-rickshaws are planned to connect railways stations and in-town areas. E-buses are planned to connect twin cities (Talcher and Angul).

- Out of the 6 verticals, the conceptualisation, design and paperwork is done for the rolling out of 3 verticals.
  - Infrastructure and Allied vertical
  - Landscape restoration and rejuvenation of water bodies
  - Eco-restoration of abandoned mines and repurposing restored land
- For the plastics and e-waste management vertical, design of the project is in process.
- Infrastructure and layout are already in place for the Aluminium and Steel vertical.
- Work done under each vertical:
  - Infrastructure and Allied:
    - Done in collaboration with the Development Alternative (DAI)
    - Generation of carbon credits, roadmap to ensuring green norms compliance of all buildings (IGBC), plans for setting up MRFs and local enterprise-based operational models, policy design for mainstreaming circularity, SRMs for building construction
    - DMF has a budget of 200 Cr., each panchayat has an annual budget of 50 lakhs. The work done in this domain is aimed at addressing the huge capacity gap that exists within procurement and technological capabilities.
  - Landscape restoration and rejuvenation of water bodies:
    - Done in collaboration with IIT Kanpur
    - Major deliverables: created a district water atlas, distilled water governance platform, designing projects required for restoration of water bodies.
    - 2-year project
  - Eco-restoration of abandoned mines and repurposing restored land
    - Project to be rolled out in 4 phases.
    - Void mines need to be filled in meaningful ways-need to provide livelihood-repurposing abandoned mines.
  - Plastic and E-Waste Management
    - Project design in progress
    - 2 plants will be established in the span of the next 6-7 months.

    - ❖ Creation of circular business models for plastics- encouraging people to deposit used plastics to collection centres
    - ❖ Outputs: building supporting public infrastructure, buy-back arrangements with the government
    - ❖ The plan is to extend the project to state-level implementation
- All kinds of prerequisite events that are required to gain knowledge and background to develop a solid base were organised. An investor's meet was organised in May to gather investors who are looking to finance sustainable manufacturing.
- Circular Hub Challenge/Centre of Excellence Challenge- to be launched soon- entrepreneurs will invest in sustainable segments (manufacture, train, provide services).
- More information about Cycloo
    - Two spaces: manufacturing and retail
    - Every product that is part of the space will have recyclability in their core.
    - All blocks and ULBs will promote at least one Cycloo based product/service.
    - Many partnerships- Shoonya: refurbishing electronic waste; JSPL: manufacturing paper-based waste. Upcycling is done out of wastepaper; Alpha Planter: planter boxes and dustbins made from waste pouches (milk pouches, bottle caps, etc.)
- Circularity Challenge organised by GRACE: The team is open to suggestions and inputs on how innovations can be fostered.
    - Shilpi Ma'am suggested conducting Innovation Challenges, like hackathons.
    - It is also important to have industry connections and provide a platform for entrepreneurs to showcase their solutions.
    - Furthermore, the scope and backing for pilot demonstrations should also be factored in.

Discussion with the EMC Team

GRACE has identified a set of key areas to work on. How is work being institutionalised? Are there other agencies (like IIT Kanpur) that you collaborate with? What is the nature of the collaboration? Do you see Angul district approaching a possible Centre of Excellence on Circularity in this respect? What kind of support would you seek? Are there any guidance areas that are lacking from your current collaborations that the Centre could fulfil?

- GRACE has UNEP on board, and an official has been signed.
- GRACE will thus seek UNEP's advice through a global think-tank, academia, not-for-profit helping for technical support.
- Resource requirements can be fulfilled by the district administration, which will route some of the resources required, in terms of legality, ground support and so forth.
- The work done in Angul is separate from the work pertaining to CE that was done in the state of Goa and Telangana under the EU-REI project.
- It is very difficult to find proper anchoring at the state level. Unless the leadership up in the hierarchy prioritises this domain, work will not get a head start.
- Angul is prospering because it has the resources (mining royalty, CSR funding) and the administrative backing. In addition, Angul also has a lot of scope to do work related to decarbonization and CE, housing a heavy emitting industry.
- Angul is also working with multilateral organisations and highly ranked academia. These institutions are very bureaucratic.
- GRACE plans to establish concrete outcomes (within and outside Odisha) within 3.5 years in order to set examples for other regions to replicate and scale up the efforts.

- The organisations that provide guidance to GRACE are not well-versed with the government regulations and procurement criteria. For instance, a renowned NGO can support the programme, but is unaware of how time-consuming it is to go through the government, which leads to loss of interest.
    - The issue of compliance at the lower levels is still pertinent.

Would you agree that a lot of activities that you are doing under key parallels fit into the hotspot areas for the district and the action-plan?

- No, very few are aligned with the district hotspot areas.
- For instance, mining restoration was in place as a regulatory norm, but know-how within the company about environment friendly practices was lacking. The innovative use of space is not something that the lease taking company would be interested in because they are too busy getting compliance in place.
- Another example would be the parallel of landscape restoration and rejuvenation of water bodies. It is not within the scope of the typical line departments to do this kind of work.

- GRACE is trying to connect recycling facilities to public funding sources. They collaborate with institutions, for instance, CIPET (Central Institute of Petrochemicals Technology). CIPET will run a plant commissioned by GRACE for 1 year and try to achieve a break-even point. It is then outsourced following a municipality revenue model. This will employ some waste-pickers who will be skilled as well. It is also closing the loop because waste-pickers are not reliant on external kabadiwalas to deposit the waste. The project cost will be around 12 crores.
- Currency Angul is sending plastics to outside states for treatment. This is an effort to localise the treatment and recycling process, by making Angul a recycling hub. This will eventually also generate revenue.
- Currently the capacity of this project is 5 TPD, which can be scaled up once progress is visible.

Scope for EMC to collaborate with GRACE

- Establishing a park dedicated to CE, showcasing artefacts made from waste with the aim to generate awareness about CE. Artists who create these artefacts should be of national repute.
- Support required for launching the Circularity Challenge. Setting up eligibility criteria for entry of participants, standard operating procedures. Documentation and dissemination support is required. Outreach strategy will also need to be built.

EMC & MAHINDRA GROUP

Date: 14th October 2022
Time: 9:30 AM to 10:10 AM
Participants: Anirban Ghosh (CSO, Mahindra Group), Dr Shilpi Kapur (Vice President, EMC Pvt Ltd), Jidnyasa Ghag (Research Assistant, EMC Pvt Ltd), Sharvari Lowalekar (Research Assistant, EMC Pvt Ltd),

<u>Key areas of focus for the discussion:</u>

- Proposed architecture of the CoE
- Broad service areas that the CoE could investigate (the aim is not to duplicate the services that are already being provided in an Indian setting)
- Understanding industry needs and how this Centre can provide the kind of assistance that industry stakeholders typically would not get from elsewhere

General Remarks by Mr. Ghosh: Circular Economy in Automobiles

- Two possible things can be done to foster CE in the Automotive sector:
  - Using recycled materials
  - Increasing the recyclability of products through innovative design
- Other things that are talked about, but are far-fetched for the automotive industry include:
  - Designing for durability
  - Reduction in materials used
- The "Rs" of Circular Economy often written about in theory are difficult to achieve on-ground, given the current position India holds in the transition to a closed loop economy.
- The actual recycling process of some materials used and the reuse of the by-products during manufacturing (e.g.: sludge) is also not developed enough to reach maturity in India.
- There are 3 buckets common to all sectors:
  - The by-products resulting from manufacturing
  - The extent of recyclable material in the product
  - The potential of life extension (from a design perspective)

With respect to recyclable materials, would standards and certifications play a key role? Do you think it would help if the Centre considered this as a possible service? (This question is also addressed further in subsequent sections)

- The practice of reverse logistics and the ecosystem of recycled services needs to become stronger, and standards and certifications can strengthen this need.
- In Mahindra's context itself, for a recycling centre set up with MMTC, the inflow is very less, hence there is no potential for scaling up.

What are the levers that can be pulled to create a sound recycling ecosystem?

- Policy backing and research will solve part of the problem.
- More importantly, there needs to be an increase in incentives for stakeholders (not just in monetary terms).
- Better propositions for consumers, that will make them choose an authorised recycler above informal sector recycling, and further, better opportunities for the informal sector to tie up with recycling units.
- There must also be a push towards changing consumer behaviour- "Why will people give their vehicles for recycling?"
- The first useful life of vehicles:
  - How long can you drive a car before it turns into scrap?
  - Mention of RTO rules
  - Mention of BS IV and BS VI emissions standards

https://www.acko.com/auto/difference-between-bsiv-bsvi-engine-bs4-bs6-performance/

"Both BSIV and BSVI are emission norms that set the maximum permissible levels for pollutants emitting from a car or a two-wheeler exhaust."

- The Centre could do suggestive policy work, indicating what kinds of policies are required in which areas. This would act as a powerful and impactful tool.

- Probably the biggest bottleneck in India's CE landscape currently is material recycling.
- Different industries require different expertise when it comes to recycling their products.
- In this context, "material sciences" could be one aspect of services that the CoE could provide.

- "The element of bringing design into circularity is important, but it is also important to look at CE from a material perspective, especially to achieve the target of zero waste to landfill."
- The Centre could draw learnings from and collaborate with IITs across India that have enterprise in metallurgy, chemical engineering, production, and many other departments relevant to material sciences. The contribution of these academia will be invaluable.

What is your perspective on remanufacturing?

- Remanufacturing is not new; it has been happening since the 1990s (example of XEROX was given)

https://www.sciencedirect.com/science/article/abs/pii/S0959652600000329

- Remanufacturing is a success when the product evolution is slow. In general, when the product-life is long, remanufacturing works (example of furniture was given)
- For products with a short life, the impact might be limited (example of smartphones was given)
- It is also possible to remanufacture a part of the product. This, however, depends on the pace of technology change (example of engines was given, if a newer technology for engines becomes market competitive, there is no use in remanufacturing the obsolete engine parts.) Remanufacturing is closely linked to the reuse of materials within the engine.
- It is therefore essential to understand what impact manufacturing will have on the operations and value chain before going for it.
- A major reason why automobiles do not get remanufactured is the associated high risk of consumers facing spurious parts, which could potentially detriment the reputation of the company.
- Repurposing materials of old products is thus more relevant for automobiles manufacturers. The sector faces a choice: remanufacturing or repurposing?

An element of the proposed architecture of the Centre is looking at benchmarking pertaining to circularity and Resource Efficiency. What are your thoughts on this?

- Benchmarking is extremely essential in the CE space and the Centre looking at this aspect would be helpful.
- Eventually the question of "how green is the product?" will arise. The percentage of recycled material used in the product's manufacturing, for instance, will determine its success.
- In this changing backdrop, benchmarking is inevitable. So are standards and certifications.
- There needs to be some concrete framework in place that will gauge the quality of the products being churned out in a circular economy.
- Mr. Ghosh gave the example of food standards, how they were a big deal when he was young, and how there were ample cases of adulteration found in food.
- A similar situation persists in the CE space, as consumers need some cues to distinguish good from bad.
- As a closed loop economy becomes the norm, certifications will become a part of life and their importance and intensity will reduce. They will become a part of life, like food standards are today.
- However, the certifications assuring that a product is the result of a CE will have to be simpler to understand for consumers. However, one needs to be mindful as to not make it too simple and fall prey to false and unreliable marketing claims.

