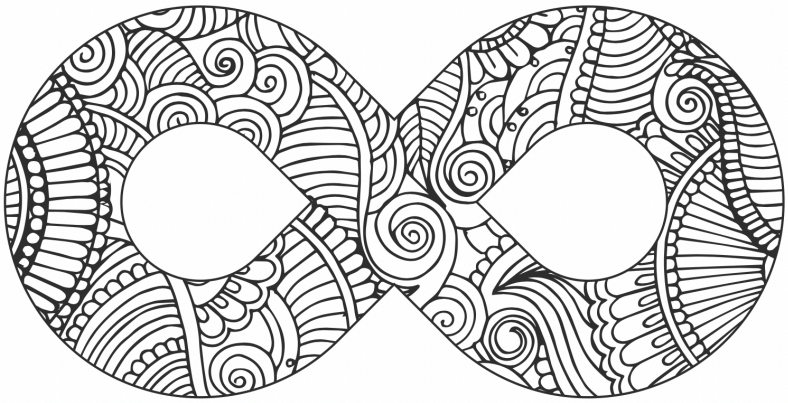


Enabling The Development of "Circular Campus"

A MANUAL ON

IMPLEMENTATION OF CIRCULAR ECONOMY IN EDUCATIONAL INSTITUTIONS

Focus on Plastic Waste Management

Global Institute for Circular Economy and Sustainable Development Goals

DISCLAIMER

The Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs) and Mobius Foundation accept no claims for compensation with respect to any wrong, abbreviated incorrectly included content in this manual. No part of this publication may be reproduced, stored or transmitted in any form means, including, electronic, mechanical, zeros or otherwise without the prior written permission from the Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs), India.

PUBLISHED BY

Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs)
Hyderabad, Telangana 500008

REFERENCE NUMBER: ICE&SDGs-02/07/2021
July 2021

COPYRIGHT

ACKNOWLEDGEMENT

The manual on **'Implementing Circular Economy in Educational Institutions',** is developed by the Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs). The manual is the part of the project ***'Project on Design, Development and Conducting Training Programmes on Circular Economy : The Programme for Training of Trainers on Circular Economy; for Educational Institutions and SMEs (Focus on Plastic Waste Management).***

The project is jointly funded by Mobius Foundation and ICE&SDGs, India. ICE&SDGs acknowledge the support provided by Mobius Foundation, India.

We would like to also acknowledge the support of our knowledge partners, Sanshodhan: An E-Waste Exchange Pvt Ltd., India; Vescobel, Belgium; Members of 'International Alliance on Circular Economy and Sustainable Development Goals (IAoCE&SDGs)', for contributing their expert insight on the subject. We thank the entire team at ICE&SDGs for their efforts in publishing this manual.

The manual aims to offer specialised knowledge, essential skillsets and mindsets required to develop core competencies and enable the implementation of circular economy models in educational institutions.

AUTHORS

Dr Shalini Sharma, Founder Director, ICE&SDGs

Dr Shalini Sharma is the Co-Founder & CEO of Sanshodhan: An E-Waste Exchange Pvt Ltd. (the company mentored by NASDAQ Entrepreneurial Center, Silicon Valley, USA) and Founder Director of Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs).

She innovated world's first tech-based circular economy platform for e-waste sector and continues to work on development of digital standards and circular economy model for various sectors.

Her innovation is recognised as Highly Commended The Circulars 2019, World Economic Forum, Davos at The Circulars 2019. Her circular economy innovations are also awarded by Responsible Finance and Investment, United Kingdom & DDCAP Abu Dhabi; DIPP, Government of India; and various other organizations.

Shivaani Vishwakarma, Director, Social Development, ICE&SDGs

Ms Shivaani Vishwakarma is the Director of Social Development at ICE&SDGs, India.

Ms Vishwakarma is a former Assistant Professor, Cane Growers Nehru College, Uttar Pradesh, India.

She completed her B.Ed at CCS University and Master's in Social Work (MSW) from Lucknow University.

She focus on capacity building and awareness campaigns on circular economy, e-waste management, plastic waste management and Sustainable Development Goals (SDGs).

CONTENTS

Purpose of the Manual **6**

Executive Summary **7**

Chapter 1: Introduction **8**

Why Should Educators Steer Towards Circular Economy 8

Opportunities, Drivers & Barriers 9

Educational Institutions and Policy Interventions 10

National Policy Interventions for Circular Economy Education 11

Approaches & Preparedness: Implementation of Circular Economy 12

Chapter 2: What is the Circular Economy **13**

Principles of Circular Economy 13

Schools of Thought on the Circular Economy 14

SECTION 1: PEDAGOGY FOR CIRCULAR ECONOMY LEARNING

Chapter 3: The Need for Learning Circularity in Educational Institutions **18**

Building a Future of Circularity 18

Educational Institutions & Circular Management 19

Circular Economy & Education Across Geographies 19

Building Competencies in Circular Economy & Sustainability Expertise 20

Chapter 4: Circular Economy Learning & Pedagogy **21**

Approach 1: Competency Models for Circular Economy 21

Approach 2: Learning Topics for Education for a Circular Economy 23

Approach 3: Creating a Didactical & Pedagogical Approach for Circular Economy Education 24

Approach 4: Embedding Circular Economy & Waste Education in the Curriculum 25

Approach 5: Creating an Assessment Toolbox 27

Chapter 5: How to Mainstream Circular Economy Thinking for Educators **29**

Mainstreaming Circular Economy by Promoting Mind shift for Educators 30

Mainstreaming Circular Economy by Shift in Mindsets for Educators 31

Promotion of Stewardship 32

Product & Brand Promotion 32

SECTION 2: IMPLEMENTING CIRCULAR ECONOMY IN EDUCATIONAL INSTITUTIONS

Chapter 6: Integrating Circular Economy in Your Educational Institute **35**

Why, What, Where & How of Integrating Circularity for Educators 35

Establishing Relevance of Circular Economy & Waste Education 36

Allocating Responsibilities & Budget for Circular Economy 37
Stakeholder Engagement & Collaboration 37
Educational Resources 37
Problem Identification 38
Strategies for Integrating Circularity in Education Institutions 38
Chapter 7: How to Prepare Your Organisation for Circularity 41
Chapter 8: Methodologies to Implement Circular Economy in Education Institutions 43
How To Align, Apply & Implement Circular Economy For Educational Institutions 43
Methodology 1: ReSOLVE Framework 43
Methodology 2: Plan-Do-Check-Act & Improvise-Establish-Sustain Framework 45
Guidelines & Approaches to Implement Circular Economy 47
SECTION 3: CAREER OPPORTUNITIES IN CIRCULAR ECONOMY
Chapter 9: Career Opportunities in Circular Economy 50
Career Options in Circular Economy 50
Specialist & Expert Level Career Options in Circular Economy 51
Chapter 10: Aligning Circular Economy Education with SDGs 52
Where, Why & Who of Aligning SDGs with Circular Economy Education 53
How SDGs are Aligned with Circular Economy Education 53
Chapter 11: Benefits of Circular Economy for Educational Institutions 56
Chapter 12: Case Studies 57
Case Study 1: Circularity & Sustainability Performance of the University of Manchester 57
Case Study 2: Action-led Circular Economy Assessment Framework 58
Case Study 3: Nachaltig Digital: a platform for sustainable digitalization 59
Case Study 4: Cycle Competence Centre 59
Case Study 5: Educational Platform for Interdisciplinary Knowledge Exchange 60
Exercises 61
References 65
Definitions 67
Acronyms 68
ANNEXURE - I: 69
ANNEXURE - II: 71
ANNEXURE - III: 72

PURPOSE OF THE MANUAL

TRAINING THE TRAINERS ON CIRCULAR ECONOMY

The project *on* ***"Design, Development and Conducting Training Programmes on Circular Economy : The Programme for Training of Trainers on Circular Economy (ToTCE) ; for Educational Institutions and SMEs (Focus on Plastic Waste Management)'*** is conceptualised by the Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs) in partnership with the Mobius Foundation, India.

The project aims to develop the vision, mission, mindset, thought leadership and skillset for much-needed transition from linear to circular economy.

This manual, developed as part of the ToTCE project, will provide guidance, resources, insights and relevant links to support higher education institutions to implement circular economy in their institutions.

By aligning educational institutions as incubators & accelerators for circular economy it will, **strengthen capacities to address the issues related to waste management, carbon emissions from waste management sector, resource management, resource conservation, by enabling the ecosystem to create innovative ways to respond to these challenges.**

This manual aims to:

- **Offer guidelines for educational institutions** to implement circular economy within their contexts and campus, to enable the development of "CIRCULAR CAMPUS"
- **Provide essential knowledge and skillsets** to build their capacity to implement circular economy models,
- **Kickstarting circular economy practices** in schools, colleges, universities and educational centers in India,
- **Establishing hubs** for knowledge exchange and practice in educational institutions in India,
- **Provide career opportunities** for students interested in building a career in circular economy.

EXECUTIVE SUMMARY

Education has a unique power to bring in change – let's harness this power to accelerate the transition from linear to circular economy.

The circular economy is the latest sustainability paradigm that is restorative and regenerative by design, and aims to keep materials and components at their highest utility and value. The circular economy helps in 'closing the loop' of product and material lifecycles through greater recycling and re-use, and bring about benefits for both the environment and the economy.

The implementation of circular economy in educational institutions can dynamise and strengthen the cause of circular economy as they are hubs of learning, knowledge exchange and application. This can lead to stronger communication, knowledge sharing, fostering innovation, open learning for skill development and entrepreneurship.

Leadership by educational institutions on circular economy practices can bring about action and practice, furthering our transition towards circularity. This manual developed by the Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs) in partnership with Sanshodhan E-Waste Exchange and various other knowledge partners, hopes to provide guidance, insights and relevant links to support higher education institutions that are looking to develop circular economy learning, teaching, upskilling and upgrading.

The manual offers educational institutions, three key approaches to implementing and kickstarting circularity in their contexts:

- **Knowledge, tools and methods** of implementing circular economy in their institutions.
- **Teaching and pedagogic methods** for management, staff and teaching professionals to communicate the value and key components of circular economy for their students.
- **Opening up professional opportunities** for students to take forward circular economy, supporting its application in various domains.

This manual explores three crucial questions and provide reply for:

(1) Are educational institutions keen turn 'Zero Waste' and steam ahead to emerge as 'Circular Campus'?

(2) Are they aligning their waste management practices, specially plastic waste, with best practices principles of circular economy? \

(3) If yes – can they upgrade their skill sets and implement the learning from this manual?, and if no – what are the ways to begin aligning, applying and implementing best practices of circular economy.

A well trained and empowered educator, trainer and facilitator can allow the knowledge and tools gained through this manual to trickle down to bring students into action as equal stakeholders and change makers for transitioning from linear to circular model and integrating circular thinking in their personal, academic and professional settings.

The training also shares information on how to align, apply and implement teaching circular economy education with UN Sustainability Development Goals (SDGs): **Goal 4:** Quality Education, **Goal 8:** Decent Work and Economic Growth, **Goal 9:** Industry, Innovation and Infrastructure, **Goal 11:** Sustainable cities and communities, **Goal 12:** Responsible Production and Consumption, **Goal 16:** Peace, Justice and Strong Institutions and **Goal 17:** Partnership for the goals.

CHAPTER 1: INTRODUCTION

From teaching and learning, through research, innovation and student action, there is a growing momentum to transition into the circular economy space.

In comparison to the traditional approach of the linear economy, of 'take, make, use and dispose', the circular economy is a transition that is futuristic, where in all the systems are designed to be regenerative and the materials are made and recycled, recovered and redesigned, flowing back into the cycle after every use.

Circular economy aims to keep products, products as service, components, and materials at their highest utility and value. It also allows stakeholders to distinguish between technical and biological cycle and creates a system of material flow which shall not render both the cycles unfit.

The circular economic model aims to ultimately decouple global economic development from finite resource consumption. It is a key enabler for policy objectives such as generating economic growth, creating jobs and reducing environmental impacts including carbon emissions.

Circular economy opportunities have a sound underlying profitability, businesses are driving the shift towards the circular economy. Yet, there are often non-financial barriers limiting further scale-up or holding back pace for circularity. Policymakers, therefore, can play an important role to help overcome these barriers and create the right enabling conditions and, as appropriate, set direction for a transition to the circular economy.

The key attributes of circular economy principles are:

- **Preserve and enhance natural capital** by controlling finite stocks and balancing renewable resource flows
- **Optimise resource yields by circulating products, components, and materials** at the highest utility at all times in both technical and biological cycles
- **Foster system effectiveness by revealing and designing out negative externalities** such as water, air, soil, and noise pollution; climate change; toxins; congestion; and negative health effects related to resource use.

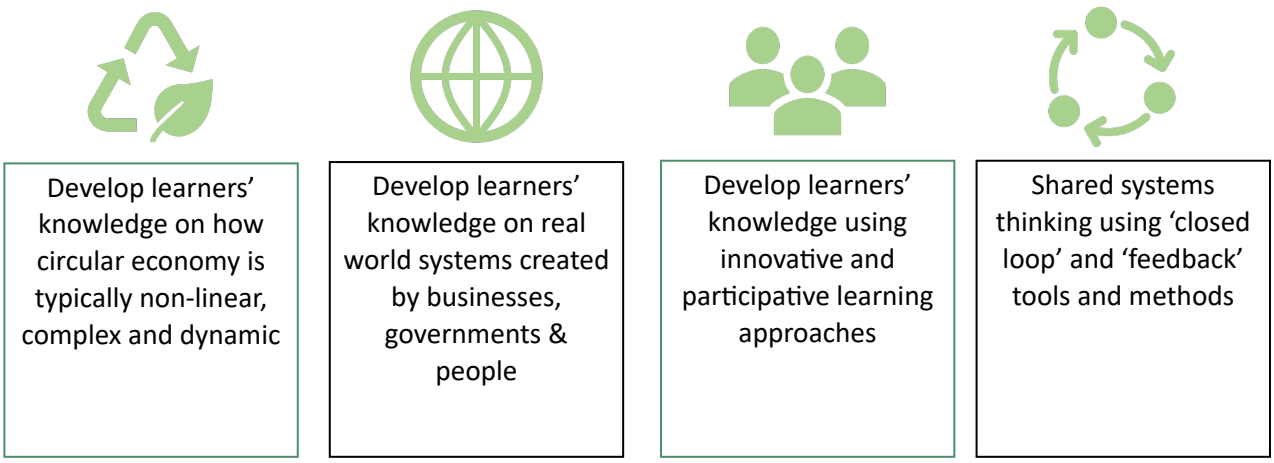
1.1 Why Should Educators Steer Towards Circular Economy

Implementing circular economy creates a generation that not just thinks for circularity, but creates a future for circularity. Educators, professionals and practitioners can learn to rethink, redesign and build a positive loop for a regenerative system and material flow.

Aligning, applying and implementing circular economy in educational institutions and infrastructure settings – with focus areas such as, catalysing innovative businesses, aligning teaching approaches (pedagogical skills), communicating the opportunities for redesigning educational products and approaching products as service that are made from minimised resource use, easy to recycle and recover - does not curtail undue harm to the environment and in turn caters to saving economic costs.

More importantly, it can gain the approval of policy makers, thought leaders and curriculum experts, inspiring new programs on circular economy commissioned from government, private and public institutions.

Figure 1: Circular Economy for Educators



Source: Ken Webster and Craig Johnson, Sense and Sustainability Report

1.2 Opportunities, Drivers & Barriers

While the circular economy can bring about significant benefits for educators in particular, it is important to assess the opportunities, drivers and barriers (financial and non-financial) in implementing circular economy for educational institutions.

The table below details the key opportunities, drivers and barriers to help unpack the value in implementing circularity, and best ways to deliver on a successful transition.

Table 1: Opportunities, Drivers and Barriers of Circularity

Opportunities	• Reduced material consumption • Cost reduction • Lower carbon emissions • Strategic design and management of innovative buildings and infrastructures • Creative thinking and innovation • New educational programmes • Behavioural change among students and staff • Stakeholder engagement in sustainability practice
Drivers	• Highly skilled staff to realise organisational and operational changes • Environmental sustainability action plans, programmes and strategies • University living lab for sustainability and network of sustainability champions • Extensive stakeholder network of the schools, colleges, and university campus, including partners and suppliers • Integration of circular economy related specifications in tender processes (Green procurement) • Circular Economy - oriented legislation and strategies

Barriers	• Lack of awareness and lack of involvement in circular economy best practice • Budget limitations and time constraints • Lack of practical frameworks and tools to ensure improved circular economy performance • Material-intensive student expectations (value for money) • Conservative culture and rigid governance structure • Seasonal changes in campus operations • Business competing demands, goals and priorities

Source: Author's analysis

1.3 Educational Institutions and Policy Interventions

For educational institutions, the first step is to build awareness and access information on circular economy and its practices to:

- Integrate circular economy and its systems thinking into school and university curricula
- Build public communication and information campaigns to support policy decisions
- Lead on consumer information campaigns to influence behavioural change.

Circular economy education is a lifelong learning scenario. Methodologies in action can applied, aligned and implemented in every sphere, over a period of time.

Table 2: Core actions for implementation of circular economy at education institutions

Circular thinking in education: Educational designers will find useful insights on the promotion of circular holistic approach in schools; a bird's-eye view on how tertiary education is integrating the circular economy into its educational offer; the creation of attractive learning pathways in adult training.
Upskilling waste, repair and reuse industry: Educators and professionals in the field of vocational training will find useful references on the development of professional standards and competence profiles for 3R's industries,
Facilitating the transition towards circular economy: Facilitating transitions in educational institutions can be made mandatory and not just a mere learning exercise. Action and evidence-based deliverables should be encouraged not just for the institution, but for the city, communities and societies at large.

1.4 National Policy Interventions for Circular Economy Education

1.4.1 The New Education Policy, 2020, Ministry of Human Resource Department, Government of India

In July 2020, the Human Resource Department, Government of India announced a new education policy to set up core curriculum and competencies of the students from elementary to higher education including professional courses.

As per the National Education Policy, 2020 (NEP), education is fundamental for achieving full human potential, developing an equitable and just society, and promoting national development. New Education Policy, 2020 can be referred on the link https://www.niepid.nic.in/nep_2020.pdf .

1.4.2. New Education Policy (NEP)2020: How it Incorporates the Environmental Sector?

The NEP covers all the crucial areas related to the circular economy, climate change, sustainability, renewable, resource conservation and or environmental economy/ cost benefits. Few excerpts from NEP 2020 are provided for ready reference.

- Section **0.2.** states that - With climate change and rapid depletion of natural resources, there will be a sizable shift in how we meet the world's energy, water, and sanitation needs, again resulting in the need for new skilled labour, particularly in biology, chemistry, physics, and climate science.

It is crucial, that circular economy shall be integrated into the curriculum to ensure raising the students' awareness on the most pertinent issues.

In NEP2020, c**urricular integration of essential subjects and skills** are mentioned in Section-4, 'Curriculum and Pedagogy in Schools: Learning Should be Holistic, Integrated, Inclusive, Enjoyable, and Engaging', Section 5, 'Teachers', Section 11, 'Towards a More Holistic Education' and Section 17, 'Professional Education', and same details are provided herewith for ready reference:

- **4.23.** Environmental awareness, water and resource conservation
- **4.29.** Conserve the environment and reduce the logistical burden – pdf printable version of all textbooks by all the states/UTs and NCERT – Saves time, paper and environment friendly and economically viable and cost effective
- **5.10.** Governance, resource sharing and community building–resource conservation attribute
- **11.7.** Environmental education and value-based education
- **17.2.** Emerging technologies while being cognizant of critical issues such as declining land productivity, climate change, food sufficiency for our growing population, etc.

While it is important to educate the current and future generations about circularity, it is just as important to **create new knowledge by promoting high-quality research** in educational institutions. Promotion of high-quality research and the potential technologies to be used for the same, 'Promoting high-quality research: National Research Foundation' and Section 23, 'Technology Use and Integration'a re detailed under Section 18, NEP2020, as briefed below:

- **18.1.** Knowledge creation, research, sustenance for a vibrant economy and uplifting society
- **18.2.** A robust ecosystem of research: Climate change, air quality, water resources, energy, infrastructure, top notch science and technology for innovation for deeper understanding and addressing of issues.
- **23.13.** Disruptive technologies that are expected to change the way we live, and therefore change the way we educate students, including those relating to clean and renewable energy, water conservation, sustainable farming, environmental preservation, and other green initiatives; these will also receive prioritized attention in education
- **23.8.** Artificial intelligence and data analytics for addressing climate change.

1.4.3. National Assessment and Accreditation Council (NAAC), Manual for Super Speciality Medical Universities. Institutions, India

India has one of the largest and diverse education systems in the world. Privatization, widespread expansion, increased autonomy and introduction of Programmes in new and emerging areas have improved access to higher education. At the same time, it has also led to widespread concern on the quality and relevance of the higher education. To address these concerns, the National Policy on Education (NPE, 1986) and the Programme of Action (PoA, 1992) spelt out strategic plans for the policies and advocated the establishment of an independent National Accreditation Agency. Consequently, the National Assessment and Accreditation Council (NAAC) was established in 1994 as an autonomous Institution of the University Grants Commission (UGC) with its Head Quarter in Bengaluru. The mandate of NAAC as reflected in its vision statement is in making quality assurance an integral part of the functioning of Higher Education Institutions (HEIs). NAAC‟s endeavor to- To arrange for periodic assessment and accreditation of Institutions of Higher Education or units thereof, or specific academic programmes or projects; To stimulate the academic environment for promotion of quality in teaching- learning and research in Higher Education Institutions; To encourage self-evaluation, accountability, autonomy and innovations in Higher Education; To undertake quality-related research studies, consultancy and training programmes, and To collaborate with other stakeholders of higher education for quality evaluation, promotion and sustenance.

ICE&SDGs suggest that all national and international policies on educational institutions, large building, medical colleges or any such set shall integrate the policy and guidelines regarding implementation of circular economy in such institutions. This will help prevent the environmental pollution and land degradation i.e. happening due to medical waste, plastic waste and other non-degradable waste emerging out of such setups.

1.5. Approaches & Preparedness: Implementation Of Circular Economy

The key approaches and methods to implementing circular economy in educational institutions are:

1. **Action-based Methodology Framework**
2. **R-Ladder Framework**
3. **Plan-Do-Check & IES Framework**
4. **4P Model for Circular Economy Education**

Educational institutions will have to choose the most appropriate approach to implement the circular economy at their educational institution (school / college / university).

Educational institution should also prepare themselves for implementation of circular economy, by focussing in getting replies of following points:

- Define their circular economy vision
- Evaluate the baseline circular economy and sustainability performance
- Analyse feasible circular economy opportunities
- Develop a circular economy action plan
- Analyse barriers and drivers
- Implement the most suitable Circular Economy Model
- Monitor
- Review

CHAPTER 2: WHAT IS CIRCULAR ECONOMY?

A circular economy is the design & system that tackles global challenges like climate change, biodiversity loss, waste, and pollution.

According UNIDO, the circular economy is a new way of creating value, and ultimately prosperity. It works by extending product lifespan through improved design and servicing and relocating waste from end of the supply chain to the beginning – in effect, using resources more efficiently by using them over and over, not only once. *(UNIDO, Circular Economy)*

More than a 100 billion tons of resources enters the economy every year. This is sourced from metals, minerals and fossil fuels, plants and animals. The use of resources has tripled since 1970 and could double again by 2050 if business continues as usual. We would need 1.5 Earths to sustainably support our current resource use (WRI, 2021).

In 2019, over 92 billion tonnes of materials were extracted and processed, contributing to about half of global CO_2 emissions. The resulting waste – including plastics, textiles, food, electronics and more – is taking its toll on the environment and human health. The world right now is only 8.6% circular (Global Circularity Gap Report 2020).

The earth has survived five mass extinctions and will survive futures scenarios as well. Climate change, circular economy, resource efficiency and similar concepts are not about saving our earth. They majorly focus on saving our resources and using it judiciously. It's about the smart use of limited resources and requires extraordinary capabilities to manage a highly fragile planet, dependent on natural resources for our survival.

Circular economy is not about waste management or recycling only. It's about changing the operating system of how the world runs. It's about the fundamental shift of thinking, behaviour and consumption patterns.

One of the key aspects of a circular economy is that it requires collaboration and cooperation from individuals, institutions, organisations, the government and corporations, to achieve the world we want for our survival and for our next generations.

A circular economy is a systemic approach to economic development by a regenerative design and aims to gradually decouple growth from the consumption of finite resources.

2.1 Principles of Circular Economy

Design-out Waste and Pollution

- Choosing sustainable materials
- Standardising components
- Using designed-to-last products
- Design that facilitates reuse, recycling and cascading of product or material

Keep Products & Materials in Use

- Innovative and profitable business/institution models
- Leasing, renting, reusing, recycling, refurbishment
- Initiatives from leading brands with significant market share and capabilities to inspire other players.

Regenerate Natural Systems

- Cascading and final return of materials to the soil or back into the industrial production system
- Cost-efficient, better-quality collection and treatment systems
- Effective segmentation of end-of-life products
- Decreasing leakage of materials out of the system

Circular economy is the opposite of our current linear model of 'Take - Make – Dispose', which inevitably leads to declination of natural resources and the increase pollution and waste.

2.2 Schools of Thought on the Circular Economy

Cradle to Cradle Approach: This approach by Michael Braungart and Bill McDonough suggests that 'all material involved in industrial and commercial processes are to be nutrients'

- **Waste equals food:** Design products and materials that can be reused perpetually through biological and technical metabolisms
- **Use current solar income:** Maximize the use of renewable energy
- **Celebrate diversity:** Respect human and natural systems

Performance Economy: This approach by Walter Stahel and Genevieve Reday suggests the importance of **selling services, rather than products.**

Biomimicry: This concept by Janine Benyus suggests takes its inspiration from nature. It shares the approach to follow nature for innovation and design - **nature as model, nature as measure, nature as mentor.**

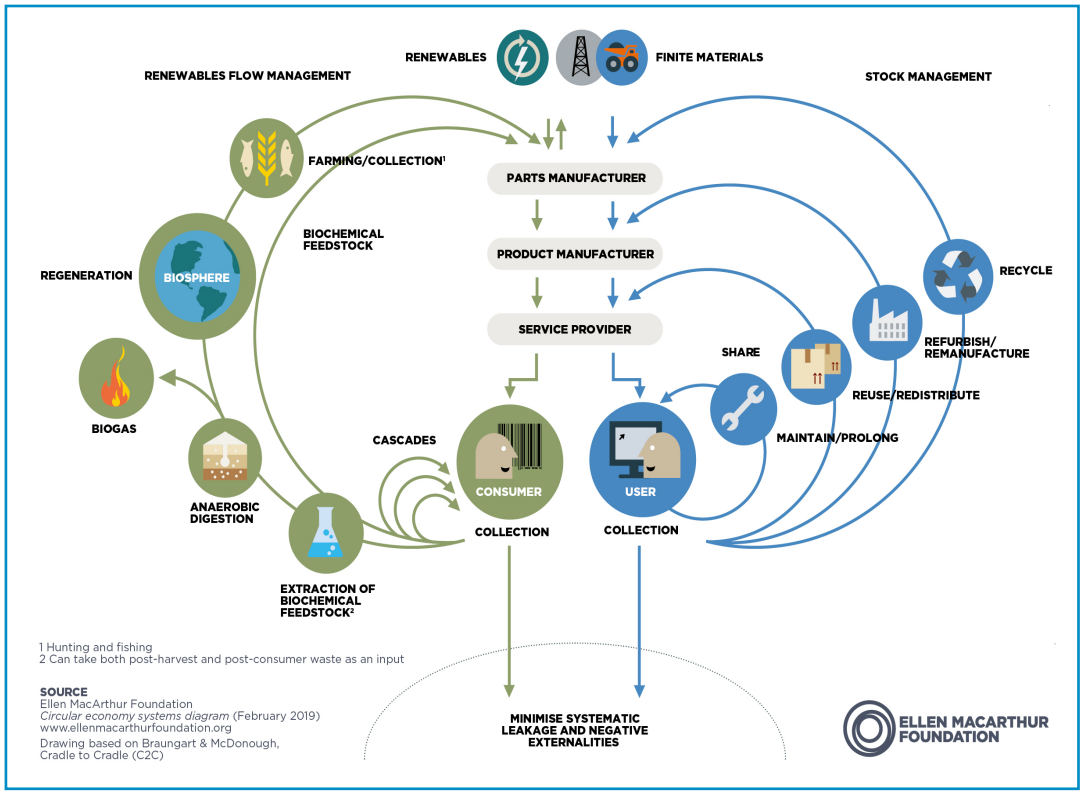
Industrial Ecology: is the study of material and energy flows through industrial systems to create **closed-loop processes** in which waste serves as an input, thus eliminating the notion of an undesirable by-product. It also focuses social wellbeing.

Blue Economy: An approach by Gunter Pauli encourages **better stewardship of our ocean** or 'blue' resources'. Similar to the 'Green Economy', the blue economy model aims for improvement of human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities.

Circular Economy:: by MacArthur Foundation, suggests that a circular economy seeks to rebuild capital (financial, manufactured, human, social or natural) to ensure enhanced flows of goods and services.