Concluding Remarks

- The central focus should be on material sciences with an ultimate goal to create an ecosystem in which every single material is looped back into the system.

- Material sciences will help in figuring out whether waste can become input/raw material- within the value chain or for another industry.

1st REFERENCE WORKING GROUP MEETING

Date: - 20th October 2022

Time: - 4:00 PM to 5:30 PM IST

Opening Remarks by Dr. Shilpi Kapur

The presentation delivered by Dr. Kapur aimed to provide a glimpse into the ongoing work undertaken under the project and to seek inputs on key aspects from the Reference Group members. Dr. Kapur spoke about the relevance, need, and role of a Centre of Excellence (CoE) on Circularity, specifically in an Indian context. She further went on to discuss the existing models of CoE's in India and the possible architecture of the CoE on Circularity. The presentation touched base upon the objective, scope, and work plan of the study. The services that the Centre could offer, under some broad areas identified by the EMC team were also talked about. Emphasis was laid on the importance of the life-cycle perspective, sectorial focus and some emerging issues and tools for the CoE to consider. A draft institutional architecture was proposed and the financial sustainability of the CoE was discussed. In addition, Dr. Kapur also spoke about the possible criteria that could determine the selection of institutions that would form part of the Centre.

Discussion with Reference Group Members

Dr. Kapur encouraged participants to pitch in with their inputs as she was presenting the slides. The presentation started by introducing the role of the Centre, and how it could cater to some specific domains. Members were asked for their views after the work done by the EMC team under each domain was talked about.

❖ *Inputs on the role of the CoE towards policy:*

Dr. Ruediger Kuhr

- Any progress to be achieved on circularity must be data driven. The proposed structure of the Centre lacks the mention of data.
- The Centre could play the role of a data hub in conjuncture with circular economy, providing unbiased and insightful data which can drive further research.

Mr. Shailendra Singh

- There is a policy/advice/guidance functionality that would be supported by the necessary tools.
- How is the policy advice, sandboxing, guidance to ministries getting translated into effective policy statements?
- The application of the policy advice and guidance should be a separate, more explicit bucket.
- The use of scientific tools (e.g.: a materials library, life-cycle assessment) are fundamental to foster circularity. The Centre should lay emphasis on these.

Question to Mr. Singh by Dr. Kapur: What according to you are the ways in which the Centre could take a lead in the delivery and use of knowledge products and policy suggestions?

- Establishing prototypes and demonstrating their functioning could be a way.

- Backing pilot demonstrations could thus be a role of the Centre. This also calls for collaboration with various stakeholders.
- How do you get all the stakeholders to collaborate?
- A transition to CE must have equal impacts on economic value creation and social capital creation.

Dr. Ruediger Kuhr

- The CoE should be developed in a way that it acts as a "one-stop-shop" for all circular economy related information.
- This stand will help the Centre in remaining cutting edge.

❖ *Inputs on the role of the CoE towards awareness and capacity building:*

Mr. Shailendra Singh

- Knowledge and awareness gaps exist within all stakeholders, not just government officials, around the meaning of circular economy.
- People usually miss out on the aspect of CE that includes systemic thinking, innovative design, etc.
- The Centre could be involved in the making of a knowledge product on CE which could include a definition, adaptation of CE for various industries, business case for CE, environment case for CE, etc.
- Ultimately, everything will boil down to materials. The Centre could also follow a material perspective.
- For the user of the Centre's services, there must be availability of R&D equipment, trial equipment and involvement of sectorial experts that can become part of capacity building.
- Cross-sector collaboration is something that can be triggered through knowledge building. The Centre could facilitate such kinds of collaborations.
- "There is a lot of cross-learning waiting to happen".
- In summary, the Centre should focus on:
  - Knowledge sharing and best practices surrounding the fundamentals of a CE
  - Technical aspects of a CE dealing with materials, processes, R&D and innovation

Ms. Maya Valcheva

- The Centre could focus on designing more programs for the general public on how to have a more sustainable lifestyle.

❖ *Inputs on the role of the CoE towards partnerships and collaborations:*

- None

❖ *Inputs on the role of the CoE towards circular business models and industry:*

Mr. Shailendra Singh

- Examples of systems thinking, and innovative design need to be quoted as examples of good practices in CE.

Question to Mr. Singh by Dr. Kapur: What is the mode of demonstration that you have in mind, and how can the Centre help in the setting?

- The Centre can set the stage for best practices.
- The Centre can also popularize circular initiatives (examples) undertaken in an Indian setting, enabling people to think at a broader level.

General Question by Dr. Kapur: Are there any other broad service areas that the CoE could cater to, apart from the buckets currently identified by the team?

❖ *Inputs on Landscape of the CoE: Life-Cycle Perspective, Sectorial/Cross-Sectorial focus, emerging issues, and tools slide:*

Dr. Vijay Habbu

- Electronics sector is missing, can be included as it is prominent to CE.
- Renewable Energy could be moved from the "Emerging Issues" domain to the "Sectors" domain.

Question by Dr. Habbu: Why are plastics and packaging considered as different sectors?

  - The packaging sector also considers materials other than plastic.
  - Plastics has been considered as an industry, and the plastics within the packaging sector looks at application, and will focus on design, reuse. The plastics sector in itself will look at the entire value chain, and focus will primarily be on recycling.
  - Hence, chemical recycling, for instance will be of more relevance to the "Plastics" sector.

Dr. Ruediger Kuhr

- The automotive industry should also be covered under the "Sectors" umbrella.
- Batteries might also be a sector for inclusion, since it is now a ubiquitous good.
- EPR is very much pushed around the globe currently. However, Individual Producer Responsibility is also gaining traction. IPR might be something the Centre could consider.
- "It is easier to establish circularity if you are only dealing with your own products."

Ms. Maya Valcheva

- It might be good to clearly inculcate the concept of industrial symbiosis, which brings in the element of localization.

Mr. Shailendra Singh

- Systems thinking is not being addressed and needs to be culled out separately.
- Establishing a link between achieving circularity at various levels (city, state, and then eventually the nation) and seeing how the interplay comes into action.
- "Let us work our way up. Start by making a village circular, then a district, a state and finally the nation."

Mr. Prabhjot Sodhi

- Government is actively working on a comprehensive scrap policy, enhancing repairability, and so forth.
- The Centre could provide policy adviser to the government in areas or sectors where gaps persist.
- Mr. Sodhi also brought out the importance of product life extension.

Ms. Manisha Choudhary

- The government has already come up with 11 CE action plans. The idea is to develop a framework on how the Centre can support the implementation of those action plans. Keeping this motive as the base and working backwards to build a framework could help.
- It could help to hold Reference Group Meeting on focussed areas of discussion (just on financing, institutional architecture, etc.) to get concrete inputs.

❖ *Inputs on Architecture of CoE- Network of Apex and Host Institutes:*

Mr. Shailendra Singh

- Recommendation: Proposing an entity of CE which has a holistic representation of ministries. Collaboration at the ministerial level.
- Waste management is an emerging issue, and eventually, the top-down and bottom-up approaches of dealing with waste will merge. Developing both are equally important.
- Comment on architectural framework: Managing the vast nature of the network might be an issue.
  - "How do you get all the horses riding in the same direction?"
  - Managing the operation of the network would then be a major part of the apex body's job, which should be avoided.

❖ *Inputs on Governance Model*:

Dr. Kapur explained the proposed governance model of the Centre, consisting of an amalgamation of bodies. She pointed out that the nature of the Centre (Not for Profit SPV or For Profit SPV) is yet to be finalised. Further Dr. Kapur also elaborated on the challenge that the team is facing on prioritizing the areas that the Centre could serve.

- No inputs

❖ *Inputs on Service Delivery Model*:

Dr. Kapur shed light on the proposed mode of service delivery that the Centre could adopt. Some services could be provided directly by the Centre, while others could be provided through the expertise of the host institutes. Services can also be delivered through government regulatory entities to facilitate monitoring and with the help of national and international partners.

Mr. Prabhjot Sodhi

- The Centre can take up the role of developing standard operating procedures in conjuncture with government entities to enable CE at all levels of the country.

Ms. Maya Valcheva

- The models (architectural, services, landscape) are all well thought of and interconnected.
- However, there is a need to conduct a feasibility study to understand the sustainability and demand of the framework that will back each service delivery domain, as all of them have varying target audiences and will require different institutional designs.
  - "How do we decide the best model?"

❖ *Additional inputs*

Dr. Vijay Habbu

- What is the motivation for different industries to be part of the Centre?
- Barring some (e.g.: plastics) why would other industries that are not in the limelight to practice CE want to be a part of the Centre?
- What are the parameters to measure the progress of the Centre?

Both questions were answered by Dr. Kapur.

Mr. Prabhjot Sodhi

- What are the interests of different sectors in practising circular economy and how can they be addressed?
- Mr. Sodhi talked about the work done by the 11 Sector Committees ad their linkages with ministries.

- The Centre could take up the role of becoming a monitoring body. It could monitor the actions of the 11 Sector Committees. The Centre should strengthen the effectiveness of the system.
- Investments and grants should follow a phased and controlled approach.
- Effective waste management of renewable energy components (Solar panels, wind turbines) is also pivotal in fostering a CE. The Centre could come up with implementable action plans for the same.
- Mr. Sodhi asked about the financial sustainability of the Centre.

Closing Remarks by Dr. Prasad Modak

Dr. Modak offered his thanks to all participants for their insightful suggestions. He elaborated on the need to design the institution under question as a Centre of Excellence, and not as a Ministry of Circular Economy. Dr. Modak also spoke about how a lot of work surrounding CE is being undertaken at the private and public domain. For instance, each of the 11 live ministries set up by the government have already started implementation pertaining to circularity. The plastics sector is also gaining a lot of traction. The role of the Centre would thus be to identify the gaps that exist within the current system and come up with solutions to address them.

Furthermore, Dr. Modak also drew upon his experience in setting up Centres of Excellence in other countries. He remarked on how the process always begins with setting a very broad, overarching framework with specializations brought in in a phased manner. He emphasized on the need to map the growth of the Centre in a strategic setting.

Dr. Modak pointed to the lack in discussion and implementation on circularity at the state and sector level, as opposed to the geographical level. He concluded by bringing in the need to sharpen the broad canvas of the framework and identifying the critical areas that the Centre should focus on.

Next Steps:

- Bilateral meetings to be set up with all members to gain further insight on targeted areas.
- Project work plan and schedule for subsequent meetings to be shared with the Reference Group members.

EMC & ICCE (International Council for Circular Economy)

Date: 21st October 2022
Time: 9:30 AM to 10:10 AM

Participants: Mrs. Shalini Bhalla (Managing Director, ICCE), Dr. Shilpi Kapur (Vice President, EMC Pvt Ltd), Sharvari Lowalekar (Research Assistant, EMC Pvt Ltd), Jidnyasa Ghag

<u>Key Focus Areas for Discussion:</u>

- Recommendations on important service areas that the CoE could cater to
- Scope and extent of ICCE's collaboration with the CoE

Discussion on service areas

- Explicit focus needs to be put on measuring circularity with the help of indicators and metrices
- Quantifying circularity is going to gain traction in the future, and the Centre would be a facilitating body in this regard.
- In particular, measuring circularity for industry players should be focused on
- Two things will take shape in the Indian circular economy space:

    - Given the current policy and regulatory landscape globally (ISO amendments and EU policies for decarbonizing supply chains were mentioned) India is in a dire need to speed up its transition to circularity.
    - In this context, as standards and regulations go mainstream, quantifying the extent of circularity will become an important sector.
- Measuring circularity is a service that is not being provided by any Indian entity till date, and the Centre can become the frontrunner.
- It is not possible for the Centre alone to undertake this responsibility, and it can be achieved through meaningful and strategic partnerships.