The system diagram (given below) illustrates the continuous flow of technical and biological materials through the 'value circle'

Figure 2: System diagram for flow of materials through the 'value circle'



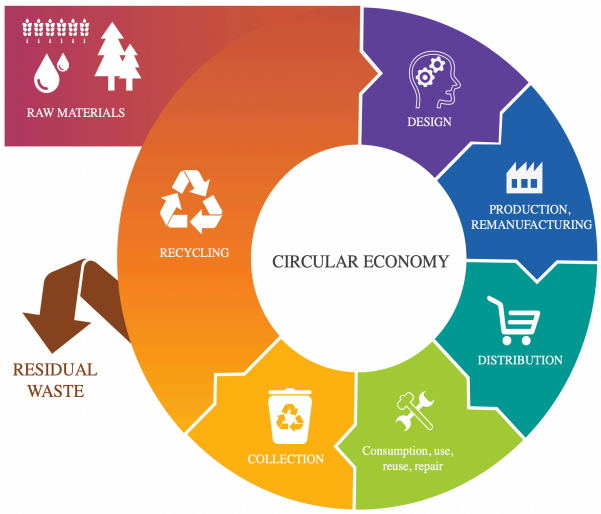
Source: Ellen MacArthur Foundation: Circular economy Systems Diagram (2019)

In practice, the circular economy implies reducing waste to a minimum. This means that when a product reaches the end of its life, its materials are kept within the economy wherever, and however possible. These then can be productively used again and again, creating further value.

This is a departure from the traditional, linear economic model, which is based on a take-make-consume-throw away pattern. This model relies on large quantities of cheap, easily accessible materials and energy.

Figure 3: Circular economy - key components

Moving towards a more circular economy could deliver benefits such as reducing pressure on the environment, improving the security of the supply of raw materials, increasing competitiveness, stimulating innovation, boosting economic growth and creating jobs.



Source: Circular Economy, European Union

SECTION 1

PEDAGOGY FOR CIRCULAR ECONOMY LEARNING

CHAPTER 3: THE NEED FOR LEARNING CIRCULARITY IN EDUCATIONAL INSTITUTIONS

Education is key to bring in the circular economy transition. They are drivers for fostering change in thinking, approach, being rational, logical, strategic and fostering change via innovation and practice. In addition to adapting education systems towards circularity, they can lead this transition through teaching and providing students with the right skills and thinking to make the transition happen at scale.

Circular economy demands a systemic approach, using skills, knowledge and experience from many disciplines. Pedagogy for the circular economy argues that education for sustainable development and entrepreneurial education should both be fundamental pillars.

If there is stronger link between a systemic view on resources and value generation, the more waste will be viewed as a form of bad management that adds costs and affects profits. Education is not only related to business start/scale-up, but it should increasingly deal with the introduction of a successful mechanism to help learners to 'reinvent' new active citizenship behaviours and new modes of work based on the spirit of personal initiative.

Education should foster innovation that includes:

- **Sharing tools and methodologies** to promote active citizenship and structured dialogue between individuals and public authorities
- **Promoting eco-consumption and sustainable behaviours,** tackling food waste, building awareness on eco-labels
- **Supporting bottom-up processes** leading to sharing economy business models
- **Supporting local production processes,** enhancing maker spaces and social innovation co working hubs.

The learning objectives of circular economy education underlie some key concepts, such as:

- The limit of resources and their origin
- The resilience of natural, anthropogenic and social ecosystems
- Production processes and product innovation (recycling, regeneration and reuse processes)
- Conscious and sustainable consumption
- Analysing the degree of sustainability of products and services

3.1 Building a Future of Circularity

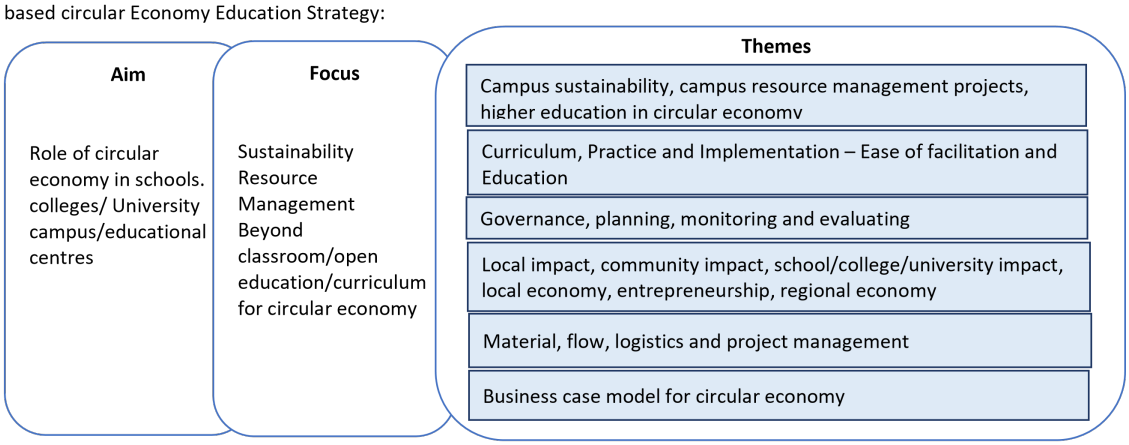
It is evident that circularity can bring about the urgent and necessary changes in our systems, ensuring a more secure future for the generations to come. However, to bring circularity into action, especially in the case of educational institutions, it is important to keep the following in mind:

- **Explore the fundamentals:** learn about the circular economy and get inspiration from leaders working in different design disciplines, biomaterials, architecture, urban planning and more.

- **Apply the principles:** get to grips with the approach and get a sense of what designing for a circular economy can mean for your industry, work, or research
- **Connect with others:** exchange ideas and inspiration with your peers, and get feedback on your circular design thinking and work
- **Contribute and be part of the transition:** contribute to the acceleration of the transition. Find different types of opportunities to be part of the global circular design movement.

Figure 4

Evidence based circular Economy Education Strategy:



3.2 Educational Institutions & Circular Management

Like corporate entities, educational institutions also place underlying pressures and have issues with regard to resources and its use and management. However, corporate entities report their stewardship, accountability and responsibility in the form of reporting as per set reporting standards and guidelines.

In a resource constrained world, hubs of learning and up skilling allow communicating and providing the power to raise the voice for the issues and to resolve it. They need to report their stewardship, accountability and responsibility to its associated stakeholders.

Also, since they are the hubs for bringing change by being the infusers of right blend of education, they can plan and prepare a policy for a formal education on circular economy, sustainability, renewable energy and other allied and associated subject matter.

As the curriculum needs to be aligned with problem so that nudging can happen to resolve it. Open learning is important for real learning to happen, aligning to real problem and not to ideal system.

3.3 Circular Economy & Education Across Geographies

Across geographies, circular economy has turned out be the latest sustainability paradigm towards resource conservation and towards best practices of reduces, reuse, recycle, recover, redesign, remanufacture, refuse waste and infuse alternative concepts. Efforts are being made and must be made to ensure that every sector has experts on circular economy.

We need professionals and practitioners who are educated and empowered in lifecycle thinking. We also need extensive cooperation between stakeholders that understand economic growth is not dependent on the extreme consumption of natural resources.

To package for economy, one must now package for environment, as people, profit and planet and prosperity and well-being are the attributes to reach triple bottom line in every sector, industry base, and community and city level hierarchy.

The circular economy makes it easier to observe constantly changing world and enables good foundation for life-long learning and the education of new professionals.

3.4 Building Competencies in Circular Economy & Sustainability Expertise

An able work force or an expertise on the subject matter is required for a student to move towards forming a chain of competent learners. It also helps build uniformity in problem solving and in addressing resource constraints. Together students, who then go on to become employees can develop future proofing strategies within specific contexts and special cases, enabling circularity across domains and situations.

Future employees can also support government decision making in creating policies that are beneficial for the people and the planet, enabling prosperity in the coming decades.

Climate change, circular economy, energy and energy utilities, net zero (just transitions), carbon neutrality is going to be the future. Therefore, content developers, boards and universities should frame content that show that environmental upheaval is not just static or stable, it is transitioning and so are its impacts.

CHAPTER 4: CIRCULAR ECONOMY LEARNING & PEDAGOGY

The circular economy needs a unified and effective communication and educational strategy using training, educational and participatory tools available (or to be reinvented). These need to be set up in an appropriate and synergic way, differentiated with respect to the different objectives and targets. Detailed in this chapter are approaches to circular economy learning and pedagogy.

4.1 Approach 1: Competency Models for Circular Economy

A competency is the ability to use a set of relevant knowledge, skills, and abilities to successfully perform 'critical functions' or tasks in a defined setting. Competency models define what performance success should look like within an organisation for each task. For circular economy, models are applied to ensure circular design, circular learning and shifting of mindsets towards circularity.

Creating a Competency Matrix

The transition to a circular economy required new skills, competencies and approached. The fundamental competencies used for systems changing can be divided into:

Figure 5: Competency Model Approach

Cognitive: Skills related to knowledge, concepts and ideas

Psychomotor: Abilities related to the performance of actions, basic skills and abilities and

Affective: Capacities related to feelings, emotions and attitudes

Source: Author's analysis

Integrating these for circularity would require an additional layer in approaching the competency model. Creating a competency matrix can alter systems thinking and designing towards circularity.

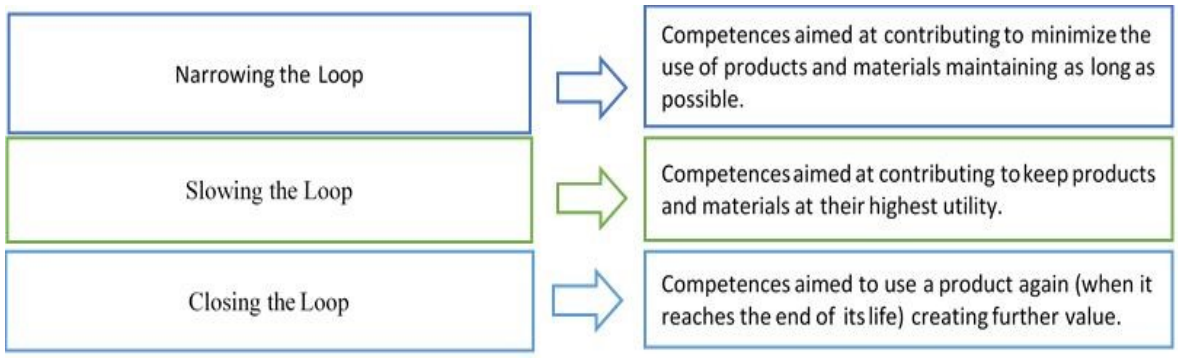
According to circular economy and lifelong learning report there are three types of competencies that make the basis on a circular approach: **competencies aimed at**

(1) Narrowing the loop

(2) Slowing the loop and

(3) Closing the loop.

Figure 6: Competence Framework Structure



Source: CYCLE CC, Competence Centre United Kingdom

The **matrix consists of five learning levels, creating competencies for a circular economy.** The approach includes three dimensions of learning and is integrated in one framework: knowing, doing and feeling.

Within the competence matrix for circular economy redesigning, systems thinking is used for the knowing and doing dimension, systems designing is used for the doing dimension and multi-perspective thinking is used for the feeling dimension.

Figure 7: Competency Matrix for Circular Economy Redesigning

	Knowing	Doing	Feeling
Level 5	Strategic Transfer	Versatile Redesigning	Convinced about Circular Economy
Level 4	Perspectives and Solutions	Solving and Redesigning	Relate yourself to multiperspectives
Level 3	Causes and Consequences	Analyzing and schematizing	Relate and embrace analysis
Level 2	Identify the problem	Gathering Information	Be curious
Level 1	Start	Start	Start

Source: EU, Erasmus+, THREE MOOC

Circular economy training and its aligning competencies shows us how to:

- **Build awareness** on the circular economy by defining the model and highlighting successful case studies.
- **Host awareness-raising sessions** with experts to discuss circular economy and how it can be embedded in universities.
- **Host brainstorming sessions** with working groups to address wasteful processes within a school/college/university/educational centres and hubs through circular solutions.

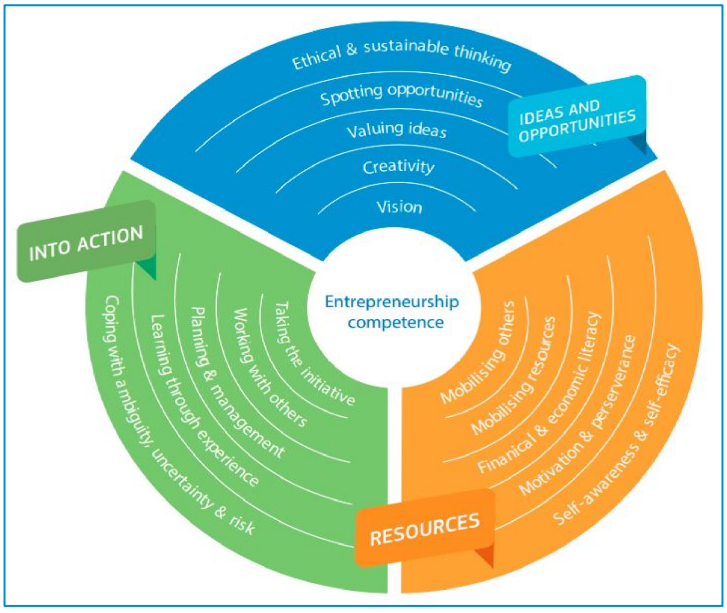
- **Identify material flows** within universities and map out opportunities for waste reduction.
- **Convince and assemble the school/college/university stakeholders** to discuss how (what approaches) and where (which departments, centres, etc.) to embed circular economy concepts.

4.2 Approach 2: Education for a Circular Economy

There are **nine learning topics essential** for education for a circular economy. These steps support learning and education, fostering new and innovative ways to learning about and teaching circularity:

1. **Systems thinking:** The learner is able to schematize causes and consequences to an identified economic, environmental or social issue, using different dimensions and levels of analysis.
2. **Perspectives:** The learner is able to challenge common concepts.
3. **Innovative:** The learner is able to deal with uncertainty and sensitive towards weak signals.
4. **Inclusivity:** The learner takes others into account for those and his own benefit.
5. **Proactive:** The learner is proactively seeking goals to organize effective outcomes of consumption and production, meeting the needs of present and future generations.
6. **Problem-recontextualization:** The learner recognises chances and designs solutions in a responsible and creative way.
7. **Communicative:** The learner explains choices with relevant arguments and is able to convince others.
8. **Change:** The learner is able to adapt ideas for dynamic change in uncertain environments.
9. **Action:** The learner acts independently on own initiative, cooperating with others, based on strategic planning.

Figure 8: Circular Economy Framework: Actions, Ideas, Opportunities and Resources



Source: Ellen MacArthur Foundation

4.3 Approach 3: Creating a Didactical & Pedagogical Approaches for Circular Economy Education

Based on the competence matrix and learning principles of pedagogical concepts, a didactical approach was developed for circular economy competencies. **Didactical models allow teachers to choose their own teaching strategies**.

The nine steps are simply a roadmap to ensure that learners will meet relevant aspects of the learning process, related to the competence matrix circular economy redesigning.

1. **Attention =** feel familiar or wonder.
2. **Understand =** define the problem, a question.
3. **Relate =** feel interconnected, show empathy.
4. **Analyse =** relate, schematize, change level of analysis, dimensions.
5. **Value =** change perspectives.
6. **Solve =** choose a solution.
7. **Design =** design changes in the production process and the product itself.
8. **Present =** explain your design.
9. **Evaluate** your learning process

Didactical Approach

Didactical concepts can be seen as the basic idea behind education. The most common division of educational ideas in terms of didactical concepts is: behaviourism, cognitive and constructivism. Education for Sustainable Development (ESD) fits best with constructivist ideas, based on the idea that as well ESD as constructivism are about high levels of learner engagement, social interaction and a metamorphosis of the learner's beliefs.

ESD means the creation of space for social and transformative learning. Social learning can be considered as 'a learning system in which people learn from each other and collectively become more capable of dealing with setbacks, stress, insecurity, complexity and risks.' Transformative social learning includes space for alternative paths of development, new ways of thinking, pluralism, consensus and respectful disagreement, autonomous thinking, self-determination and contextual differences.

Another concept for ESD, closely linked to social transformative learning is based on a simple strategy: integrate learning processes rooted in learners' head, hands and heart. The goal of this integration is to effect behaviour, the ultimate goal of transformative learning.

Didactical Approach

This approach is an enabler for integration of Head, Hand and Heart for implementing circular economy.

Head

Critical, rational and logical thinking for framing strategies. This can happen via reading the manual, implementing it at the respective educational setting, attending lecture series, webinars, online tutorial courses.

Hand

To enact, act, apply, coordinate and implement it at the respective educational institution setting.

Heart

To imbibe moral and ethical responsibility towards resource conservation and preparing them on how to future proof the use of resources in a constraint setting.

4.4 Approach 4: Embedding Circular Economy & Waste Education in the Curriculum

Embedding circular economy and waste management education practices needs a sound state and national education policy for its induction and to be adopted as an integral part of formal education. It allows accredited educational campuses to have in their curriculum circular economy, waste reduction and sustainability practical education.

This comes in place after due approval, adoption of policy and mandated in consent and consultation with educators and thought leaders as stakeholders with panel being the board, education department and minster of education of state and national competent authority and department.

EVS or Environmental Studies has long been introduced from basic elementary/kindergarten level to higher education, science, business management, including the professional/engineering course work. However, the current curriculum is a theoretical approach of formal education. It talks about circular economy in a generalised and theoretical manner. What formal education should now induct or introduce is open classrooms, beyond classrooms learning and up skilling so that students shall be able to foster sense of belonging and work and innovate and resolve the problems in living labs (environment/habitats).

Corporate entities through their reporting communicate their corporate citizenship and stewardship. Education system needs corporate entity alike stewardship. It should place and engrain stewardship as a part of deep learning and life - long learning education. We do not want a student to define climate change, we want the student to be a responsible or future torch bearer to be able to mitigate and defeat climate change. In addition to adapting and acclimatising to climate change, students need to innovate to reduce the impact of climate change.

4.4.1 Key areas to embed circular economy include:

- **Zero Waste:** Here, training and mentoring on how to prepare, align, apply and implement strategies on resource use, reuse and reduce is provided. Transition from learn to implement

is done here. As like Make in India is meant for entrepreneurs and start-ups, schools, colleges and universities can join as accelerator.

- **Clean Energy Initiatives:** Training and mentoring on use of energy compliant devices, i.e., replacing incandescent and CFLs with LEDs. The use of renewable energy resources - solar energy- where it is installed and how much savings it does- importance of its competencies. Educating the trainers on how billing cycle works – metering importance, energy week and or month in educational institution setting. Importance of Mission Ujjala scheme deliverables learning and importance.

- **Clean Water and Sanitation:** Implementing Swachh Bharat in Schools/Colleges/Universities. Education begins not just in educational institutions, it begins where we live – our homes, towns, cities town and our very neighbourhood with whom we connect. We need to Value water as resource, as a public health attribute including sanitation, hygiene and civic sense. These areas are most vulnerable as educational institutions are providers of future competent students and workforce moving ahead. The importance of water recycling, rainwater harvesting, recharge wells, water standards applicability in educational institutions can happen in the setting,

- **Housing for All:** Under the umbrella of URBAN HAT, Ministry of Urban Affairs – we can see what type of material is used, which are the eco-friendly materials that can be used, how to align, apply to construct energy efficient building, live project base and concepting based mentoring. We need to assess what are smart cities and sustainable cities and build community's awareness on their role are in cities.

- **Net Zero – Carbon Neutrality:** We should employ devices, components, utilities and services, retrofitting, panels, embankments, quantifying emission, remove or sequester emission, convert waste to energy – and access awareness trainings and mentoring

- **Sustainable Production and Consumption:** Understanding what to manufacture (environmentally friendly, economically viable and socially), responsible products learning, training and mentoring, capacity building on how to manufacture (use of minimal resources, reduced waste and associated by-products, learning on responsible use, reuse, reduce, dispose, recover, refuse non-viable, reinfuse alternatives.)

- **Inclination Based Learning:** Training and mentoring on deep rooted learning on real world components or attributes. Trainers be trained on public health importance if efficient resource disposal techniques are implemented, so that students too in turn are honed with similar competencies. This includes innovation or accelerator hubs where trainers can create, and upgrade problem inclined to resolve and experimental learning.

Industrial and technological innovation cannot bring systemic changes or transformation in driving / steering economy or in fostering better economic models on their own. Institutional shifts via formal, awareness oriented, skill oriented, professional development oriented and moral and ethics-oriented education at every level is required to nudge the GDP or fiscal restructuring and instruments/ markets. A competent trainer can create a competent student and workforce moving ahead for creating sustainable cities and communities to dwell in it.

4.5 Approach 5: Creating an Assessment Toolbox

Assessment toolbox for circular economy implementation in educational institutions include:

Questioning

Initiate with a question – as to why it is required, make them think about – this is a logic and reasoning attribute

Relate

Create an example scenario. For example, the learner wants to know how to reduce the use of waste – allow the learner to relate to the situation. Give them 20 pages, a task for a week – advise them to use the paper in a way that though they are able to complete the work but at the end of the week save so and so number of pages so the relation to the scenario is he/her as reduced the use of number of pages, saved the pages and in turn saved the costs/expenditure.

Value

Not everything is supposed to be discarded or disposed. Using it again after use, extending it till it is usable is also an attribute of reducing waste, giving it life and valuing it as a resource. Resource is no longer a resource in circular economy principle application – it is a commodity – has a price or value, unless we do not price and pay for it, we do not value its importance.

Integrate

Integrating the elements of buy, use, reuse and dispose. For example: Publish on Product- "how you dispose"in a disorganised manner **or** segregate it at the source level.

Communicate

Every practice towards aligning, applying and implementing circular economy should be communicated to the stakeholders, *via* monthly newsletters, display or mentioning at the website, articles, reports (for policy makers/for benchmarking your efforts).

Connect

For any practice to reach its better outcome or deliverable there must be a better connect, the way we communicate and build relations with the stakeholders shall be an integral part of circular economy. For example: A school plan to conduct a circular economy week for its neighbourhood. the first thing it shall do is connect with the varied stakeholders in the neighbourhood *via* campaigns, handouts, posting of their plan activity, then connect with them, after the campaign by conducting a talk or workshop mode platform session.

Investigate

After the connect and conduct, note down the findings, their response and gaps; for ease of facilitation and better implementation of circular economy practice for the next workshop and also as a practice for lifestyle development.

Refer worksheet - Annexure III

CHAPTER 5: HOW TO MAINSTREAM CIRCULAR ECONOMY THINKING FOR EDUCATORS

Circular economy is regenerative and restorative, and combines various aspects with a societal relevance. It starts with a way of thinking (circular thinking) that needs to be supported and complemented by relevant circular economy competencies. It also necessitates to find a way to certify them in the curriculum.

For mainstreaming circular economy thinking, the United Nations Sustainable Development Goals (SDGs), particularly **SDG-4,** inclusive and equitable quality education and lifelong learning opportunities for all is a top priority. The inter linkage between education, especially in a lifelong learning perspective and sustainable, innovative development is the central focus.

Innovation and circular economy aim at having competencies which are pivotal for any rational and logical thinking in developing business case for circular economy. It Includes:

1. It aims at creating a **shared treasure of knowledge and experienc**e that facilitates the introduction of circular economy competencies and the continuous update of the relevant skills.
2. It wants to serve as a **starting point to promote multi-stakeholder and international cooperation**, which is essential for the sustainable development of circular economy policies.
3. It **involves local authorities** at regional and municipal level, which are the nearest institutions to the citizens. Without having them as allies once cannot fully conceive the ambitious circular economy model. In fact, circular economy competencies are at a crossroads between citizenship competencies and entrepreneurial competencies, in equipping people.
4. The most inclusive strategy to concretely educate people about sustainability, environmental protection, climate change and circular economy is through formal, and informal education.
5. To develop circular economy it is necessary to **reshape our attitude** and the way we think about industry, natural resources, waste management and the economy.
6. **Cooperative learning /training** in fields like sharing, reuse, eco-design, up-cycle and remanufacture, business model innovation, circular thinking concepts throughout business models; active dialogue among training institutions, local authorities and private stakeholders forms the concrete stage.
7. Circular thinking includes **viewing the economy, society and the environment as complex interconnected systems** with rich flows of resources, materials and information.

5.1 Mainstreaming Circular Economy by Promoting Mind-shift for Educators

Communication is most important aspect to start any new initiate or progress any existing initiative. Circualr economy models can be implemented in educational institutions through strategic and effective communication. Few strategic interventions to implement circular economy in educational institutions are provided herewith, for implementation in educational institutions. Few strategies to enable mid shift among students are provided below:

Ambassadors for Circular Economy

Educators can be identified/ nominated as ambassadors of circular economy.

Every month, one Class Monitor /School Captain / House Captain can be nominated as 'Ambassador for Circular Economy'.

Meet up Learning

Action-based meet ups can access interaction-based learning. Meetup can be action oriented. For eg. Student groups can meet to design solutions for waste management in their University/ school.

Self-Scanning Learning & Upskilling

Scanning the learning to self-assess and up skill competencies is the basis for formulating triple bottom line where actions are not merely for profits, but for people and planet as well. Region based, problem-based and evidence-based didactical learning is required here. For projects or through inclusion within curriculum, the core competencies can be scaled up through various levels:

Core – I (Beginner level)
Core – II (Intermediate Level)
Core - III (Advanced Level) and
Core - IV (Future proofing Level)

It includes aligning course curriculum, didactics, operational management and implementing specifics of circular economy models as suitable for the institutions and, educator competencies.

Monthly Movement – Special Drives

Every month as a part of special drive, movement, campaigns, signature campaigns, workshop, storytelling, interactive events be planned and awarded for its efforts. Circular economy and SDGs award for best practice, Resource stewardship award, Pledge and Act for circularity event and award can add momentum for meeting the aim **'Circular Campus'.** Few pointers are:

- Let's Design for Environment month
- Let's Design for Economy month
- Let's Design for Reduce month
- Let's Design for reuse month
- Let's Design for recycle month

5.2 Mainstreaming Circular Economy by Shift in Mindsets for Educators

Shifts in mindsets here refers to shift in attitude, motivation, perception, blending the problems skill sets, habits.

5.2.1 Circular Thinking to Circular Action

Attitudes to place thinking into action by 'plan-do-check' of buy in. Eg. what to buy, how to buy, how to use, how to extent its use and how to dispose. This shall be the first step for educators for at any level want to hone their skills and competencies.

5.2.2 Circular Motivation

For any action to happen there should be a motivation. Many a times it's the motivation that allows success stories to be created. Incentives for reducing for the way resources are used are also enabling motivators. This is not necessarily monetary incentives for educational institution educator.

Suppose a school teacher or a University Professor participated in this training programme, after the end of the training with those competencies gained in practical orientation, he/she implements a best practice then adjudicating an award is a motivator for setting new initiative and drives to be conducted.

5.2.3 Perception

Not everyone perceives with the same approach. For some, waste is a waste, use and dispose but for some it is a resource for making new product. How one perceives - can help shape circularity.

5.2.3 Blending the Problems

Every entity, sector, institution and organisations with varied workable use resource i.e., we have the take and make concept and with it comes the allied problems. Blending the problems in educational institution can happen when **educators create platform to tackle the issue of resource use** so as to mainstream circularity at not as mere awareness level action but a mandated, accountable and official responsibility per se.

Blending happens in financial markets to tackle crunch and in de-risking. Same concept can be applied here. Blending in educational institution include activity-based action by the educators, interaction-based action implementing that happens with student to institution and institution to student action interface, workshop mode interaction where each of the group can engage and bring change or shift in thinking in action.

From thinking to performance and benchmarking the dynamic role an educator can steering drive the implementation and be the CAP OF HONOUR not for a month or for an institution but to the very ethos and cause of circularity.

5.3 Promotion of Stewardship

Stewardship is a sure way to enable and encourage shifts in thinking and perception – moving towards incentives that work effectively for students. There are various ways in which 'Stewards' can be honoured and motivated. There are:

Logos: Educational institutions with **logos of their commitment towards circularity** or for sustainable development.

Badges: The UN Sustainable Development Goals are interface for inducting circular economy linkages in everything and everywhere. So, b**adges with goals promoting it for a particular month** is a promotion attribute of circularity and sustainable development.

Say for example, Goal-4 is Quality Education, so for a dedicated month as assigned, the institution shall run campaigns, parallelly have signature drives, workshops, interaction day with an expert, tete-a-tete with live thought leaders from the industry, fun, play and learn activities, implement a small grant project of circularity in neighbourhood, essay, elocution/ extempore, every day thought on circularity displayed either digitally or on board.

All this can be worked out by wearing the badge of goal-4 throughout that month, this way it shall promote circularity as well as UN Sustainable Goal-4 as well.

The idea behind it is beyond curriculum integrating problem solving learning and upgrading and also communicating achieving larger goal target of quality education.

Align with SDGs: Another example for promoting it can be by giving badges evenly distributed in a classroom, say for example a classroom has 20 students distribute 17 goals badges to them and assign activities small projects, associate with live experts for interaction and workshops aligning to those goal.

Institution Uniform: Uniform with logos promoting circularity concepts. For example reduce, reuse, recycle, recover, redesign and innovation.

Deputation: Deputing the institution educator and dedicated time (eg. 2-3 hrs/week) for the training will promote institution commitment, dedication and leadership in circular economy and make them engage with industry interface and implement the competencies in the institution settings.