Question by Dr. Kapur: Do you see the Centre designing the tools necessary to measure circularity for subsequent use by industry players and the government? Could the Centre also play the role of reporting on circularity?

- There is no need to reinvent the wheel, there are already multiple organisations that have come up with frameworks to measure circularity.
- We might need to alter existing metrices according to Indian industry requirements.
- The Centre can come in at how these metrices can be effectively used, enabling their proper use and reporting for industry players.
- The Centre can also help Indian products in complying to sustainability-related standards and norms that are applicable in international markets.
- Currently, we do not have widely accepted indices/metrics of any particular company. Each company that has developed frameworks has done so in a way that it caters to their own needs.

Question by Sharvari: ICCE offers a "One-Stop Sustainability Tool" as one of its services. Is this something that the Centre could draw learnings from in the context of measuring circularity?

- ICCE has not worked on the metrics that are provided by the tool themselves, it is a third-party tool.
- The Council delivers analysis through that tool, and it is a collaborative initiative with another organisation.
- Currently, it is more driven from the regulatory perspective (ESG), and not from a CE angle. Going forward, other aspects will be incorporated into the metrics.

Discussion on policy advice as a service

Question by Dr. Kapur: What are some areas within policy advice that the Centre could take up on priority?

- In an India specific context, discouraging the use of virgin stock by promoting models of reuse, refurbish and remanufacture.
- The present focus is largely on recycling, and that is not helping in product life extension per say. The process of recycling also tends to be emission intensive.
- At the moment, the Indian policy landscape does not support remanufactured and refurnished goods.
- Policy push will make circular products cost competitive.

Discussion on CoE's institutional model

- The involvement of not-for-profit organisations is very miniscule or negligible in the proposed framework.
    - These third sector organisations play an extremely important role when it comes to waste management and other domains pertaining to sustainability.

- Along with public and private partners, the third sector should also have an equivalent say in the workings of the Centre.

Discussion on ICCE's CoE

- ICCE is in the process of launching India's first Centre of Excellence, called Circular Lab. The Lab will be inaugurated in the month of November. It is centric the state of Maharashtra. The Lab plans to focus on policy advice, capacity building, circular tool development and industry collaboration.
- The first conference of the Lab will be organised in November, and which will have a research centric aim. It will encourage competent minds to submit papers.
- The Lab is also working very closely with the Maharashtra state government, which will then work towards fostering circularity at the local levels.

Question by Dr. Kapur: Could the Circular Lab be considered as a potential host institute of the CoE in the future?

- Absolutely. Such a collaboration will set an example for other states to develop state-level circularity action plans.
- The ICCE is also working on another platform, which is a national entity hosted. The Council has already engaged with a multitude of stakeholders and will see the light soon.

Question by Dr. Kapur: Do you see ICCE contributing towards strengthening the institutional structures that are required to take the CE agenda forward?

- Definitely. This is very much on ICCE's agenda, and it is within the capacity of the Council.
- Capacity building will be an ongoing strength of the Council.
- The Council also brings in international experiences and collaborations, whose importance cannot be underplayed. The EU, the UK, Scandinavian countries and doing extremely impressive work in the domain. The ICCE has strong cross-country contacts and those will prove helpful in taking the CE agenda to the mainstream.

Question by Dr. Kapur: While interacting with stakeholders to gain inputs on the framework of the Centre, a lot of them indicated that there is a strong need for integrating CE knowledge into academic curricula. What are your thoughts on this?

- The Council has been actively working in this area for the past two years. They have developed a 32-hour course which served as model curriculum for AICTE (All India Council for Technical Education). ICCE is also working with other colleges across India (Goa, Tamil Nadu, Uttarakhand, Delhi) that want to integrate CE in their course structure as an open elective.
- Many a times, colleges do not want circularity as an explicit model are looking to club the concepts of CE with big data, data analytics, etc. ICCE then tweaks the course to the needs of the college.
- That buy-in or willingness to integrate CE into education exists in India and Indian institutes have the appetite to include it in their course modules.
- ICCE is also in talks with the NCERT for integration at the school-level. The Council is pushing for climate change and CE to be incorporated in the syllabus.

Discussion on MSME needs

Question by Dr. Kapur: What could be potential service areas that the Centre could provide, which would cater to MSME needs?

- Sustainable procurement is what will boost the SME sector.
- The entire chain will develop accordingly once SPP is integrated into the system.

- To enable circularity in the MSME sector, capacity building will also be pivotal.
- Standards and certifications will also encourage industries to work in that direction.

EMC & HCL TECHNOLOGIES

Date: 21st October 2022
Time: 11:00 AM to 11:30 AM

Participants: Mr. Santhosh Jayaram (Global Head- Sustainability, HCL Technologies), Dr. Shilpi Kapur (Vice President, EMC Pvt Ltd), Sharvari Lowalekar (Research Assistant, EMC Pvt Ltd), Jidnyasa Ghag

Key Focus Areas for Discussion:

- Recommendations on important service areas that the CoE could cater to
- Inputs on how the Centre can cater to industry needs

Discussion on service providing areas and industry gap

- Within industry players, the Original Equipment Manufacturers (OEMs) and Small and Medium Enterprises (SMEs) must be dealt with separately.
- For instance, instilling circularity within Samsung or Bajaj will look at product-level thinking.
- SMEs require handholding and support systems, while OEMs need to be driven either through regulations or benchmarks.
  - Benchmarking: Measuring circularity of an element (at product-level or organisation level).
  - If benchmarking is clearly established, it will drive OEMs to adopt circular measures.
- Hence, the approach towards tackling the circular economy needs to be different for OEMs and SMEs.

- Opportunities broaden when "zones" are driven towards circularity rather than individual entities.
- Creating a circularity driven marketplace for industrial zones could be a solution that will help these zones in connecting with each other.

Question by Dr. Kapur: The interaction of OEMs with SMEs is limited to Tier 1 suppliers. However, there is a lot of scope to use by-products created by Tier 1 in Tier 2 and Tier 3 suppliers as resources. What are your suggestions on how the Centre could help in integrating all the Tiers in the system?

- Mr. Jayaram reiterated the points he made previously.
- For SMEs, capacity and knowledge building is crucial.

Question by Dr. Kapur: How can the Centre enable mainstreaming the use of digital technology in fostering circularity?

- As a Centre of Excellence, building a case for such a service provision is important.
- It is thus crucial to understand whether there is a market for it, how the market would function, etc. If this clarity is gained, players will willingly enter and the Centre could then oversee the workings.

Additional literature to refer to:

- KPMG and EU Study: https://ec.europa.eu/environment/sme/pdf/Training%20materials_English.pdf
- "I Got Garbage" Platform:

https://www.mindtree.com/about/investors/annual-reports/annual-report-2017-2018/tree-always-gives-back/i-got-garbage

EMC & ECUBE INVESTMENT ADVISORS PVT LTD

Date: 3rd November 2022
Time: 11:00 AM to 11:40 AM IST

Participants: Ms. Rita Roy Choudhary (Managing Partner and Chief Executive, ECube), Dr. Shilpi Kapur (Vice President, EMC Pvt Ltd), Sharvari Lowalekar (Environmental Specialist, EMC Pvt Ltd)

Key Focus Areas for Discussion:

- Inputs on the proposed architecture of the CoE
- Recommendations on important service areas that the CoE could cater to

Discussion on the architecture of the CoE

- The idea of framing a network of institutions would work well in this case.
- While most host institutions will be research-based, it is also important for the CoE to build linkages with industry players and other stakeholders to make the approach holistic.
  - This connection will also help in deriving practical insights from the private sector.
  - Industry collaboration as a part of the service offerings of the Centre will be done, but it would also be beneficial to have industry as a host institute, having a regular say in the functioning of the Centre.

Question by Dr. Kapur: You have clearly demarcated industry involvement in terms of service provision and representation in the overall framework. In this context, how do we involve industry in the Centre's architecture? Should we consider proposing industry associations as potential host institutes, per say, or consulting organisations working closely with industry?

- It would be great to build ties with an industry body like FICCI.
  - FICCI has set up its own Centre for Sustainability Leadership, which will be working directly with industry. This Centre will also push for CE.
  - In an instance where FICCI is a host institute within the network, a natural complementarity will be established, where both bodies gain from each other's competence, expertise, and network.
  - The Centre can achieve the objective of having a regular interface with industry through FICCI.
- Organisations like ECube can play a very different, yet equally vital role.
  - ECube is a Knowledge and Implementation Partner for the FICCI Centre.
  - There is also potential for engagement in terms of specific elements that the CoE plans to target. This involvement can be brought in at a later stage.

Discussion on service providing areas

- Regarding the *policy* bucket, Ms. Choudhary did not have additional inputs and felt that it captured all the necessary aspects of policy research and advice.
- Regarding the *circular business models and industry* bucket:

Question by Dr. Kapur: How could the Centre play a role in converting the gaps persistent in industry to viable solutions?

- The Centre needs to have the institutional, technical and infrastructure backing along with a strong network of host institutes. This ecosystem catalyses work related to CBMs (pilots and demonstrations, for instance).
- The Centre in itself should remain lean and should not be involved in this process first-hand as it will require a huge human resource base, technical skillsets and backing.
- The proposed architecture of the Centre fits perfectly well in this context.
- The Centre can act as an overlooking authority (guiding, facilitating and catalyst role) providing the technical guidance required to facilitate work amongst the host network.

- Regarding the *partnerships and collaborations* bucket, Ms. Choudhary did not provide any additional inputs or suggestions.

Discussion on LCT, Sectorial Focus and Emerging Tools that the CoE could provide

Question by Dr. Kapur: Based on your work experience, is there potential for sectors apart from the ones mentioned in the slide where CE can be pushed?

- Circularity is relevant to almost every sector in existence today. Linkages can be created for every sector from the waste generated for all other sectors.
- Hence, it won't be a good idea to have a sectorial limitation.
  - Waste streams could be defined instead of sectors.
  - "Will the Centre look at all waste streams, or start by looking at a few?"
- Packaging, plastics, and water are all cross-cutting domains (mentioned in the slide).
- Agriculture and construction could be considered as independent sectors.
- It could help to differentiate between sectors and the cross-cutting areas of waste that the Centre would look into.
- Thought should go into how waste streams will be approached (sector-wise waste?).
- The waste streams today are very varied (municipal solid waste, plastic waste, industrial hazardous waste, other kinds of industrial waste, wastewater, etc.) and having a clear distinction (according to sector) will help.
- Each waste stream will have to adopt a different pathway in the context of circularity.

Discussion on eligibility criteria for potential host institutes

- Ms Choudhary found the criteria fairly comprehensive.
- "You may not find all the criteria in every institute. The aim should be to build complementarity."
- The important thing is to create a network having organisations with targeted specialties.
- It would help to divide the criteria into minimum eligibility and additional criteria (where it could be altered according to the nature of the institute assessed).
- Eventually, trade-offs will become evident on the selection of institutions. It will be necessary for the Centre to prioritise and choose accordingly.