5.4. Product & Brand Promotion as Green School/ College

Understanding 'What to buy' in training is also a promotion and mind shift leadership enabler. A particular product is known for its commitment to sustainability and circularity. An institution can promote the product in their institution for its use based on this. For example, if an institution has all its lighting setting with LEDs (Light emitting Diodes), the institution is not only committing for energy efficiency but also becoming the brand ambassadors of the company manufacturing it.

As a part of Corporate Social Responsibility (CSR), companies can directly partner with the educational institutions for use of their product as well promote their brand and viz–a–viz can get incentivised for their actions under section VII of company acts which calls for promoting for the wellbeing, environment and education as a part of CSR activity.

Via social media, branding, advertisement and online platform everyone knows what to buy and where to buy now a days with everything being digital, but it's an open market promotion and buy in. It does not have nudge of closure of loops which is very much necessary for circular economy to trickle from bottom to top and top to bottom.

Educators can learn and upgrade their competencies on what to buy in and what not to buy in – not open market but closed market buy in competencies that is applicable for digital platform 'An Open Market but with Closed Loop Market interface (OMCLMI).

A few ways for educators to apply product and brand promotion, for their school/college as 'Green School' are:

- Promoting - products as service. This needs mind shift and attitude transition at the user level.

- Schools shall **start selling the old books** (at discounted price), not only to help the students to be able to afford the books, but also to save the resources (like papers) and greenhouse gas emissions.
- Schools shall **promote the use of products made of natural resources,** like wood, slate (stone etc).
- Schools/ colleges shall **stop** the distribution of plastic covers (for books/ copies).
- Schools and colleges shall **stop using / guiding** the students to use thermacoal etc., for their project/ drawing/ decoration etc.
- **Training on Eco-Labels** for products so that user is well armoured, prepared and aware of what to buy in which in turn will not burden environment as well as economy.

So, to endure better facilitation and wider approach of best practices and mainstreaming circular economy thinking and bringing in mind shift in education policy and transition in educators' approach to implement it attitude, perseverance, dedication, commitment, leadership skills and change infusing mind set shall be the prerequisite.

SECTION 2

IMPLEMENTING CIRCULAR ECONOMY IN EDUCATIONAL INSTITUTIONS

CHAPTER 6: INTEGRATING CIRCULAR ECONOMY IN YOUR EDUCATIONAL INSTITUTE

The future is not circular classrooms, but beyond classroom circularity.

6.1 Why, What, Where & How of Integrating Circularity

Why

There is a need for competent educators, mentors, tutors, faculty, thought leaders, knowledge providers and change infusers to teach, design, research and mentor students for action and not just mere learning.

The best practice will be making them **think beyond the classroom learning and innovate for resolving the beyond classroom problem** in the class @'Innovation Hubs'. **Educators need to be provided with in class learning resources and workbook, planners and preparatory documents.**

What

Honing the skills, upscaling, upgrading and benchmarking for the use, design, reduce, recycle, recover, redesign of materials. This in addition to remanufacture, refurbish and revalue any product, product as service and or any material component including raw material.

The key components essential for circularity are:

- Transition from linear model to circular model
- Plan – Do- Check and Act for Circular Economy
- Top down and bottom-up approaches for circularity

Finally, schools, colleges and universities must ensure measurement, management, monitoring, reporting, verification and validation of their processes towards circularity. These include:

- **Transaction costs:** Includes cost incurred and saved through reduced waste and adoption of green technologies and products
- **Resource Pricing:** resource prices allocate scarce resources among alternative uses; resource prices and resource productivity are important for institutions in minimising their costs.
- **Natural capital:** Natural capital is a way of thinking about nature as a stock that provides a flow of benefits to people and the economy. It consists of the institutions natural capital assets – such as water, forests and clean air.

Where

Skills training, up scaling, upgrading and integrating processes for circularity need to be brought to the classrooms, labs, auditoriums, libraries, washrooms, canteens, campus roads, administrative buildings, hostels, play areas, sports clubs, recreation zones and club houses.

Educators need to be trained to design circularity, sustainability and resource use and design at these aforesaid places by providing worksheets, questionnaire and deep dive analysis and reporting, tools and learning, research and innovation strategies.

How

- By understanding and applying circular economy methods and approaches through trainings and sessions within the context of the institute.
- By understanding aligning and applying circular economy through hands on experience on how to model circularity in their setting.
- Through learning to nudge a particular issue, to blend in solutions, stakeholder engagement, brainstorming sessions and processes to close the loops in material production and use.

6.2 Establishing Relevance of Circular Economy & Waste Education

To establish relevance of circular economy and waste education to institutions, the basic structuring step shall be the source education of waste, screening and characterising waste. In addition, scoping opportunities and policies divert the waste is important.

Assessment education tools (both quantitative and qualitative) need to be applied. It's not about the quantum of waste but the quality of waste that matters in assessments (such as degradable or biodegradable). The assessment of the quantity and quality forms the basis for cost saving and to plan, prepare, prioritise and proceed for a sound business case for future proofing and de-risking negative externalities.

The next step is **allocation of finance** and costs to reduce the wastes and in case of reduced waste cost incurred and cost saving that happens. Education tools or frameworks help establish cost benefit analysis, SWOT analysis and pay for use principles.

Key Performance Indicators (KPIs) for educators helps measure, monitor and validate progress following the resource efficiency and sustainability tools. For robust and strategic KPIs, competent financial models are needed, further necessitating a relevance-based learning on the part of educators for a strengthened support based preparatory financial models.

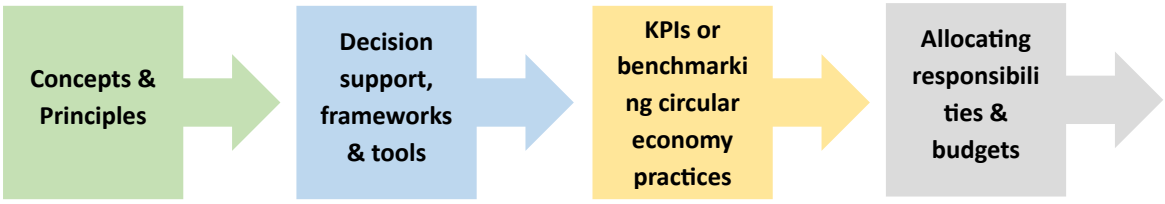
Relevance attributes should include:

a) **Value creation** (key partners, key resources and key activities) that make up for the service offering base learning

b) **Value delivery** (whom to) – to students, to staff, to administrators of the school/college/ university campus and or to the management or board, faculty and teachers.

c) **Value capture** includes cost structure or how to stricture the costs and revenue flow/streams

Figure 9: Relevance attributes to align circular economy practices for educators



Source: Circular Economy: Benefits and good practices, Marino Cavallo, 2018

6.3 Allocating Responsibilities & Budget for Circular Economy

Institutions do not benefit directly from the economic savings related to improvements in resource efficiency because budgets to take such actions and the related savings are handled by the administrative department. This may discourage institutions and department managers to pursue circular economy practices. Budget incentives and appropriate KPIs should be developed to facilitate implementation of circular economy by institutions.

The creation of a joint team of managers and technical staff who are responsible for implementation is important. Top-down circular economy strategies devised and implemented by the senior managers may not be practical at the operational level if they lack consideration of technical aspects, so a staff and practitioner focusing only on operations management may lose track of the organisation core goals and strategic priorities. It thus becomes important to create teams combining operational staff, technical staff and senior managers including practitioners to develop realistic circular economy strategies for ease of facilitation and implementation of best practices.

6.4 Stakeholder Engagement & Collaboration

Institutions on their own do not have the capabilities and competencies to develop and implement circular economy and sustainability-related activities. In such of scenario, it becomes imperative to devise stakeholder, collaboration, co-creation and innovation platforms that encourage partnerships for devising and implementing circular economy best practices at all the levels in its settings.

6.5 Educational Resources

Resources for integrating circular economy for educators are many and easy to apply. These resources arrive from cross disciplinary approaches and can be made to fit the situation as required.

Below are some resources that can be used by educators to kickstart circular economy practices in their instruction:

- **Activity oriented:** Individual activities and best practices by intuitions, including training courses that are bundled and made visible for varied stakeholders. Educational resources with activity-based worksheets, storytelling, deep dives, brainstorming, interactive sessions and documentaries and case studies can be created. For example, activity-based resource for segregating waste (concept and understanding) can give them know-how on how to do it.
- **Process oriented:** Resources are linked to each other in a way. For example, a waste or a by-product becomes a resource for making another new product. So, circularity of resource is an indirect way prerequisite for reducing costs, helps cost saving and allows future proofing fiscal instruments and policies aligning to how process, where to close the loop and where to proceed for maximised and strategic tangible benefits. In nutshell, processes induce circular economy to be interlinked and to reinforce each other for benchmarking with resource stewardship.
- **System oriented:** A regenerative and restorative system always orients towards fostering wider circular economy best practices, allows structural restricting of gaps, loops and constraints and in embedding it as an 'Resource Guiding Strategy' for institutional implementation and success, as well as sharing the success and the stories with peers, though leaders and other associated stakeholders.

- **Governance oriented:** Any best practice implementation will be successful if there is a will to implement it by authorities and management of intuitions. Leadership that are self-driven and self-motivated bring in policies and practices that align to circular economy, resource conservation, its use and upkeep and management. The way, the management of the institution governs the implementation with ethics, accountability, transparency, human rights, code of conduct and due diligence can shape the institutional governance as well as policy making for future course of action.

6.6 Problem Identification

A problem aligning with the successful implementation of circular economy is like a Jig-Saw puzzle. It is possible that a loop closer at one stage of supply chain opens up a negative loop at another stage of supply chain. The ultimate purpose of shaping any best practice will be in mapping all the stakeholders of the supply chain. For an educational institution the supply chain shall be the competencies of the - suppliers, contractors, support staff, administrators, management and board, teachers, faculty, professors, researchers, technical staff, managers and other associated stakeholders.

Mapping of the above-mentioned stakeholders' competencies can be the base using their skills, knowledge and teaching pedagogical approach. A problem can arise if these stakeholders are unevenly mapped. In addition, if the management or board does not issue a directive then there can be a problem with implementation.

Some factors of this happening include:

- Unawareness and lack of involvement in circular economy practice
- Budget limitations and time constraints
- Lack of practical frameworks and tools to ensure improved circular economic performance
- Material-intensive student expectations (value for money)
- Conservative culture and rigid governance structure
- Seasonal changes in campus operations
- Business competing demands, goals and priorities

6.7 Strategies for Integrating Circularity in Education Institutions

While there can be a wide variety of strategies to implement circularity in educational institutions, some effective approaches are detailed below.

6.7.1 Strategy 1: Upcycling

For institutions upcycling involves upgrading already initiated processes towards circularity. If there is a beginner level awareness drive is implemented in the institute or campus, based on the initial success, the institute management upgrades the best practice to next level – then it is upcycling.

Based on the space, budget, strengths (manpower as well as their competencies) and governance, upcycling can be worked upon at the following levels:

- Beginner Level
- Intermediate Level

- Advanced Level

Highly skilled staff who can bring in institutional and operational changes in the way and approach of work dynamics of their institute by implementing the best practices. Aligning to the institute day to day routine and work upkeep as per the circular economy principles of reduce, reuse, recover, redesign, remanufacture, refurbish, refuse, reintegrate and remodel and rebundle.

Up-cycling via projects setups in the institute and team building aligning with it to work upon:

- Green team – Student Action Group
- Green team – Institute Faculty Action Group
- Green team – Institute Management and Board Action Group

6.7.2 Strategy 2: Green Ambassadors

Based on the success of a particular project – say for example in an institution where 25 students are assigned a project on 'reuse' of materials and the faculty/mentor has trained the students and honed their competencies. The group of students that have successfully completed this task within a timeframe can be the green ambassadors of the institution.

Sustainability Stewardship Award: The institution can be awarded by for their successful implementation of sustainability practices by a competent authority.

6.7.3 Strategy 3: Circular Economy Incubators & Accelerator Hubs

These are platforms where students, educators, mentors and management can co-create and accelerate the best practices in circular economy as per their set guidelines and availability of budget, access and allocated data base and strategies and tools to showcase they being the institutional incubator and accelerator partners or stakeholders.

They have opportunities to lead this as an individual interface within their setting and share, communicate and report this to the trainer who has inducted them to these skill sets. Alternatively, it opens opportunities for collaboration with other educational institutions, towards building a wider platform of facilitators, incubators, accelerators, communicators, innovators and crusaders.

These platforms also support corroboration of best practices, getting it certified for its commitment and stewardship towards advanced interface of high level impacting of bests practices with wider applicability and benefits.

6.7.4 Strategy 4: Zones and Naming

Under this strategy, educational institutions can divide their campus into zones that require circular guidelines to be followed. Some options are:

ZONE I: No litter in Classroom

ZONE II: Use of recycle products/materials

ZONE III: Segregation the products/material used

ZONE IV: Collection of products, materials

ZONE V: Capacity building, outreach and communication

ZONE VI: Management and policy/decision Making

ZONE VII: Innovation

ZONE VIII: Stakeholder engagement

ZINE IX: Assessment, reporting and rating

6.7.5 Strategy 5: Club Houses in Education Campuses

Other than the zones, club houses as a likely suggestive can be introduced on campuses. Here, educators and mentors allow students in action to have fun, learn, play and create activities to come up with suggestive, innovative and prospective tools to integrate circularity.

In addition, education institutions can be certified based on the performance and best practices adopted. As like we do for building (Green building, LEED,), Management (ISO certification and standardisation, ISO 14001, ISO 15001, and other certified standardisation) every institution be brought under purview of it. Intuitions can learn how to align and adopt standardisations as per the institute set up and necessitation.

6.7.6 Strategy 6: Green Metrics - Ranking & Rating

Ranking and rating systems can be designed and established to inspire circular transitions. For example, Balanced Score Card approach for circular educational institutions. Some example parameters that can a part of the Balanced Score Card approach are:

- For minimised and sustainable consumption of water
- For reduction in the quantum of waste produced
- For having energy efficient devices, lighting (use of CFL and /or LEDs)
- For use of recycled products
- Using less paper, encouraging and adopting to digital and e-learning
- For practicing composting, rainwater harvesting
- For use of renewable and energy utilities devised

CHAPTER 7 HOW TO PREPARE YOUR ORGANISATION FOR CIRCULARITY

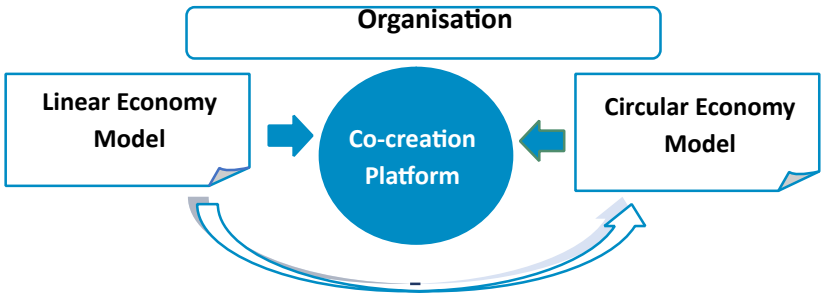
7.1. Nudging Through Co-Creation Platforms

Nudging means to repair, bridge the gaps, redesign, remanufacture and reintroduce any product and product as service to wider stakeholders. It is essential to make the waste into new products and product as service by working as cohorts and producing through co creation platform with many stakeholders working in partnership at every level of product make.

In order to better the circularity applicability or setting it up at the organisational and institutional hierarchy or supply chain, the focus should be at the basic level on technical cycle and ecosystem/ biological cycle and for system design thinking, regeneration and restoration.

Nudging via co-creation can happen if the two aforesaid cycles are mentored to the educators, board and management and other associated stakeholders move towards learning, upgrading, up skilling, upcycling and up keeping the competencies of circular economy best practices.

Figure 10: Schematic Representation: Co-creation platform for nudging from linear to circular economic model for organisation.



7.2. Co-creation Platform as a Success Enabler

These platforms must include understanding of technical cycle, and educators need to be mentored for aligning, applying and implementing circular economy via nudging happening at every level of supply chain. To understand and implement co creation every attribute or criteria elements of circularity needs to learnt and made understandable for the participants for ease of facilitation and implementation.

7.3. Co-creation Platform in Partnership with Stakeholders

The platform includes stakeholders within the platform along with other work force working in cohesion for design, manufacturing and end of life cycle phases and also moving ahead in resource recovery, redesign and reintroducing the product /product as service; co creation ultimate aims is eliminating waste generation or so to say removing negative externalities per se.

It aims to make the entire supply chain ecosystem greener, in line with the Circular Economy Action Plan, and to set new standards for manufacturing, enabling an increase in cross-sector synergies. It also fosters for a path towards a more cost-effective, low carbon economy, while tackling issue of increase in resource consumption, waste and emissions.

Co-creation Example - Single Use Plastics Ban

Circular economy is more often defined as take, make, redesign and remanufacture and reintroduce. However not creating a particular product which is harmful, results in no waste at the source as well as well at the disposal level, saves costs on its safe disposal, protects human health, and reduces negative externalities.

So, for example a ban on use of single use plastics is a loss for the manufacturer but a cost saving attribute for the other supply chain with wider benefits in its make. Manufacturer in order to join back as an integral part of stakeholder or co-creation connect will begin to manufacture biodegradable plastics for bringing in the market. So, this also is a circularity concept.

Another example of Co-creation platform, as per the European stakeholder platform undertaking offers a circular economy approach to construction industry by promoting the reuse of reclaimed construction materials. It provides support and knowledge on how to reclaim and reuse the materials, and offers a marketplace to trade them.

Co-creation for Organisational Circularity or in an Institution Setting

When resources are sourced locally and their value is maintained as part of a continuous loop, this would mean implementation at an organisational setting. An example for co-creation platform for circular organisation and circular cities is—'Circular Berlin'. It operates across areas such as community-building, education, as well as developing knowledge on industries with a high potential for circularity: the built environment, food and biomass, textile and fashion, and materials and products.

It hosts events in which the community meets, debates and exchanges and topics range from sharing knowledge to collaborative planning sessions, and has built open-source digital tools allowing information to be exchanged more quickly for circular economy best practices to be aligned, adopted, applied and implemented more quickly and robust with better tangible benefits.

CHAPTER-8: METHODOLOGIES TO IMPLEMENT CIRCULAR ECONOMY FOR EDUCATIONAL INSTITUTIONS

8.1 How To Align, Apply & Implement Circular Economy For Educational Institutions

Circular economy concepts and its aligning practices needs sound methodologies, tools, guidelines and benchmarking at every hierarchy. This does not only support the implementation of circularity for the current outcomes or success, but also for future proofing and de-risking entities which educational institutions are an integral part of.

Methodologies in this manual is not just meant as a read out or a reading material for understanding, but is a transition to action document or an action-oriented tool kit for ease of facilitation an implementation.

The core steps of implementing circularity for institutions are:

READ → UNDERSTAND → ORIENT → ACT → IMPLEMENT

8.1.1 Pitching Circular Economy in Education Institutions Settings

The circular economy hierarchy in the toolkit that describe workflow for educators is:

Table 2: Circular Economy Hierarchy – Tool-kit Workflow for Educators

Methodology	Guidelines	Aligning
Tools	Application	Assessment
Framework	Implementation	Rating

8.2 APPROACH : ReSOLVE Framework

The ReSOLVE Framework is developed by the Ellen MacArthur Foundation, in partnership McKinsey and takes the core principles of circularity and applies them to six actions: Regenerate, Share, Optimise, Loop, Virtualise, and Exchange. Each action represents a major circular business opportunity.

In different ways, these actions all increase the utilisation of physical assets, prolong their life, and shift resource use from finite to renewable sources. Each action reinforces and accelerates the performance of the other actions, creating a strong compounding effect.

Regenerate

- Shift to renewable energy and materials
- Reclaim, retain, and restore health of ecosystems
- Return recovered biological resources to the biosphere

Share

- Sharing the usage of assets (example: through sharing schemes or exchange platforms).
- Reusing assets (example: through resell/resale, redistribution).

Optimise

- Increasing performance/efficiency of products
- Remove waste in production and supply chain
- Leverage big data, automation, remote sensing, and tracking systems for resource tracking and optimising its efficacy accordingly for its use, recovery and reuse.
- Prolonging or extending the product use through maintenance, design for durability and upgradability.
- Decreasing resource usage (example: increasing efficiency, designing out waste)
- Optimising the logistics system through implementation of reverse logistics

Loop: Keeping products and materials in cycles

- Remanufacturing and refurbishing products and components (example: through design for disassembly)
- Recycling materials (example: through making the right material choices in the design process)

Virtualise: Dematerialising resource use and delivering utility virtually

- Replacing physical products with virtual services (example: e-books instead of books)
- Replacing physical stores with virtual locations (example: online shopping/e-commerce, virtual travel)
- Delivering services remotely (example: cloud computing and storage)

Exchange: Selecting resources and technologies wisely

- Shifting to renewable energy and material sources
- Using alternative material inputs (example: cascading by using by-products or extracting biochemical feedstock from biological nutrients)
- Replacing old with advanced technical solutions (example: 3D printing)
- Replacing product-centric with new service-centric delivery models

Learn more about the ReSOLVE Framework in 'Growth within: A circular economy vision for a competitive Europe' by McKinsey and Ellen MacArthur Foundation.

8.3 Methodology: Plan-Do-Check-Act & Improvise-Establish-Sustain (IES) Framework

8.3.1 The Plan-Do-Check-Act or PDCA model

The Plan-Do-Check-Act or PDCA model is an iterative design and management method that can be used to explore and test multiple solutions in a small, controlled and trial scenarios using the Total Quality Management or Six Sigma initiatives. These can be developed and improved to be applied across industries and organisational types.

BACKGROUND INFO.: *In the 1950s, Dr William Edwards Deming developed a method of identifying why some products or processes don't work as hoped. His approach has since become a popular strategy tool, used by many different types of organizations. It allows them to formulate theories about what needs to change, and then test them in a "continuous feedback loop." With the PDCA cycle organisations can solve problems and implement solutions in a rigorous, methodical way. The four phases of PDCA Cycle are : Plan, Do , Check, Act.*

Details are provided herewith:

Plan

- Identify and analyse the problem areas and hotspots
- Identify the opportunity for change
- Develop hypothesis for what the underlying issues and causes are
- Decide one plan, to test first
- Write down the goal your organisation wants to achieve

Do

- Work on the strategies required for implementation
- Test your plan, at small scale
- Controlled conditions allow critical insights

Check

- Note the results
- Review and analyse the results
- Evaluate your solutions
- Revise plan, if necessary.

Act

- Implement the tried and tested plan if all results were achieved as planned by the organisation.
- Go back to the planning stage to make adjustment and prepare for new trial if plan did not pan out as expected.
- If your plan was successful in controlled conditions or in test phase, then move ahead towards IES framework.

8.3.2 Improvise- Establish- Sustain (IES) Framework

The IES Framework was developed by the Global Institute for Circular Economy and Sustainable Development Goals, India (ICE&SDGs). It is a method to be implemented in continuation to the PDCA model (explained above). While PDCA enables organisations to implement circular economy, IES supports in improvising, establishing and sustaining these actions.

IMPROVISE

Organisations implementing circular economy can continue working as per the results/ outcome achieved from PDCA. However, if the models fail, the organization can prepare for 'improvised' actions. Use do not need to restart complete experiment. Particular component can be improvised and existing practise / mode/ activity can continued.

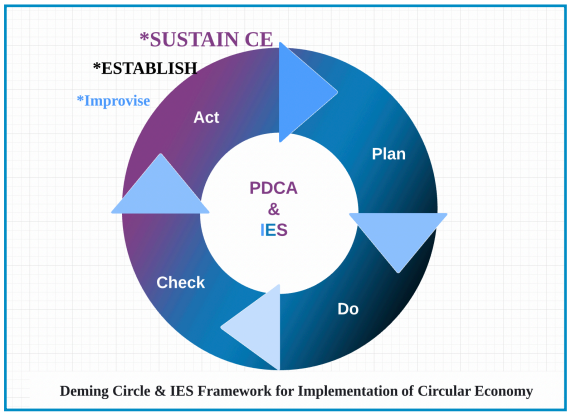
ESTABLISH

Integrated circular practices help mainstreaming circular economy i.e., to establish circular economy practice within organisations.

SUSTAIN

Good practices shall continue mainstreaming organisation's efforts towards circular economy to achieve environmental - social - economic profits, sustainably.

Figure 11: Deming Circle & IES Framework for the implementation of circular economy



The user of PDCA cycle can use the IES framework as part of PDCA cycle. Mainstreaming action for circular economy is important for the organisation to make it as practice.

Organisations using PDCA and IES frameworks together can experience a shift among their organisation and employees practicing circular economy, benefiting their organisation significantly.

8.4. Guidelines & Approaches to Implement Circular Economy

The guidelines for shaping the circular economy best practice and agenda in the institutional setting are a pre-requisite for making the institutions integral part of cities for future, smart cities and sustainable development. Guidelines also include the framework of R ladder for circularity. The following are the step wise guidelines which allow ease of facilitation and implementation of circular economy in the institutions.

Table 3: Guidelines for Circular Economy Education, for Educators/ Academicians

Circular economy concepts and principles	• It is important to agree on the circular economy vision, so it resonates with the organisation's core goals and priorities. • Circular economy criteria should be embedded in sustainability policies to avoid putting too much effort in the development of strategies that would only lead to marginal improvements. • It is important to raise awareness on circular economy among staff, students and other stakeholders.
Decision support frameworks and tools	• Sustainability oriented decisions derive mostly from internal meetings where stakeholders share information, propose solutions and agree on actions based on knowledge and experience in daily activities. • Staff should access decision support systems that could facilitate the identification of best alternatives through a combination of circularity and sustainable criteria. • It is important to obtain a buy-in from every person involved, encouraging sustainable champions to facilitate the implementation across campuses.
Key Performance Indicators (KPIs)	• KPIs are used to measure and monitor progress on resource efficiency and environmental sustainability. • A key barrier to setting meaningful KPIs is the lack of suitable data collected from systems. • Current financial models cannot provide disaggregated data to set robust KPIs and support the development of comprehensive circular and sustainability studies.
Allocation of responsibilities & budgets	• Often education institutions do not benefit directly from the economic savings related to improvement in resource efficiency as budgets are handled by estate departments. • This may discourage institutions/departments to pursue circular practices. • Budget incentives and appropriate KPIs should be developed to facilitate implementation of circular economy practices.

Source: Toolkit by Ellen MacArthur Foundation & Journal of resources, conservation and recycling

Dimensions to Guidelines

While the above guidelines, set core action steps and background preparation for the implementation of methods towards circularity, these fall under a series of dimensions that are integral to the circular economy principles.

Table 4: Dimensions to Guidelines

Dimensions	1	2	3
Core Principles	Recycling	Reusing, Recycling	Reducing, Reusing and Recycling
Dominant Business Model	Buy and Own	Buy and Own/ Product as service	Product as a service (not as product in itself)
Organisation of Loops	Decentralised by entities/ school/ college	Centralised by Government	Mixed (by government and business entities

SECTION 3

CAREER OPPORTUNITIES IN CIRCULAR ECONOMY

CHAPTER-9: CAREER OPPORTUNITIES IN CIRCULAR ECONOMY

As circular economy is a growing and expanding field, it makes sense to explore career opportunities that exist. The biggest benefit of finding employment in circular economy is that you don't need to be from a particular field to get into it. Universities are increasingly adding circular economy to their environmental and sustainability courses. For example, The LUT University provides a post graduate degree in the field of Environmental Sciences.

Since there is a growing interest in sustainability, many employment opportunities have been created and will continue to emerge as circular economy becomes the leading model in the world. As of now, a lot of countries are beginning to adapt the paradigm after following the lead of countries like Finland.

As a graduate, one may find employment in industry, consultancy, regulatory agencies, and governmental and non-governmental organizations.

9.1 Career Options in Circular Economy

Let's take a closer look at some of the positions that can be held by a person looking to pursue a career in circular economy.

9.1.1 Environmental Specialist

Environmental specialists are experts who monitor the impact of a population on the environment, identifying environmental issues, and recommending solutions. Their chief goal is to improve the living conditions of the environment. Some of their duties include overseeing field examinations and reporting hazardous locations and materials, develop and recommend solutions to eliminate pollution and environmental hazards and collect and analyse test samples of food, soil, water, and air among various other responsibilities.

9.1.2 Sustainability Specialist

Sustainability specialists combine business expertise and environmental factors to determine how businesses can operate in an environmentally responsible way. They specifically look at sustainability issues; they seek business solutions that will not have an adverse effect in the future. Some of their duties include - data analysis, preparing reports and performing cost-benefit analyses of proposals in order to help their business make effective decisions, reviewing data to determine how to implement sustainability strategies and they are often involved with setting targets for their company's progress in implementing sustainable practices.

9.1.3 Environmental Safety Specialist

An environmental safety specialist is responsible for promoting environmental sustainability by ensuring that the production and manufacturing operations of an organization would not harm the environment's condition in any way. Their duties include monitoring the safety and efficiency of the company's processes to minimize risks and hazards that may occur in the workplace, planning and facilitating safety training and programs for all employees to reiterate safety guidelines and regulations while within the premises and assisting with emergency planning and response, resulting in implementation of disaster recovery program while minimising risks.