Discussion on the Financial Sustainability of the Centre

- The Centre will have to take up a model which will enable it to become self-sustainable after the first 2-3 years.
- Till then, some seed money can be pumped in to facilitate the take-off.
- The initial support could come from donor agencies, the government, the private sector or financial institutions.
  - The Centre will have to explore which funding channel fits its approach best.

Suggestions on some institutes that could be part of the Centre

Question by Dr. Kapur: We aim to provide the government with a list of organisations/institutes that could form part of the Centre. Any suggestions?

- Building linkages with Indian research institutions, especially ones under the government's own network would be crucial.
- The FICCI Centre would bring in huge complementarity and will provide natural linkages with industry, especially in the MSME context.

Question by Dr. Kapur: What about academic institutions?

- It could work if one academic institution was in the host network, but focus should be on the domains which have thrust on ground level research that can support actual adoption in industry for circularity-related solutions.
- "How do you take solutions to ground-level implementation?"

EMC & THE CIRCULATE CAPITAL

Date: 3rd November 2022
Time: 12:00 PM to 1:00 PM IST

Participants: Mr. Umesh Madhavan (Research Director, The Circulate Initiative), Dr. Shilpi Kapur (Vice President, EMC Pvt Ltd), Sharvari Lowalekar (Environmental Specialist, EMC Pvt Ltd)

Key Focus Areas for Discussion:

- Inputs on the proposed architecture of the CoE
- Recommendations on important service areas that the CoE could cater to

General Comments by Mr. Madhavan

- Mr. Madhavan asked about the expected short-term outcomes/goals of the Centre.

Dr. Shilpi set forth some broad outcomes, including:

  - To make India more circular
  - To enable penetration of the CE agenda to lower levels of the government- bringing forward emerging local solutions.
  - To address the sub-national gaps that persist within the CE domain
- It would help to have an overarching goal or target that can be quantified using measurable metrics. Once this is in place, it would be easier to define smaller targets and actions within the proposed buckets of services.
  - "Once you set an end goal which can either be short-term or long-term, the rest of it will follow through in terms of achieving that final goal."
- The "human" aspect of the Centre seems to be missing.
  - Eventually, this aspect will create change.
  - For instance, it is pivotal to include informal waste workers within the domain of plastic recycling.
  - The proposed architectural framework of the Centre might work out in this regard-it would be beneficial to have a not-for-profit or labour organisation as a nodal host institute.
- Mr. Madhavan was unsure of how the uptake of circular solutions at the state/local level would be a success within the proposed architecture.

- "When it comes to a nodal institute, unless it is affiliated back to a state entity, state-level ownership and implementation might become a challenge."
- "How do we make sure that there is a political will amongst the states to take up CE?"
- Reply by Dr Shilpi: There is uncertainty pertaining to whether the Centre will be able to address unwillingness. However, the general policy landscape right now seems to be inclining towards the CE, and it is safe to assume that willingness will follow. The focus should be on how the drive gets implemented.

The Centre does could be focused around developing metrics and indicators for measuring circularity. These indicators could then be contextualized to industry, to a sub-national level. Sub-national levels could then report on these metrics and measuring CE progress would be achievable.

Question by Dr. Shilpi: You recently concluded work in Udaipur, in the domain of waste estimation. How do you plan to take those results forward?

- There was an existence of political will in that project.
- One of the partners who was engaged in the study was providing waste management services in the city of Udaipur. Hence, there is an immediate connection between the municipality and the project partner. This sheds light on the importance of the "right" kind of collaborations.
- The need for this project did not come from the city. It came from a private entity offering funding which the city administration was ready to take on.
- The municipal corporation provided a positive response on the findings of the study. There was a buy-in subsequent to the research that had been done.
- Cities that have a generally progressive outlook provide a good head-start. Constraint comes in in the form of resource limitations.
- In this context, the CoE could also identify these low-hanging fruits (cities and states willing to push forward the CE agenda) which could set an example for replication.
- "I don't think there is an issue with the dearth of programs. The problem lies in pooling of resources."
  - Mr. Madhavan gave the example of Bali, which has multiple programs set up in the sphere of CE. However, each initiative seems to be looking at the problem disparately, and there is no central resource pooling to ensure that progress is achieved towards a common goal.
- There are vested interests of private entities operating in key geographies where CE-related work is evolving. Obtaining buy-ins is not very difficult.

- The nature of the Centre makes it fit to be a knowledge hub, amongst other service-providing arms.
  - The Centre could conduct dedicated research and share best practices.
  - The Centre could also be responsible for setting up a central research repository which could contain work done by different entities around the field of CE in order to enable easy access and dissemination of knowledge. This could be a strategy to avoid duplication of work and siloed thinking. Furthermore, work already done could also guide similar work planned in other geographies.
  - In India, the best practices seem to be those that are connected to technology transfer. There is thus an opportunity to seek international partnerships as well.
  - Hence, the Centre will not just focus on local resource use, but also pool in international resources and expertise.

Discussion on role/service areas of the CoE

- Mr. Madhavan asked about whether there is a central repository of any public related work available for tendering or bidding.

Dr. Kapur shed light on the platforms available for public procurement in India.
She also elaborated on how circularity could be integrated into the criteria of evaluation of procurement bids.

- Mr. Madhavan pointed out that awareness and capacity building activities could be a source of revenue to the Centre. Training and certification could also generate revenue.
  - Certification could work in a model similar to Coursera
- Regarding partnerships and collaborations, Mr. Madhavan brought up tie-ups with incubators, entrepreneurs, and support organisations.
  - Based on past learnings, especially in the circular plastics domain, there are incubation programs being done, but scalability is a persistent challenge. Follow-through and continuity of the projects is also a gap.
  - Since waste management is a public service, the framework fails when there is a lack of the necessary ecosystem services.
  - "How do you make sure that the current ecosystem of activities allows entrepreneurial activities to sustain?"
  - In India, the situation is slightly better. However, a larger number of entrepreneurs are unsuccessful in their CE efforts (on a comparative basis).
  - The Centre should not run its own incubation program. It could instead play a role in taking start-ups to their next phase of growth.
  - Dr. Shilpi pointed out the relevance of this issue in the context of the UP Plasticathon project and how the government does not have the funding to pilot the winners of the innovation drive.
- Regarding CBMs and industry collaborations, Dr. Shilpi brought up the linkages of CE to CSR activities.
  - A think-tank organisation working closely with industry could bring in this alignment. Such an organisation would then be part of the nodal host network.
  - Example of decentralised WM solutions through CSR funding was given.
- Mr. Madhavan pointed out how the Centre could act as a one-stop-shop on CE, having a holistic umbrella of services under which work is undertaken.
- The Centre should also lay emphasis on the fostering circularity in the upstream activities of the value chain.
  - This is relevant especially to agri-resources, bio-based materials

Discussion on the Financial Sustainability of the CoE

- Mr. Madhavan talked about striking a balance between centralisation and decentralisation and its tricky nature.
  - Pitfalls of centralisation: potential blockages in the flow of resources

Discussion on the role of the CoE in taking impact investing to the mainstream

- Investors will mainly target opportunities which are already generating positive returns.
- Blended finance is another way, which is one strategy to target project that are still in the inception stage.
- The Centre could look into developing blended financing instruments
- Looping in VC funding into impact investment- making minimum funding obligations in CE and climate change related projects- ambitious yet could create a change and pool in money. Mr. Madhavan was unsure about how the Centre could help in this regard.

This will require the necessary policy backing.

Discussion on the role of TCC as a part of the CoE network

- Collaborations could be explored in terms of supporting start-ups through TCC's programs, knowledge, and network building

Additional Literature to refer to:

- The Circularity Gap Report 2021:

https://drive.google.com/file/d/1MP7EhRU-N8n1S3zpzqlshNWxqFR2hznd/edit

*Some resources within this report could provide guidance on city-level circularity and how it could support the larger picture.

- Revisit city-based landscapes for CE (8 Indian Cities)

Work done by The Circulate Capital

FOCUSED GROUP DISCUSSION WITH EXPERTS FROM ACADEMIA

Date: 21st November 2022
Time: 2:30 PM to 4:00 PM IST

Agenda 1: Feedback on the Landscape Matrix for the CoE

Professor Yogendra Shastri:

- Very comprehensive presentation
- Industry is promoting and encouraging interaction especially while designing products and services with the prime focus in mind as how such pertinent issues can be resolved by academia.
- Sustainable concept in education: promoting various outreaching activities not only for the students but also for the BMC people.

Sachin Mangla:

- Involvement of circular economy concept should be the utmost priority.
- Practical solutions for circular economy need to be implemented especially while discussing it with the various business industries.
- Designing relevant business models for the industrialists
- The policy perspective of various stakeholders and players involved directly in the process needs to be understood.
- Ground level interventions and strategies need to be framed effectively.

Souvik Bhattacharya

- The following presentation showcases some cross cutting initiatives. For example-building partnerships and collaborations, B2B
- Initiatives such as: Research and Development (R&D), skill development and capacity building initiatives are mandatory in the government organizations.
- There is a clear overlap between the following segments and the value chain (life cycle assessment). Thereby creating a clear possibility of another cross-cutting area

Angus Mackay

- The presentation was systematic and comprehensive.

- Suggested to frame a holistic management structure and various strategies associated with it
- How different entities are going to perform their respective roles in this?
- The role of formal education needs to be well defined.
- The role of various resources in the research space needs to be defined.

Professor N.C Narayan

- Prime focus should be laid on the small towns, comprehending to municipal waste.
- Decent business understanding should be there.
- Strategies need to be carved out as to how to solve these critical issues such as- suitable planning and capacity building initiatives.
- Circularity as a concept is a major issue in India's small towns.
- Livelihood generation should also be the priority while designing strategies.
- To sum up, 'inclusivity and sustainability' are the two emerging thematic areas that need to be focused on the small towns. This is the major reason as to why they are focusing on involving students to map these issues.
- An element of accountability shall also be added in the framework.

Agenda 2: Feedback on Proposed Architectural Model

Souvik Bhattacharya

- How do we bring the traditional debate of other ministries into this venture? How does it get communicated in the action plan of the concerned Ministry? Are we in any way focusing on that?

Dr Shilpi

- Currently, they are on talking terms with other respective ministries in an active manner. Attempts are being made to get NITI Aayog in the picture.
- Emphasis shall be made on the point as to how their framework can reach the national and subnational level followed by other district authorities.

Agenda 3: Feedback on Service Delivery Models

Dr. Shilpi

- Not all the eligibility criteria mentioned in the presentation will match. Therefore, it is crucial to set up minimum eligibility criteria.

Professor N.C Narayan

- In order to strengthen and leverage existing capacities, spoken contributions and learning hub needs to be managed well.
- Users and stakeholders who would be accessing the various knowledge products and toolkits, shall be well defined along with its additional benefits associated with the product.
- Demand from the government needs to be well defined.
- Multiple stakeholders and practitioners need to come on a common platform to collaborate and communicate together, sharing their perspectives and developing various policy products.

- The client should be the government itself. That's how we can get other entities as well on board resulting in the cross learning.

Angus Mackay

- The addition of another delivery model should be there in the framework.
- Relevant changes in the circular economy model can be brought by individual commitment and not public awareness.
- In a local manner, reforms in changes should be highlighted which also relates to the government's recently launched LIFE program.
- Valuable perspectives can be designed and formulated via CoE which in a way is a challenge from India and not for India
- Implementation of a credible service delivery model should be made which is not dependent on the politicians to undertake certain actions.
- The current service model needs a revisit.
- Relevant examples from across the globe need to be grasped to make it a local level initiative.

Dr. Shilpi

- They will focus in engaging the pliers either through behavioral change program or looping them directly in the process.

Souvik Bhattacharya

- Limited administrative issues should be there.
- Other post institutions should be there at sub-national level. That is how the service model can be widened and broadened at the three levels- local, regional, and sub-national level.
- Creation of demand is crucial at the National level so that the particular demand gets distributed at the other levels as mentioned above.
- There should be some kind of resource that must be generated.
- Requirement of un-tied resources

Dr. Shilpi

- The apex in the center has been designed in such a manner that it provides support to the other elements around it in the framework.
- The team has provisions to improve it and will refine it further.

Agenda 4: Feedback on "Key performance indicators for CoE"

N.C Narayan

- Officially, a memorandum of understanding (MoU) can be signed with both the parties, so that he can get involved officially into the process.

Dr. Shilpi

- Do organizations give the flexibility and convenience to manage funds and get involved directly in the process?

N.C Narayan

- Center for Policy Research (CPR) is one such example that works along the same lines.
- To begin with, certain circular economy issues need to be identified first.
- Skill development and capacity building initiatives should be brought to the agenda and its output shall benefit the respective organization.
- Mentioned to refer the following website for a better clarity_ CAN.alopy.com

Souvik Bhattacharya

- The real challenge lies with the non-public funding institutes. Certain activities require quick implementation. How do we tackle that?

Agenda 5: Does CoE need to have a physical entity or should it be an online network? What kind of architecture is much more flexible?

Professor N.C Narayan

- Quotes an example of the 'living lab' which is a physical entity in IIT-Mumbai that has been designed for a similar purpose. Suitable learnings can be drawn from there for CoE.

Sachin Mangla

- Signing of MoU might be a potential steppingstone to begin with but the team also needs to have a strategic and disciplined work plan at least for the next 1-2 years along with a specific time frame. May be then we assure that different stakeholders shall come together on a common platform.

Dr. Shilpi

- Are there any specific services upon which a corporate sector is looking at?

Sachin Mangla

- Limited subject knowledge is there within the corporate sector. They are just equipped with the term, recycling.
- Lack of relevant business models, scarcity of resources and lack of adequate support continue to be a few of the burning issues in the sector.
- Community engagements and participatory approach shall be considered.
- Better clarity and suitable information with respect to economic business models needs to be disseminated and streamlined.

Angus Mackay

- Once you label the center, it is boxed within a certain premises.
- Budgeting, allocation of resources, work planning etc. need to be considered if the center is being allotted a dedicated physical space.
- The role of the respective organization needs to be carved out in the CoE. This is the main objective.

Professor N.C Narayan

- To begin with, it could be a lab.
- Physical hubs can be anywhere else.

- Host institutions shall benefit from one of the organizations.

Arvind Neema

- The city should be picked up as one of the units to start the interventions.
- The prime focus should be to connect with the legacy waste.
- Tangible benefits to the city/stakeholders shall be well defined.
- Even though the CE framework is well defined, project targets still need to be polished.

EMC & IIT MADRAS

Date: 29th November 2022
Time: 8:15 PM to 9:20 PM IST

Participants: Dr. Ramesh Srinivasan (Founder & CEO, Eco-Catalyst, Adjunct Professor, San Jose State University), Dr. Indumathi M. Nambi (Professor, Department of Civil Engineering, IIT-Madras) Dr. Shilpi Kapur (Vice President, EMC Pvt Ltd), Sharvari Lowalekar (Environmental Specialist, EMC Pvt Ltd)

Key Focus Areas for Discussion:

- Inputs on the proposed architecture of the CoE
- Recommendations on important service areas that the CoE could cater to

Discussion on Service Providing Buckets

Dr. Nambi

- It will be a good idea to include entrepreneurship in one of the service domains
- Fostering innovation in the CE space could also be an important job of the Centre.

Question by Dr. Shilpi: How according to you could the Centre support innovation within CE?

- Product design, design for environment, design for repairability is one way.
- You are currently looking at it from the industry perspective, how industries can improvise and adapt.
- It would also be helpful to look at innovation from the research point of view.
    - Any technology development should integrate principles of CE from the conception stage, so that ultimately the development is aligned with CE.
    - Any innovation happening in academia (innovative projects coming out of academia), across sectors (vehicles, building materials, etc.) needs incorporation of CE.
    - "CE should be engrained into the system, right from education to innovation."
    - Include innovation explicitly in the "CBMs and Industry Collaborations" bucket.

Dr. Srinivasan stressed on the importance of Life Cycle Assessment to be looked at by the Centre.

Discussion on Specific Services within the Bucket

Dr. Srinivasan

- You can consider bringing in social entrepreneurship/enterprises explicitly under the Circular Business Models arms.

- Creation of jobs would be a focus, with less focus on excessive profits.
- Emphasis on self-sufficiency
- Example: Creating models for communities that are lacking basic amenities.
- These models will be particularly useful in the waste management domain.

- It would be good to lay emphasis on EPR mechanisms and policies
  - Instruments which can facilitate the implementation of EPR
  - Designing mechanisms for other waste streams in India

Comment by Dr. Shilpi: We are currently supporting the government on its G20 agenda for EPR. Within this, we are proposing a sector-agnostic, overarching framework that countries could adopt for EPR. This agenda is something that the Centre, if it was in place, could have taken forward.

Dr. Nambi

- Inclusion of circular metrics that are tied to SDGs
  - Under capacity building, can we include something on quantifying circularity?
  - Looking at metrics for implementation at the national/sub-national level
  - Social aspects should be embedded into the circularity indicators
  - Developing a framework for translating SDGs through a set of metrics that play a role at the national/sub-national level, such that any innovations that come up can be cast in the context of the sustainability metrics.
  - A framework which is built around measuring the progress of SDGs and is also able to propagate that down to sub-national levels and connecting the goals to CE.
- Accreditation could be an important service offering. It will help in identifying genuine propellors of CE within industry, start-ups, academia, and other institutions. The Centre could thus act as a certifying body for identifying truly "circular" service providers for CE solutions.

Discussion on Architectural Model

Dr. Nambi

- Experts working in the field of CE internationally can also contribute significantly to the Centre's activities.
  - Establishing a "visiting fellowship" as part of the model to bring in international experiences and advise.
- It may be difficult to manage the network if it is too large.

Dr. Srinivasan pointed to the importance of tying up with venture capital funds.

Discussion on the location of the Centre and the Network

Dr. Nambi

- Having a physical lab/hub for each of the nodal institute will complicate things.
- It will be possible to establish virtual institutes, and more feasible as well.

Discussion on the Potential of Collaboration between IIT-M and San Jose State University with the Centre

Dr. Srinivasan commented that he would need time to think about the areas in which collaboration can be initiated in the case of San Jose State University

- IIT Madras can build strategic partnerships with the Centre in the domains of capacity building, innovation, and entrepreneurship; and identifying circular solutions.

- The college is currently developing a Centre for Sustainability. The aims of this Centre align with the vision of the CoE and there is immense scope to explore joint opportunities.

2nd REFERENCE GROUP MEETING

Date: - 12th December 2022
Time: - 3:00 PM to 4:30 PM IST

Opening Remarks and Progress Presentation by Dr. Shilpi Kapur

The presentation delivered by Dr. Kapur provided a summary of the work completed under specific aspects of the project. Dr. Kapur started out by revisiting the points discussed in the first Reference Working Group Meeting and setting the agenda for the second one. She then went on to talk about the broad landscape of the Centre of Excellence (CoE), which was fine-tuned as per the inputs received by stakeholders in past meetings. The presentation laid special emphasis on the service areas that the CoE could offer. In this regard, a market assessment was conducted to understand the demand for Circular Economy related services by identifying push and pull factors that persist in the Indian context. Dr. Kapur talked through the key findings of the market assessment exercise. These findings aided in arriving at wide-ranging service buckets that the CoE could focus on. The buckets were discussed in detail and the Reference Group members were asked to pitch in with their inputs. A top-level view (from the policy perspective) for the CoE was also discussed. The presentation delved into the strategies that can be adopted to ensure the long-term financial sustainability of the Centre. Furthermore, light was shed on the identified key performance indicators to measure the Centre's progress. Finally, in regard to the "apex and nodal host network" framework that was proposed as the architectural model of the Centre, the eligibility criteria for selecting suitable host institutes were presented.

Discussion with Reference Group Members

Dr. Kapur encouraged participants to pitch in with their inputs as she was presenting the slides. Members were asked for their views after the work done by the EMC team under each domain was talked about.

❖ *Inputs/Questions on the Role of the CoE in India:*

Question by Dr. Habbu: Are Centres of Excellence on Material Sciences currently existing?

- There are no Centres specifically looking at materials yet.
- However, there are Centres which have adopted a materials perspective (for instance, focus on polymer science while looking in circularity in plastics)
- However, an overarching body having a pure focus on materials is currently lacking in the Indian context.

Question by Dr. Habbu: Are there any anchor points to facilitate national and international collaboration on materials for CE, or will the Centre be the first one to take a step in this direction?

- There are institutes working on these issues in siloes, and others that have freshly taken up these topics.
- It would be a good opportunity to tap on their learnings and expertise and facilitate the exchange of knowledge amongst entities that are a part of the collaboration.

❖ *Inputs/Questions on the (revised) Landscape of the CoE:*

Question by Dr. Habbu: Like the 5 cornerstones that drive the functioning of the topics covered under the landscape (policy, capacity building, education and awareness, circular business models and investment and

technology development and innovation), can an aspect related to dialling into the regulatory environment of other countries or the UN be included as a cornerstone?

- To incorporate this aspect, we are proposing that the Centre will have a knowledge repository which will pool learnings and best practices from the international domain.
- Creating a dialogue that will enable the translation of international policy to the Indian context is an approach to how the Centre will provide services. In this context, we have also brought in a lot of focus on networking and partnering.
- "Knowledge created elsewhere can be of use to India and vice versa with a strong network base."

Question by Dr. Habbu: Would "plastics" fit better as an independent sector than under a "critical waste stream"?

- Bringing plastics are a separate sector would create a lot of overlap.
- If plastics need to be looked at independently, we will consider rethinking our "sector" approach to a "material" approach.

❖ *Inputs/Questions on the Market Assessment for Service Identification:*

Mr. Shailendra Singh

- This slide does a great job in identifying some macro indicators that point towards CE
- Adding opportunities for India in the context of resource efficiency of materials could also be fitting.
- Sustainable and responsible consumption and production is also an important driver.
- There are multiple drivers enabling circularity in different domains (investment, policy, and so on).
- It would also help in mapping the market for the services that the CoE could offer. It would help to bring in the sectors identified in the landscape matrix for this.
- Estimations on the size of the sector, waste generation, data on bill of materials will further help in providing a clear picture on how the Centre could enable circularity within these specific sectors.
- Opportunities in design or search for new circularity-enabled materials will also be brought forth in the course of these estimations.
- Systemic changes that may be required will also become evident.
- Quantification of sector specific activities would thus give a sense of what the market for the services of the CoE could look like.
- Current research (in Indian and international context) calculating the value of the CE seems misleading.