9.1.4 Researcher

A Researcher supervises research projects to accomplish specific objectives. Their duties include identifying research goals, establishing methods and setting budgets for the organization for which they work. Researchers often work with a team of other researchers and committees to plan research objectives and test parameters. They also identify research methods, variables, data collection techniques and analysis methods. Researchers monitor the project to make sure it follows the requirements and standards. They interpret the data, produce reports discussing research findings and provide recommendations at the end of the project.

9.2 Specialist – Expert Level Career Options in Circular Economy

Apart from the career opportunities mentioned above, there are many more that one can get into if they are from other, more specialised fields of study. Let's take a closer look at some of these opportunities:

9.2.1 Circular Investment Specialist

An investment specialist invests in and sells short-term securities to meet short-term investment and financing needs. They track market rates, set rates to be paid and the daily quantity to be sold. High finance is starting to laser in on the unique solutions driving circularity. So, a circular investment specialist looks to invest an organization's circular economy fund in the best way possible.

9.2.2 Product Life-cycle Manager

A product life-cycle manager sees a product through from the beginning to the end of its life cycle. The role was a linear role, where a product's life cycle would begin in a mine and end in a landfill, but that is no longer the case. This is a crucial role where new methods can be used to ensure that there is as less waste as possible and remove waste altogether by adopting the circular economy model. This is one of the emerging career opportunities where there is a lot of scope for creative, sustainability-driven individuals who want to create zero-waste products and can innovate ways of doing so.

Ultimately, the circular economy only reaches its world-changing potential once circularity-related work becomes broadly understood as business as usual. The circular niche will become the mainstream, and nobody will feel the need to spell it out as part of a job function. Overall, circular economy is a paradigm that will be used in every industry and is currently expanding and growing. So, there will always be career opportunities in the field of circular economy.

CHAPTER-10: ALIGNING CIRCULAR ECONOMY EDUCATION WITH THE SUSTAINABLE DEVELOPMENT GOALS (SDGs)

In September 2015, the United Nations General Assembly formally adopted the 2030 Agenda aiming for global action consisting of 17 Sustainable Development Goals (SDGs) and 169 associated targets. The implementation of SDGs initiated since 2016 needs every country to meticulously plan, prioritise, and adapt the goals and targets in accordance with the local challenges, capacities and resources availability.

Through the teaching of SDGs, trainers are trained for their competencies on how to trickle awareness and empower children from schools and students from colleges and universities, for higher education about UN Sustainable Development Goals.

There is a need to come together in solving most pressing local, regional and global issues and align them with 17 goals to exhibit implementation progress and targets set. Refer Figure-12 for more details.

Figure 12: The 17 Sustainable Development Goals

Source: The UN Sustainable Development Goals (SDG.org)

Governments, civil societies, the private sector, academia, the UN system and concerned individuals, including children and youth as per UNICEF work support to UN and other associated stakeholders can actively involve in implementing SDG agenda from the local to the global levels so that all people -- including all children -- will live in a safer, cleaner, and healthy world by the year 2030.

Each goal needs to be customised with circular economy to bring in awareness among individuals, students, staff, officials, educators, faculty, board and management to look and act beyond

classrooms – have boot camps, deep dives, meet ups, open ground learning, e-learning tutorials, webinars, workshops, brainstorming and one day school meet ups on SDGs and circular economy events at their institutional settings.

10.1 Aligning SDGs with Circular Economy Education

There are various ways and means to integrated SDGs and circular economy, in educational institutions. Few examples of place (where) SDGs can be imbibed among students; the process (how) are detailed herewith.

Where

Classrooms, open spaces, board rooms, camps, auditorium, convention centres, institutional places and organisational meeting halls, parks and gardens and townships club houses are all spaces to align SDGs with circular economy education and implementation at institutions.

How

One on one debates and discussions, or face to face interactions, e-learning tutorials, interactive sessions with experts, webinars, workshops, boot camps, deep dive sessions, brainstorming, open classroom - learning in open spaces- activity based, Q &A, capacity building, virtual meet ups, communication and outreach articles, concept papers, white papers, briefs, research and review papers, case studies, newsletters, treatise, hubs and networking channels, SDGs and circular economy outreach via TV channels as well not just with social media (twitter/LinkedIn or another social media outliers), thought leaders and experts talks and live interaction sessions and hands on practical training.

Communicate → Participate → Act → Achieve → Succeed

Age Group

From Individuals to professionals and practitioners, officials, educators, mentors, tutors, faculty, board members and management including support staff

10.2 How SDGs are Aligned with Circular Economy Education

GOAL 4: QUALITY EDUCATION

GOAL 8: DECENT WORK AND ECONOMIC GROWTH

GOAL 9: INDUSTRY, INNOVATION AND INFRASTRUCTURE

GOAL 11: SUSTAINABLE CITIES AND COMMUNITIES

GOAL 12: RESPONSIBLE PRODUCTION AND CONSUMPTION

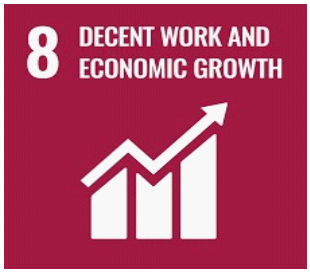
GOAL 13: CLIMATE ACTION

GOAL 16: PEACE, JUSTICE AND STRONG INSTITUTIONS

GOAL 17: PARTNERSHIP FOR THE GOALS

Circular economy is best applicable and aligned with the following goals and it reaps wider benefits if the best practices are aligned with these goals. When planning and creating circular classrooms and innovation and co creation beyond classrooms, this sub chapter in the manual will be good source of learning for the educators for ease of facilitation and implementation of goals and circular economy.

Quality education is a holistic approach of research, innovation and overall development with environment, economy and social good as focal point. To apply this to circular practices, educators need to prepare of chart of activities that he/she intent to teach to students.



Circular economy practices are a source of job creation platforms– informal recyclers can be brought into formal workforce, creates a platform for entrepreneurs as like 'Make in India', start-up India platforms, innovation hubs. As environmental upheavals or issues are multitude and need varied expertise to work upon, the green jobs market shall be a boom which will not only help strengthen environment but also economy. Every green job in the carbon market shall be a key to GDP contribution. Educators through this training are made aware through case studies and exercise the open market for green jobs, how conservation is a nudge for economy.

As the industry evolves with newer products in markets, the waste characteristics too changes. It thus becomes imperative for the industry to 'plan-do-check' the components in 'take, make and dispose' attributes. There is a constant requirement for innovation to redesign and remanufacture the products and make the provide an integral part of sustainability agenda. The success any industry or institution depends on its infrastructure be – it terms of mobility, resource or financial instruments. So, educators need to be trained for understanding and implementing a transition from 'take, make and dispose' to 'take, make, remake and reintroduce'.

For cities and communities to be liveable, every element of city (including the dwellers) needs to abide by the principles of resource conservation in the way they avail mobility infrastructure or commute, the way they produce, consume and dispose.

In nutshell, cities need smart and logical dwellers to be called smart cities, the infrastructure eases the issues, provides the comfort, the way we dwell makes the concept of smart cities strive and thrive. Educators need to learn, upscale and up skill the green, blue and grey attributes of built environment.

In addition to production, it is also important to assess our consumption. Resource conservation lies in the way we consume (value, use and reuse resource). In a resource constraint economy, when, the concept of more from less is the requirement; if we conserve there will be less pressure on manufacturing.

Educators need to learn and upskill and be prepared to trickle the learning to its students on what to buy-in, how to buy–in and how to dispose at every stage or level.

In the 'take, make and dispose' attributes, emissions are bound to increase. Resource use reduce and reuse are directly linked to climate change. Using energy efficient devices not just reduces costs but reduces emissions; Using eco labelled products too, are an integral part of climate change action. The way we use products, allow waste to be brought back to life (cradle to cradle) help align to just transitions.

Educators need to mentored towards practical approaches for climate change adaptation, mitigation and reduction emission pathways for climate risk negation (physical as well as transitional risks). Practical training on methods to quantify greenhouse gases, what are nationally determined contributions and targets.

Peace, justice and institutions forms an integral part of circular economy and SDGs linkage. Job opportunities, human rights, ethics, accountability and responsibility and a competent institution with strong governance structure and ESGs forms the base of sustainable development.

For any policy, framework or method to be implemented, strong regulation, legislation and governance is the prerequisite. Educators need to be trained to differentiate between natural capital, financial market and social capital for setting a 'empowered citizen force' for a society which is ecologically aligned and economically inclined and socially responsible for the ultimate objective of 'Triple Bottom Line'.

Stakeholder engagement, co-creation platforms, co-benefiting platform, innovation hubs, public and private partnerships form the base for achieving the goal 17 of sustainable development.

Supply chain linkages and partnership forms a base for resource stewardship, materiality assessment (which material is important) and waste management. Educators need to be oriented practically to work as cohorts for achieving the vision, mission and action /targets of SDGs.

CHAPTER-11: BENEFITS OF CIRCULAR ECONOMY FOR EDUCATIONAL INSTITUTIONS

By aligning the educational institutions as an incubator and accelerator, they can strengthen their capacities to address the issues pertaining to resource use and conservation and waste, and transform, bring change and generate new and innovative ways to respond to the challenges of resource use and how to strengthen resource reuse and recovery in their institutional supply chain.

As a learning, they can explore the key questions like :

- Are educational institutions doing in circular economy?
- Are they aligning in their supply chain with best practices principles of circular economy?

If yes – can they upgrade their skill sets and implement the learning from this training? If No – can they begin aligning, applying and implementing best practices of circular economy, through "Learn, Align, Apply, Implement and Upgrade" sequence?

By gaining knowledge, tools and skill on circular economy education and implementation at educational institution (and through the material supplied in this manual), educators, staff and students can gain the following:

- Circular thinking in education – creation of circular holistic approach and integration in educational institutions of circularity and how they can assist, associate and help resource management and or waste management workforce and their business groups (waste recyclers, waste management companies and service providers).
- Upskilling waste, repair & reuse industry –institutions can upgrade and upscale not just its competencies but also on how to refer international standards and national standards of circularity to align and apply through interactive platforms for stakeholders.
- Strengthening the competencies aimed at contributing to minimise the use of products and materials use, its maintaining value as long as possible (preserving it) so as to narrowing the loop.
- Catalysing circular economy in their institutions and work with businesses to increase the efficacy of resource use, reuse and recovery.
- Gain knowledge on how to partner with data driven waste hauling companies so that they shall be able to use the data to help make upstream decisions that help design out waste management strategies, keep products and materials in use, and at the same time regenerate natural systems.
- Strengthen the capacities of participants in how to design a future that rethinks from current 'take-make-waste' economy to focus on circular, innovative products, and business models.
- Learn how to create circular classrooms–in schools, colleges, university campuses and professional training development centres
- Learn how to have co-creation platform between educators and students and business group for a planned circular and sustainable world for all is given at the beginning of the training programme.

CHAPTER-12: CASE STUDIES

CASE STUDY-1

Circularity and Sustainability Performance: Business model of the University of Manchester

Location: Manchester, United Kingdom

Problem: This case study aims to focus on circularity and sustainability performance of University campus. By taking example case of University of Manchester it brings into learning value creation, value proposition, value delivery and value capture in their setting and day to day upkeep and implementation.

Action-Solution

The circular economy analysis chart and CE opportunity prioritisation matrix is provided below. Similar process can be used to identify the CE opportunities at schools/ colleges.

Figure1-Case Study-1: Action-led research methodology to build business case for implementation of Circular Economy

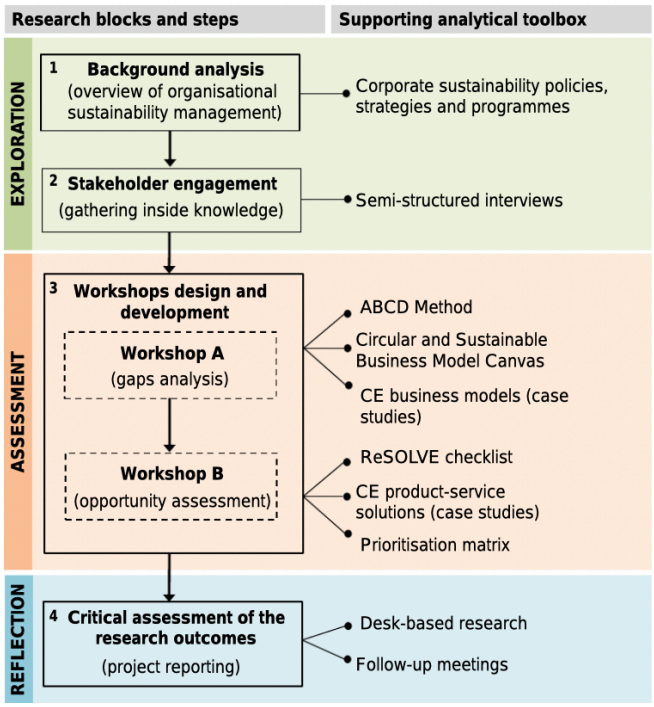
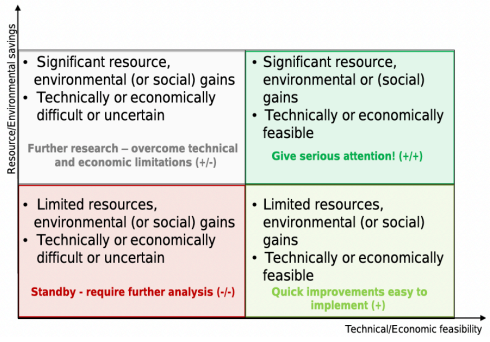


Figure2-Case Study-1: CE-opportunity prioritisation matrix (adapted from Crul and Diehl 2009).



For More Details, Refer: https://www.sciencedirect.com/science/article/pii/S095965261930424X

CASE STUDY-2

Nachaltig Digital: Platform for Sustainable Digitalisation

Location: Germany

Problem: Educational or training platform for interdisciplinary exchange

Action-Solution:

- Nachhaltig.digital is a platform for stepping up dialogue on the sustainability and digitalization of SMEs in Germany.
- It provides a space for the exchange of ideas, products, solutions, inspiration and discussion - both online and offline.
- The platform has also focused on the circular economy as well as providing a forum where companies can interact.
- Nachhaltig.digital informs them about digitalization and the circular economy, answering questions and telling them about current trends.

Outcome: The platform helps companies to use digitalization to make their business sustainable. Such platform can developed by the schools/ colleges or by the education departments, Ministry of Education, for use by schools and colleges in India.

For More Details, Refer: https://nachhaltig.digital

CASE STUDY-3

Cycle Competence Centre (CYCLE CC)

Location: Spain

Problem: Building circular economy competences. Making the case for lifelong learning.