❖ *Inputs/Questions on the Top-Level View of the CoE in India:*

Question by Dr. Deshpande: The separation of "policy" with "policy instruments" is unclear. Could you elaborate on it?

- The Centre could take a lead in guiding the drafting of a policy on any aspect of CE, hence helping out with policy formulation.
- To take forward the commitments made in the policy guidance document, there is a need for various instruments.
- For instance, green bonds are fiscal policy instruments which can be suggested in order to implement a particular objective laid out in the policy formulation stage.

Suggestion by Dr. Deshpande: It would be good to bring out the justification for the differentiation more profoundly. The current schematic may seem confusing to some.

❖ *Inputs/Questions on the Broad Service Buckets that the CoE could offer:*

Mr. Michael Bucki

- The 4 categories that have been identified by the team are similar to the work done under EU-REI between GIZ and India.
- A strong demand push is observed for the "Industry Advisory" and "Circular Business Models and Innovation" service domains. The demand is more acute and urgent for these areas.
- The integration of the informal sector (through the MSME channel) and the extent of their participation in the waste sorting and repair economies is noteworthy. Supporting the transition of these informal jobs into formal ones is something the CoE can also look into.
- It would help to have systems that would improve the quality of delivery from informal sectors. This could be in the form of platforms, or guidance instruments. Dissemination of standards would also play a key enabling role in this context.

Dr. Ajay Deshpande

- There need to be some services related to recycled product specifications as well. This was an evident gap identified in the NITI Aayog study.
- The CoE can act as a research body as well as a policy interpretation centre which can aid in this.

❖ *Inputs/Questions on the Financial Sustainability of the CoE*

No inputs

❖ *Inputs/Questions on Key Performance Indicators for the CoE*

Mr. Shailendra Singh

- The first two indicators ("Number of CE-related project proposals submitted" and "Number of state/local action plans/roadmaps on CE prepared/initiated") seem similar.
- Having quantifiable metrics (that measure direct impact) would be extremely beneficial.
    - At the moment, the KPIs are designed in a way that portray the Centre purely as an academic institution. More action-oriented indicators are needed.
    - It would then make sense to have two types of KPIs: outcome-based and impact-based.

❖ *Inputs/Questions on the Eligibility Criteria for Selection of Host Institutes*

Ms. Mehar Kaur

- One additional criterion could be "potential of having Circular Business Models".
- More definition of focussed projects could be brought in to understand the nature of the institute (business-drive, research-oriented, etc.)
- Having some institutes doing action-oriented work in the network will make the CoE more inclined toward on-ground implementation as well.

Remarks by Dr. Modak

Dr. Modak started his address by bringing out the metaphoric resemblance of the "network" structure of the CoE with that of the synergies that exist in an orchestra. He spoke more about the core philosophy of the Centre, and how each of the proposed buckets of services do not need to be directly delivered by the apex body itself. In this regard, the role of the apex would mainly be to create situations that provide stimulus in order to get more stakeholders involved for CE to prosper. This conglomeration should help in moving the wheel of circularity. Dr. Modak further pointed to the push on CE by the government, indicating that such a Centre would be coming up at the right time. Furthermore, traction coming from investors was also emphasized. He also brought attention to the urgent need to make near accurate projections about the opportunity and size of the CE in India, and the resulting requirement to set appropriate boundaries to

facilitate this exercise. As a closing remark, Dr. Modak elaborated on the overarching role of the Centre, acting as a facilitating as well as monitoring (and tracking) body.

Additional Comments by Participants

Mr. Shailendra Singh

- The network and hub model could pave the way for rising complexities.
- A possible barrier would be the hubs not being able to fulfil their commitments.
- The large number of hubs that will ultimately be part of the network might prevent the Centre from working efficiently.
- Finding synergies and working cohesively might become a challenge due to the immense nature of coordination between stakeholders.

Response by Dr. Modak

  - Following certain guiding principles like those of moderation, avoiding duplicates and progression will help in achieving the soundness of this framework.
  - Creating a concrete roadmap that describes the clear phase-out of the network and definitively progressing in a need-based pattern (starting small and building up) will also be beneficial.
- A schematic on what the progression of the structure would look like should provide a clearer picture.
- Draw learnings from the Fraunhoffer Institute's model.

Zeenat Niazi

- It is quite interesting to see a networked model which can be distributed thematically, geographically, with various skillsets working together in harmony.
- The Centre will need to look at the "servicing" of CE requirements from industry and policy, but also spread of knowledge of what constitutes CE.
- A lot of innovation inspiration will thus be something that Centre can facilitate (like incubation).

3RD REFERENCE GROUP MEETING

Date: - 21st February 2023
Time: - 2:30 PM to 3:30 PM IST

Opening Remarks and Presentation by Dr. Shilpi Kapur

The presentation delivered by Dr. Kapur provided a gist of the work completed under specific aspects of the project. Dr. Kapur initiated the presentation by retreating the objective of the study to assess the relevance and viability of the Centre of Circularity (CoE) in India and develop a framework and a guidance manual. The need for CoE in India was discussed by Dr. Kapur stating that it will have a unique position to accelerate the transformative transition to a circular economy. The relevance of such a Centre was reinforced by the fact that India's G20 presidency led to Resource efficiency and Circular Economy is one of the key themes. In addition, recent union budget announcements have encircled the facts on circular economy and resource efficiency. With three major expected outcomes of the CoE on circularity in India, Dr. Kapur stated how the CoE can foster partnerships while mainstreaming the concept of circularity in India. Furthermore, key findings from the market assessment were depicted incorporating valuable information received during the stakeholder consultations. Dr. Kapur arrived at the broad service categories based on the market assessment which were further detailed at a level of each identified bucket. The bundling of services to effectively provide beneficiaries

with each service bucket was depicted. To provide a top-level view of the CoE on circularity in India, Dr Kapur engulfed the three major processes of policy formulation, instruments and mechanism and guidance and implementation under the sections of dialogues and discussion, research analysis and identification and prioritization. Keeping in mind the limited scope of the CoE at the initial stages, eleven prioritised services were identified of which a roll-out plan was followed based on the nature of the service and time frame for roll-out. Elaboration on the architecture of the CoE along with the service delivery modes was presented to the participants. Last but not the least, the financial sustainability of the CoE was discussed based on the factors such as received grants, and revenue-generating services among many more. A final estimation based on certain assumptions was presented for the first working year of the CoE based in the resource efficiency cell of the union ministry.

Discussion with Reference Group Members

Dr. Kapur encouraged participants to pitch in with their inputs as she was presenting the slides. Participating members were asked for their views after the work done by the EMC team under each domain was talked about.

❖ *Inputs on the kind of role the CoE could play in terms of technology:*

Mr. Shailendra Singh

- Highlighted the importance of infrastructure and Research and Development institutions which was also enlightened in the previous discussions.
- Having oversight over the projects in the institutions (IITs, NITs, etc.) based on the CE approach would help connect with stakeholders in emerging fields of application (elaborated through the example of the Association of Space-based industry) space may not come under the purview of many centres but CoE on Circularity in India would make sure to have an oversight and connect stakeholder in the emerging fields.
- Making CoE future-proof with new and long-vision entry points for the CoE. In addition to making Research and development applications.

Dr. Kapur retracted the points: Infrastructure points addressed in the section in terms of sustainable industrial parks. However, integration of research and development through institutions (IITs) can be included.

Dr. Shilpi Kapur

- CoE caters for connecting these existing technological innovations to practical applications, pilot testing etc.

Mr. Abhinandan Banerjee

- The core strength of the CoE lies in creating a network rather than possessing topical expertise in a particular domain
- Leveraging the network of CoE for a particular technology
- Possible entry points for CoE, use the network to identify areas in future where CoE can use technology, where technologies don't exist.
- The approach can flow from a macro-level identification to nodal host institutions.
- At the current level, CoE acts as a repository of the CE technologies which are coming up along with the adjoining arm of policy push from the government in a particular sector,
- Connection of the technology push with the startup ecosystem,
- Agreement on rather than having technology as a separate bucket, technology used as a cross-cutting theme.

- Suggestion to not create technology for which research and development labs would be more equipped, but rather focus on the application of technology in the border process of the industry, and startups.

❖ *Inputs on the roll-out plan of the services:*

Mr. Abhinandan Banerjee

- The nature of the services and time frame will be decided with the consultation of MoEFCC before it is finalised for the final report.
- A core service identified for the CoE that it can engage on its own without waiting for the demand request from a stakeholder?

Both questions were answered by Dr. Kapur.

- *The nature of service and time frame will be finalized on MoEFCC's consultation and also would incorporate their inputs on the demand*
- *Subnational level Circular Economy Action Plans and Guidance on setting up Circular Economy or Smart Industrial Parks; these two can be the service catered initially.*
- *Connecting the upstream and downstream of the value chain and looking beyond the waste-based agenda of CE.*

Dr. Shilpi Kapur

- The major challenge CoE would address is helping startups to upscale the innovation and testing at pilot testing.
- Leveraging the network of CoE to surpass these hurdles

Mr. Shailendra Singh

- Keeping in mind the subject is well talked about, a short-term way to initiate the application would be to centre it around the 'CE Park' (tangible results) and propose it to the MoEFCC.
- Creating an association may not be critical in the short term.

Ms. Manisha Choudhary

- Pilot projects based in the Angul district can be incorporated which are ready to pilot and launch.

❖ *Clarification on the architecture of CoE:*

Mr. Shailendra Singh

- The apex body of the CoE nests under the Ministry?

Questions were answered by Dr. Kapur.

- *The Apex can be hosted in the Resource Efficiency Cell ultimately being an independent body.*

❖ *Clarification on Estimating the Cost of the CoE:*

Mr. Abhinandan Banerjee

- Revenue-generating services would be in place. However, would there be a grant given by the government to some of the network institutes?

Clarifications by Dr. Kapur.

- Yes, grants are being looked forward to and the estimates provided are based on certain assumptions as to which quantum of grants may be required.

❖ *General Suggestions*

Mr. Shailendra Singh

- A hypothetical case-study approach of how CoE would cater to the services of a particular sector can be mimicked at least for internal discussion purposes.

Inputs by Sharvari

- For each of the prioritized services such a kind of elaboration is provided in the detailed report

Mr. Patrick Schroeder

- Engagement of CoE with the international Circular Economy Experts and policy discussions

Inputs by Dr. Kapur.

- It is well inculcated in the architecture of the CoE, in addition to the project-to-project basis of the interactions with the international community.

Ms. Manisha Choudhary

- The Centre functions as a global knowledge-sharing hub on CE and feeds into the South-South Cooperation Dialogues on CE.

Inputs by Dr. Kapur.

- This can be included as one of the buckets explicitly mentioning it as a service area.

PAGE INTER AGENCY MEETING
Date: - 9th March 2023
Time: - 2:30 PM to 3:30 PM IST

Opening Remarks by Mr Angus Mackay

Mr Mackay set the tone of the discussion by introducing the work done under the project in brief. Furthermore, he also expressed positive remarks on the progress of the study, by stating that he was very happy that the team has been able to reach this point.

Presentation by Dr Prasad Modak

The presentation delivered by Dr Modak aimed to summarize the work done under the project, and to present the key findings of the study. Dr Modak started by introducing the study background, touching upon the objectives, scope of work and timelines of milestones. He then went on to discuss the need, relevance, role, and expected outcomes of a Centre of Excellence (CoE) on Circularity, specifically in an Indian context. He then discussed the review conducted of existing CoEs around the world, and briefly presented the conclusions of the review. Further, the proposed the vision and mission statement for the CoE was put forth. Post that, Dr Modak discussed the market assessment exercise and its findings in detail, which formed the basis of the service offerings of the CoE. The proposed service buckets and detailed list of services was then discussed. Dr Modak further enlisted the key prioritised services and talked about the proposed roll-out plan. The institutional architecture and networking model of the CoE was also discussed in depth.

*Due to time constraints, Dr Modak was unable to present all the slides in the presentation. Aspects pertaining to the governance structure, financial landscape and cost and revenue calculations for the CoE could not be discussed.

Inputs by the IA Team

Dr Rene Van Berkel

- The presentation was very comprehensive.
- The overall plan seems to be ambitious, and there is ambiguity in the availability of financing for setting of a Centre of the proposed scale.
- Clarification is required on how the Centre is looking at circular economy- as a strategy to further progress on SDG 12 in India, or as a strategy propelling India's recycling economy. It would be good to bring in direct focus on the connection of the CoE with various relevant SDGs.
- It would help to bring out a clear distinction between services that CoE would offer for public facilitation (towards public good), and ones that would be catering to the private sector.
- Currently, the pool of services that the CoE could offer seems to be too large. It would perhaps be better to focus the efforts of the CoE to three or four core areas.
- The networking model of the CoE is a good mention, but it would make more sense to look at networking more as a "constructive collaboration" between competitors. It would help to revisit the model with this perspective in mind. Demystifying the concept of "networking" is thus required.
- You may want to consider renaming the CoE from a Centre of "Excellence" to that of "expertise".

Mr Tomas Stenstrom

- The presentation was very detailed and elaborate, and the consultation process seems impressive as well.
- As mentioned by Dr Berkel, it would be a good idea to delve deeper into defining the networking model of the CoE.
- It would be great if the final report and presentation could be shared with the team. Upon better studying the report, giving additional feedback would be possible.

Mr Angus Mackay

- During consultations with the government, the way of presenting this work will have to be slightly different.
- Instead of going through the report as it is structured, it might help to present the high-points and learnings of the process, keeping the presentation as short as possible. Adopting a realistic approach and structuring the presentation in a way that it is not too information heavy will be a better approach.
- The comment made by Dr Berkel on the approach considered for CE is very relevant. It will be beneficial to add a couple of slides on how the CoE is approaching circularity. Is it just in relation to SDG 12, or is it more of a connector of multiple SDGs?
- It might be a good idea to revisit the barrier analysis done as part of market assessment, which identifies barriers to service provision for the CoE. Currently, the analysis identifies some points in the perspective of a "lack of ___". It would however be a better idea to understand why there is a lack of those points.
- The governance structure can also be deep dived into more. It would help in defining who has authority, for budgeting and expenditures where does the accountability reside for results. There's the idea of having a head of this apex body and how much delegated authority would they have. It would help in making the section more robust.

Ms Maya Valcheva

- As pointed out by Angus, it would help to feel the final presentation concise. Currently, the amount of information seems to be a little overwhelming.
- It may also help in directing the proposed services to agencies that can provide them, so that the final user of the guidance is not confused about what to do with the identified service catalogue.

Ms Manisha Choudhary

- It would be good to bring out an explicit mention of the CoE acting as a Centre for facilitating the south-south exchange on circularity.
- It would also help to take up the suggestion of a Reference Group Member in previous meetings, of creating a model where the work of the Centre is mapped out practically, for a particular sector.

Annexure 3: List of Stakeholders

Participants of 1st Stakeholder Consultation (organised on 15th September 2022)

Sr. No.	Name of Participant	Designation & Organisation
1.	Mr. Atul Bagai	Country Head, UNEP India Country Office
2.	Dr Divya Datt	Deputy Country Head, UNEP India Country Office
3.	Mr. Angus Mackay	Executive Director, UNITAR
4.	Ms. Maya Valcheva	Associate Programme Officer, Green Development and Climate Change, UNITAR
5.	Ms. Manisha Choudhary	Project Coordinator, PAGE India
6.	Mr. Chitransh Dua	Consultant, PAGE India
7.	Mr. Vikram Rajvanshi	UNEP Consultant-Sustainable Public Procurement, PAGE India
8.	Dr Prasad Modak	Managing Director, EMC Pvt Ltd
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Annexure 4: Elaboration of Prioritised Services

Service Title: Circularity at Sub-National Level Through Coordination
Description of the Service: ● Advisory services to develop state level and local level circularity strategies/roadmaps/plans. ● Support implementation of actions/initiatives being taken by the sub-national governments to foster circularity. Support is mainly in terms of technical assistance, which may include design of financing mechanism or engagement models to facilitate the implementation
Target stakeholders: ● Local municipality, State Departments, District Administration
Modes of service delivery: ● Roadmaps ● Action Plans ● Strategies
Business Model and Revenue Streams: Revenues can be generated through: ● Fixed Fee from the sub-national government
Any other agencies offering similar service: ● Think Tanks such as TERI, CEEW ● Individual Consultants supporting the Departments in sub-national governments
Any barriers/risks to the service? ● Inaccurate estimation of timelines ● Difficulties in engaging with the different government departments at the sub-national level ● Lack of interest at the sub-national level
Existing programs/initiatives that may find relevance for this service: 1. SMART City Mission (Circularity at the City Level) Smart Cities Mission is an urban renewal and retrofitting programme launched by the Government of India in 2015 to develop smart cities and make them citizen friendly and sustainable. The mission spans 100 cities throughout the Indian subcontinent including Union Territories. The Union Ministry of Urban Development is responsible for implementing the mission in collaboration with state governments; this is expected to be completed between 2019 and 2023. Components of area-based development in the 100 Smart Cities Mission in India comprise city improvement (retrofitting), city renewal (redevelopment) and city extension (greenfield development), along with a pan-city initiative[26] [27]. 2. Aspirational Districts Programme Launched in January 2018, the Aspirational Districts Programme (ADP) aims to transform 112 of the most under-developed districts quickly and effectively across the country. The broad contours of the programme are Convergence (of Central & State Schemes), Collaboration (of Central, State level Nodal Officers & District Collectors), and Competition among districts through monthly delta ranking; all driven by a mass movement. With States as the main drivers, this program focuses on the strength of each district, identifying low-hanging fruits for immediate improvement and measuring progress by ranking districts on a monthly basis. The ranking is based on the incremental progress made across 49 Key Performance Indicators (KPIs) under 5 broad socio-economic themes - Health & Nutrition, Education, Agriculture & Water Resources, Financial Inclusion & Skill Development, and Infrastructure.

[26] "Smart Cities Mission" https://www.ibef.org/government-schemes/smart-cities-mission#:~:text=The%20100%20Smart%20Cities%20Mission,them%20citizen%20friendly%20and%20sustainable.
[27] "About Smart Cities" https://smartcities.gov.in/about-the-mission

The delta-ranking of Aspirational Districts and the performance of all districts is available on the Champions of Change Dashboard[28].

Service Title: Regulatory/Policy Sandboxes

Description of the Service:

- Research into exploring various sandboxing models to understand which model would fit best in the Indian context.
- Collaboration with line ministries to conceptualize and design implementable policy instruments.
- Coordination with government departments

Target stakeholders:

- National government, Local municipality, State Departments, District Administration

Modes of service delivery:

- Sandboxing models

Business Model and Revenue Streams:

- This service could be supported from the annual funds allocated by the different Line Ministries to the CoE

Any other agencies offering similar service:

- This service is mainly provided by government ministries and agencies in India. Some include:
  - Insurance Regulatory and Development Authority of India (IRDAI)
  - Securities Exchange Authority of India (SEBI)
  - Reserve Bank of India (RBI)
  - International Financial Services Centres Authority (IFSCA)

Any barriers/risks to the service?

- Innovators may lose some flexibility while going through the sandboxing process.
- In case the policy sandbox fails, there may be an inertia/lack of interest for the policy makers in further sandboxing.

Existing programs/initiatives that may find relevance for this service:

1. Regulatory Sandboxing by RBI in the Indian FinTech industry

The Reserve Bank of India (RBI) set up an inter-regulatory Working Group (WG) in July 2016 to investigate and report on the granular aspects of FinTech and its implications so as to review the regulatory framework and respond to the dynamics of the rapidly evolving FinTech scenario. The report of the WG was released on February 08, 2018, for public comments. One of the key recommendations of the WG was to introduce an appropriate framework for a Regulatory Sandbox (RS) within a well-defined space and duration where the financial sector regulator will provide the requisite regulatory guidance.

The objective of the RS is to foster responsible innovation in financial services, promote efficiency and bring benefit to consumers. The RS is, at its core, a formal regulatory programme for market participants to test new products, services, or business models with customers in a live environment, subject to certain safeguards and oversight. The proposed financial service to be launched under the RS should include new or emerging technology, or use of existing technology in an innovative way and should address a

[28] "Aspirational Districts Programme" https://www.niti.gov.in/aspirational-districts-programme

problem and bring benefits to consumers. crease efficiency, manage risks and create new opportunities for consumers[29] [30].

2. Regulatory Sandboxing by the Government of Karnataka

Karnataka Innovation Authority Act has been enacted for the creation of Regulatory Sandboxes in Karnataka. 'Regulatory Sandboxes' broadly describes a set of conditions under which innovative technologies can be tested through relaxing regulatory requirements, in a controlled testing environment. The Authority has the powers to relax the State Laws only, as it deems fit and permits for the purpose of establishing a Regulatory Sandbox, in accordance with the Karnataka Innovation Act.

After the Regulatory Sandbox is notified by the Authority, the Sandbox Operator shall be responsible for inviting applications from Industry/ Academia to participate in the Regulatory Sandbox and for overseeing compliance of all participants with the terms and conditions of the Regulatory Sandbox. The Sandbox Operator shall be responsible for the administrative functioning of the Regulatory Sandbox. The innovative firm is allowed to experiment and gain exposure to a live market (albeit with limited customers and within a limited time frame), without implementing the regulatory requirements which would normally be applicable in offering its product. Implementing its product under specific known conditions also allows firms to reduce their time to market. The regulator can monitor the compliance of firms in the sandbox and use the data to appropriately draft regulations that are more appropriate for the particular sector. Once the sandbox experimentation ends, the firm can enter a broader market. During the sandboxing period, it ensures better protection for consumers through greater certainty and oversight[31].

Service Title: Sectoral Strategies

Description of the Service:

- Preparation of sector-specific strategies that can drive decarbonisation following a Circular Economy approach
- Identification of new high-impact sectors

Target stakeholders:

- Industry stakeholders
- Various government bodies

Modes of service delivery:

- Guidance documents
- Strategy papers

Business Model and Revenue Streams:

Revenues can be generated in the form of a fixed fee for creation from government bodies.

Any barriers/risks to the service?

- Lack of interest to implement recommendations of the strategies by industry stakeholders

Service Title: Circular Financing Models/Instruments

[29] RBI Report: "Enabling Framework for Regulatory Sandbox" https://www.rbi.org.in/Scripts/PublicationReportDetails.aspx?UrlPage=&ID=1187

[30] "RBI Regulatory Sandbox is Shaping the Future of Indian Banking" https://www.finextra.com/blogposting/22907/rbi-regulatory-sandbox-is-shaping-the-future-of-indian-banking

[31] "Karnataka Innovation Authority" https://itbtst.karnataka.gov.in/info-2/KIA/en

Description of the Service:

- Integration of circularity into financing instruments
- Directing flow of funds (through financing models and instruments) towards projects that foster circular economy

The Centre can work with investors/ financing institutions and different tiers of the government to design financing instruments in a way that they integrate the principles of circularity. Furthermore, the Centre can enable networking between investor companies and investee companies by establishing a platform for engagement. This may lead to the setting up of dedicated funds to ensure a stable and conformed flow of funds.

Target stakeholders:

- Financial sector organizations
- Businesses working towards circularity, circular Start-ups, financial institutions, fintech start-ups, circular funds

Modes of service delivery:

- Guidance documents
- Coordination mechanism
- Platform for engaging and connecting Stakeholders

Business Model and Revenue Streams:

- Fixed fee from the financing institutions
- Commission from the businesses receiving the funds

Service Title: Measuring Progress On Circular Economy

Description of the Service:

- Developing country level parameters and indicators which will show quantitative and substantial progress achieved by different sectors in adopting CE and allow annual measurement.
- Setting circularity centric targets for industries based on their progress.

The Centre can deep-dive into developing an overarching circularity report format which will apply universally to all sectors and industries within India, allowing the country to measure the extent of adoption of CE. The report will include well-researched and personalized parameters and indicators for each sector to track measurable progress. This will further allow India to set quantifiable targets and kickstart annual reporting for circularity.

Target stakeholders:

- Government Ministries and Departments
- Industries
- Sectoral Associations

Modes of service delivery:

- Circularity Metrics Report

Business Model and Revenue Streams:

Revenues can be generated through a fixed fee from:

- Government bodies
- Reporting entities

Any other agencies offering similar service:

- FICCI
- Accenture

- ICCI

Any barriers/risks to the service?

- Lack of adequate data availability
- Lack of representation by sectors

Example of this Service in India or Internationally

1. Circularity Gap Report

The Circularity Gap Report is published annually by Circle Economy. The exercise started in 2018 with the first report released during the World Economic Forum in 2018. The Reports provide high-level insights into the globe's material flows and key levers for transitioning to circularity. They also support decision-makers with clear metrics, global data, and a measurement of the circular economy to guide their action[32].

2. Measurement of Circularity at Product/Organisation Level
   - Circulytics (Ellen McArthur Foundation)
     The Ellen McArthur Foundation has developed a comprehensive set of tools to measure circularity. They have the Material Circularity Indicator (MCI) for measuring CE at the product level, and Circulytics as an assessment tool to measure company level circularity. Circulytics holistically measures the aspects that enable company-wide transformation, such as strategic importance of the circular economy and ability to innovate for the circular economy, as well as circular economy outcomes, for example in terms of material flows or the way in which companies have designed their services. The tool was developed in collaboration with 30 companies and academic organisations[33].

   - Circularity Transition Indicators (World Business Council for Sustainable Development - WBCSD)
     30 global companies have come together through WBCSD's Circular Economy program to develop the Circular Transition Indicators (CTI). This CTI framework is based on an assessment of material flows within company boundaries, combined with additional indicators on resource efficiency and efficacy, as well as the value added by circular business. CTI incorporates water, renewable energy and business value into its scope to create a multidimensional perspective of a company's circular performance[34].

Service Title: Guidance on Setting Up Industry Bodies

Description of the Service:

- The Centre can assist in the establishment of industry bodies.
- A Remanufacturing Council can be a priority in this domain as it will provide a common platform to address remanufacturing challenges and issues. Such a Council will be pivotal in accelerating the transition towards CE as it will provide industries with implementable solutions and also guiding policy action

Target stakeholders:

- National government

Modes of service delivery:

[32] "Circularity Gap Report 2022" https://www.circle-economy.com/resources/circularity-gap-report-2022
[33] Circulytics: "Resources " https://ellenmacarthurfoundation.org/resources/circulytics/resources#:~:text=Circulytics%20is%20a%20tool%20to,value)%2C%20and%20regenerate%20nature.
[34] "Circular Transition Indicators (CTI)" https://www.wbcsd.org/Programs/Circular-Economy/Metrics-Measurement/Circular-transition-indicators

- Feasibility Study
- Guidance Manual

Business Model and Revenue Streams:

Will need to be supported through government funding

Any barriers/risks to the service?

- Lack of participation support

Any relevant partners?

- FICCI
- ASSOCHAM
- FISME

Service Title: Need-Based Innovative Training Modules

Description of the Service:

- Developing knowledge enhancing training modules on relevance of CE for different stakeholders including the senior government officials
- Focus would be on training trainer of trainers who can then use the learning to conduct training programs for a larger audience

Target stakeholders:

- MSMEs, large industries, government officials, financing institutions, industrial clusters, common pollution control infrastructure, associations

Modes of service delivery:

- Training Workshops
- Training Modules

Business Model and Revenue Streams:

Revenues can be generated through:

- Fixed fee that will be charged to the respective trainee organization

Any other agencies offering similar service:

- Administrative Staff College of India
- APITCO
- CII-GBC
- EPTRI
- NEERI
- National Small Industries Corporation

Any barriers/risks to the service?

- Lack of interest on part of the targeted stakeholders to learn about CE.
- Complexity linked to customization of the training content to the specific target groups.

Service Title: Circular Economy Parks/Industrial Parks

Description of the Service:

- Preparing master plan of the selected parks, which includes the common infrastructures as appropriate, such as water supply and distribution, electricity, wastewater conveyance and management.
- Designing financial instruments and investment models for the parks
- Devising appropriate institutional models of engagement
- Making a call and outreach for industries in the case of pilot greenfield project and stakeholder consultation towards participation for the brownfield project
- Preparing Detailed Project Reports (DPR) and the bidding documents

Target stakeholders:

- State Industrial Boards (SIBs), State Industrial Development Corporations (SIDCs), Material Recycling Association of India

Business Model and Revenue Streams:

Revenues can be generated from:

- Fixed fee from SIBs and SIDCs

Any other agencies offering similar service:

- Private consulting organisations

Any barriers/risks to the service?

- Bureaucratic hurdles
- Coordination challenges with the government departments

Any relevant partners?

- Material Recycling Association of India
- Organizations working with the informal sector.

Existing programs/initiatives that may find relevance for this service:

1. Eco-Industrial Park in Naroda, Ahmedabad

Naroda Enviro Projects Ltd. (NEPL) has set up two main projects at Naroda: A Common Effluent Treatment Plant (CETP) of 3 million litre per day (MLD) capacity, which is providing services to the polluting industries located on the Naroda Gujarat Industrial Development Corporation (GIDC) Estate, and the first Hazardous Treatment, Storage and Disposal Facility (TSDF) to which over 1400 enterprises dispose their hazardous waste. The German International Development Agency (GIZ) has supported the development of EIPs in Gujarat since 2010, and pilot projects and capacity building (2012) took place together with GIDC and GCPC[35].

Service Title: Innovation Spaces

Description of the Service:

- Establishing Innovation Spaces (IS) such as fab labs, makerspaces, hackerspace, living labs, and coworking spaces to create a physical infrastructure with the necessary tools to create an environment that is conducive to innovation in the CE space

Target stakeholders:

- Researcher, Students, Designers, Material Scientists, Consumers

Modes of service delivery:

- Architectural plan for establishing IS

[35] UNIDO Report: "Global Assessment of Eco-Industrial Parks in Developing and Emerging Countries" https://www.unido.org/sites/default/files/2017-02/2016_Unido_Global_Assessment_of_Eco-Industrial_Parks_in_Developing_Countries-Global_RECP_programme_0.pdf

- Feasibility report

Business Model and Revenue Streams:

Revenues can be generated from:

- Membership fees
- Fees linked to different offerings by the IS

Any other agencies offering similar service:

- Incubators

Any barriers/risks to the service?

- Lack of physical infrastructure

Any relevant partners?

- Design Institutes, like NID
- Academic Institutes, like IITs.

Example of this Service in India or Internationally

1. ARA Innovation Space

The ARA Innovation Space is a place for networking, interdisciplinary exchange, and innovation, creating topics for a circular economy in Austria. Its main stakeholders are civil society, artists, scientists, creative people, students, and entrepreneurs. The goal of the ARA Innovation Space is to connect people on a cross-disciplinary level to join forces developing and implementing innovative solutions – contributing to the sustainable use of our natural resources. The members of the space organize workshops, networking events as well as creative formats such as exhibitions and performances on a regular basis[36].

Service Title: Circularity in Supply Chains

Description of the Service:

- Guiding industries towards designing and implementing measures that would make their supply chains more circular.
- Combatting the challenge of circularity in global supply chains .

Target stakeholders:

- Industries from various sectors

Modes of service delivery:

- Supplier Code of Conduct Document
- Drafting policies for circular supply chains

Business Model and Revenue Streams:

Revenues can be generated from:

- Fixed fee from industries for provision of services

Any other agencies offering similar service:

- Consultancy Organizations

Any barriers/risks to the service?

- Lack of buy in from the top management.
- Lack of interest from the supply chain players

[36] "ARA Innovation Space" https://circulareconomy.europa.eu/platform/en/dialogue/existing-eu-platforms/ara-innovation-space

Service Title: ESG Framework for Industrial Estates and Parks
Description of the Service: ● Developing ESG framework and guidance for industrial parks so that it is in conformance with national and international guidelines and standards. ● The Centre can act as a knowledge Partner to provide technical expertise in the ESG domain
Target stakeholders: ● Industrial Parks ● State Industrial Development Corporations
Business Model and Revenue Streams: Revenues can be generated from: ● Fixed fee from industries for provision of services
Any other agencies offering similar service: ● Consulting organisations
Any barriers/risks to the service? ● Lack of understanding and relevance of ESG ● Differing priorities and focus of the industries in the parks
Any relevant partners? ● State Pollution Control Board
Service Title: Technical Assistance in Developing CE-Based Pilots And Demonstrations
Description of the Service: ● Guiding and mentoring potential CE solution providers/entrepreneurs to design their pilots and demonstration activity. ● Connect them with potential platforms where the pilot or demonstration project could be set up
Target stakeholders: ● Circular businesses and start-ups ● Industries, government (including sub-national level) looking for CE solutions to the challenges being faced
Modes of service delivery: ● Workshops, Interactions ● Information collaterals
Business Model and Revenue Streams: Revenues can be generated from: ● Larger private and public sector projects focusing on broader CE agenda. ● Existing government of India programs giving the push to CE relevance and need to foster innovation and entrepreneurship
Any other agencies offering similar service: ● GIZ ● Consultancy Organizations ● Incubators and Accelerators
Any barriers/risks to the service? ● Technical challenges to the CE solutions being piloted/demonstrated. ● Lack of interest and knowledge amongst the audience on the solution being offered ● Competition from similar other solution providers

Any relevant partners? • Incubators and accelerators