Action-Solution:

- The Cycle Competence Centre (CYCLE CC) is a platform where educators can find training and guidance tools in 6 languages to help them introduce circular economy in different learning environments.
- Making the transition to a circular economy requires a pressing need for new skills, competencies and approaches. Education and training have a critical role to play in delivering and updating these skills and in transitioning the principles to actionable goals.
- The Erasmus+ CYCLE project created a set of tools and resources to support adult trainers in developing and expanding their professional and educational skills in the circular economy.

Similar platforms can be developed by the schools and colleges to learn circular economy or to disseminate the knowledge and practices on circular economy.

For More Details, Refer: http://cyclecc.eu

CASE STUDY 4

Educational Platform for Interdisciplinary Knowledge Exchange: Community National and Regional Research and Innovation

Location: United Kingdom

Problem: Waste and resources action plan in the areas of (1) Production (2) Consumption (3) Waste management (4) Secondary raw materials (5) Innovation and investments.

Action-Solution

The WRAP (Waste and Resource Action Plan) is a UK catalyst active in the space between citizens, government and businesses that focuses on maximizing the value of waste by increasing the quantity and quality of materials collected for re-use and recycling. It does so by conducting research, brokering voluntary agreements and implementing campaigns to empower consumer action.

Outcomes

Research

- Barriers to Recycling, helped hundreds of local authorities build an evidence base and coherent strategy to get communities engaged and committed to recycling.
- Switched on to value identified £1 billion of unused electronics in UK homes, and demonstrates that extending the life of electrical products could save businesses £400 million a year.
- Reducing Food Waste by Extending Product Life, motivated supermarket Tesco to source fresh produce more quickly, helping them to offer their customers products that stay fresh for longer.

Voluntary Commitments

- The Sustainable Clothing Action Plan (SCAP) brings together industry, government and the third sector to reduce resource use and improve the sustainability of clothing. The agreement targets every stage of the clothing journey, bringing together retailers, brands, re-use and recycling organizations, charities and NGOs, which collectively make up over 40% of UK clothing sales.
- The UK Plastics Pact aims to create a circular economy for plastics. It brings together businesses from across the entire plastics value chain with UK governments and NGOs to tackle the scourge of plastic waste.

Consumer Campaigns

- **‘**Love Your Clothes’ offers practical advice to help people make the most of their clothes, as well as demonstrating the benefits of repairing, re-using and recycling them.
- ‘Recycle Now’ provides information and advice to help individuals recycle more. It is the national recycling campaign for England, used by over 90% of English local authorities.

This case study is useful to learn about implementing CE in cities/ towns.

EXERCISES

EXERCISE 1. CIRCULAR ECONOMY AND WASTE EDUCATION GUIDE FOR SCHOOLS/COLLEGES/ UNIVERSITIES

How to embed the Circular Economy and Waste Education into the Curriculum

PART I: ESTABLISHING THE RELEVANCE OF WASTE EDUCATION TO YOUR DISCIPLINE

Establishing the relevance of waste education to your discipline is key to ensure that students understand the importance of studying the Circular economy best practices and its relevance in day-to-day life.

The Relevance of Waste Awareness	
Purpose of the activity	Establish the relevance of waste awareness to your discipline.
Material	Suggested materials: Flip chart paper, pens
Timing	15-30 min
Task	Discuss how waste is relevant to your discipline (For example: if circular economy is being taught by mentor to a student– then the student will be honed for competencies in design engineering – product design, restructuring and remanufacturing in a way that it creates minimum waste or no waste**).**
Background Info : Instructions	
Divide the student into the group of 4/5 and ask then to discuss the following questions: i. What type of waste are associated with you in your daily life / you see around you? ii. What type of material do you use? Can they be reused / recycled? iii. How can the waste be reduced? iv. How can "awareness on waste management" benefit your future, your employment, personal life and environment? v. Can the floods be decreased by effective management of plastic?	
Ask each group to provide feedback and present their answers to rest of the class. **You may wish to capture some of the ideas on flip chart and relate back to these throughout the course / impacting knowledge to your students.* **Identify few examples that you can bring back to discussions.* **Build thought process and awareness among fellow faculty members and build knowledge for the growth of your students and sustainable future for generations to come.* **Design -World without waste.*	

EXERCISE – II: ENVISIONING THE FUTURE

PART-II: EMBEDDING WASTE AWARENESS THROUGH REFLECTION- BIG PICTURE WASTE SEGREGATION

A. Linking waste awareness to your lectures (for all faculty members to share with their students)

Ask students to reflect on the following questions:

- How waste is related to your personal life? (Type of Personality- Waste generator/ Waste manager / Waste & related problem solver)
- Encourage students to monitor what they buy and what they throw away (including what they put in the recycling bin) — **over 2-5 week.**

Ask students to reflect on:

- Did you buy anything you did not need?
- What was the main sources of your waste?
- What did you do to this waste?
- Has it affected your **consumption behaviour?**
- What could you have done to reduce the waste you created?

Eg. Management of plastic bottles/ cloths

- How does this relate to resource consumption and waste generation? Share your perception about the waste.
- What can be changed? & How?

Stage-1: Note the Outcome and share with group.

B. Linking waste awareness and employability / implementation at school

Option 1: For Graduates / PG/ Research Students - Ask students to discuss:

i. How they can apply what they have learnt about waste- for their profession?
ii. Explore the job market / vacancies world wide.
iii. Do they think themselves fit for the position in circular economy domain? If yes, How? *If No, then what they need to learn/ enhance their skills to work in CE domain.*

Option 2: For Schools - Make the group of students. Ask to:

i. Brainstorm and list the skills and knowledge that they have gained from learning about waste (Section-A).
ii. Reflect on how these skills and knowledge can be applied in their day to day life.
iii. Choose best strategies. Plan on— How to align the best practices in their work place / educational institutions (school / college /university)
iv. Implement the knowledge at school/ college for enabling the circular transformation of your school. **Eg.** School Circular Mobilisation event/ project.
v. Choose ***'Circular Economy Brand Ambassador'*** - in every class and in school.
vi. Choose **'Circular Economy Captain'** - for school.

Stage-2: Note the Outcome (as presentation) and share with all students.

EXERCISE – III: CREATE AWARENESS ON RECYCLING
PART III: RECYCLING

RECYCLING	
Purpose of the activity	• To characterize waste - non-degradable and biodegradable; • Recyclable and Non-Recyclable products • Identification of recyclers (informal and formal)
Material	Suggested materials: Flip chart paper, pens; Slides, one pack of flash cards per group (A,B,C,D).
Timing	10 minutes
Task	Recycling: what to recycle, where to recycle and how to recycle ; what is the cost or financial instrument for recycling the products after use and reuse applicability.
Instructions	

- Define non-degradable and bio-degradable waste
- Define recyclable and non-recyclable waste
- Check the website of State Pollution Control Board (SPCB) / Central Pollution Control Board (CPCB) to see the list of authorized/ formal recyclers.
- Split students into 2 groups.
- Assign task to Group-1: Identify the type of waste (recyclable/non-recyclable/ degradable/non-degradable etc.)
- Assign task to Group-2: Download list of recyclers from SPCB/ CPCB. Select the recycler in their city.
- Define Recycling Strategy: Segregation, characterisation, channelisation of recyclable waste, for recycling.
- Collect the report from recyclers.
- Share the details about SDGs. Link the action (exercise-III) with SDG Goal-9 (industry, innovation and infrastructure), SDG-11 (sustainable cities and communities) and SDG-12 (Responsible Production &Consumption) of UN Sustainable Development Goals.
- Prepare the outcome- on presentation.

EXCERCISE – IV: UPCYCLING

PART IV: SEED THE THOUGHT ON UPCYCLING

INDUSTRIAL UPCYCLING	
Purpose of the activity:	Introduction to upcycling
Material:	A small pack of textile waste / clothing materials, Glue, Scissors,, Flipchart paper, Coloured pens
Timing:	45 minutes
Task:	Students are encouraged to develop some quality product made from waste / similar leftover materials and describe the process based on UPMADE® Certification criteria **(refer** upmade.org **)**
Instructions	

The educator will give a small presentation about UPMADE® Certification (https://upmade.org/certification/criteria)

Students shall be divided into small groups and materials' set will be given to each group. The task would be to create a poster with following components:

1. Product made from textile waste / similar leftover materials (materials needed: glue, scissors).
2. The product might be glued to the centre of poster/ display the up-cycled product.
3. Refer UPMADE Certification - CRITERIA. Discuss about the working environment's safety, hygiene and fair payment system to workers etc.
4. Describe the potential customer groups.
5. At the end of activity each group will present their poster to other students.
6. After that, each student can vote, if they will purchase up cycled product (optional).

NOTE: EXCERCISES

For more exercises refer '**Circular Economy and Resource Efficiency in the Indian Context'**, EU-REI Project, GIZ-CII-TERI-adelphi, Internationale Zusammenarbeit (GIZ) GmbH, Nov. 2020.

REFERENCES

Arup, (2016), The circular economy in the built environment, London, UK. Carbon Trust (2012), Further and higher education: training colleges and universities to be energy efficient. London, UK.

Barth, M., 2013. Many roads lead to sustainability: a process? oriented analysis of change in higher education. Int. J. Sustain. High. Educ. 14, 160–175. https://doi.org/10. 1108/14676371311312879.

Barth, M., Godemann, J., Rieckmann, M., Stoltenberg, U., 2007. Developing Key Competencies for Sustainable Development in Higher Education. doi.org 416–430. https://doi.org/10.1108/14676370710823582

Barbiroli, G. Eco-efficiency or/and eco-effectiveness? Shifting to innovative paradigms for resource productivity. Int. J. Sustain. Dev. World Ecol. 2006, 13, 391–395. [CrossRef]

Braungart, M.; McDonough, W.; Bollinger, A. Cradle to cradle design: Creating healthy emissions: A strategy for eco-effective product and system design. J. Clean. Prod. 2007, 15, 1337–1348. [CrossRef]

Bleaney, M.; Binks, M.; Greenaway, D.; Reed, G.; Whynes, D. What does a university add to its local economy? Appl. Econ. 1992, 24, 305–311. [CrossRef]

Circle Economy (2017), Circular economy reports and insights, Circle Economy, accessed September 2018 at https://www.circle-economy.com/.

Circular Economy and Resource Efficiency in the Indian Context, EU-REI Project, GIZ-CII-TERI-adelphi, Internationale Zusammenarbeit (GIZ) GmbH, Nov. 2020.

Circular Economy Simplified: What, Why & Who? REFERENCE NUMBER: ICE&SDGs/01/09/2021. *August 2021. Published by* Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs), India.

Ellen MacArthur Foundation, 2018. Teaching & Learning Resources. Available at: https:// www.ellenmacarthurfoundation.org/our-work/activities/schools-colleges/ teaching-learning-resources.

Ellen MacArthur Foundation, 2016. Intelligent Assets: Unlocking the Circular Economy Potential.

Ellen MacArthur Foundation, 2015. Growth Within: a Circular Economy Vision for a Competitive Europe 100. Circular Economy Classrooms www.circularclassrooms.com

Etsy, D.; Winston, A. Green to Gold; Yale University Press: New Haven, CT, USA, 2006.

Ellen MacArthur Foundation. Towards the Circular Economy: Economic and Business Rationale for an Accelerated Transition; Ellen MacArthur Foundation: Isle of Wight, UK, 2012; Volume 1.

Ellen MacArthur Foundation. Towards the Circular Economy. Economic and business rationale for an accelerated transition. 2013. Available from: https://www. ellenmacarthurfoundation.org/ publications/towards-a-circulareconomy-businessrationale-for-anaccelerated-transition.

Garrido-Yserte, R.; Gallo-Rivera, M. The impact of the university upon local economy: Three methods to estimate demandside effects. Ann. Reg. Sci. 2010, 44, 39–67. [CrossRef]

Goerner, S.; Voller, R. Rebuilding economic vitality. In A New Dynamic: Effective Business in a Circular Economy, 1st ed.; Ellen MacArthur Foundation: Isle of Wight, UK, 2013.

Hopwood, B.; Mellor, M.; O'Brien, G. Sustainable development: Mapping different approaches. Sustain. Dev. 2005, 13, 38–52. [CrossRef]

Kopnina, H.; Blewitt, J. Sustainable Business: Key Issues in Environment and Sustainability; Routledge: London, UK; New York, NY, USA, 2015.

Kopnina, H.; Meijers, F. Education for Sustainable Development (ESD) Exploring Theoretical and Practical Challenges. Int. J. Sustain. High. Educ. 2014, 15, 188–207. [CrossRef]

Lacy, P.; Rutqvist, J. Waste to Wealth; Palgrave Macmillan: Basingstoke, UK, 2015.

Lozano, R. (2006), Incorporation and institutionalization of sustainable development into universities: breaking through barriers to change, Journal of Cleaner Production, 14 (9– 11), 787-796.

Mathews, J.A.; Tan, H. Progress toward a circular economy in China. J. Ind. Ecol. 2011, 15, 435–457. [CrossRef]
Ellen MacArthur Foundation. Towards the Circular Economy: Opportunities for the Consumer Goods Sector; Ellen MacArthur Foundation: Isle of Wight, UK, 2013; Volume 2.

Moreno, M.A.; De los Rios, C.; Rowe, Z.; Charnley, F. A conceptual framework for circular design. Sustainability 2016, 8, 937. [CrossRef]

Murray, A.; Skene, K.; Haynes, K. The circular economy: An interdisciplinary exploration of the concept and application in a global context. J. Bus. Ethics 2017, 140, 369–380. [CrossRef]

Mendoza, J.M.F., A. Gallego-Schmid and A. Azapagic (2019a). Exploring the implementation of circular economy thinking in higher education institutions, Under review in Journal of Cleaner Production.

Mendoza, J.M.F., A. Gallego-Schmid and A. Azapagic (2019b). Building the business case for implementation of circular economy in higher education institutions, Under review in Journal of Cleaner Production.

National Assessment and Accreditation Council (NAAC), Manual for Super Speciality Medical Universities. Institutions, India.

OECD (2010), Higher education for sustainable development, Final report of International Action Research Project. Organisation for Economic Cooperation and Development (OECD), France, Paris.

Osterwalder, A. and Y. Pigneur (2010), Business Model Generation - a Handbook for Visionaries, Game Changers and Challengers. US: Wiley.

Pastor, J.; Pérez, F.; de Guevara, J. Measuring the local economic impact of universities: An approach that considers uncertainty. High. Educ. 2013, 65, 539–564. [CrossRef]

Pollard, S.; Turney, A.; Charnley, F.; Webster, K. The circular economy—A reappraisal of the 'stuff' we love. Geography 2016, 101, 17–27.

Stephens, J.C., M.E. Hernandez, M. Román, A.C. Graham and R.W.Scholz (2008), Higher education as a change agent for sustainability in different cultures and contexts, International Journal of Sustainability in Higher Education, 9 (3), 317-338

UNEP. Circular Economy: An Alternative for Economic Development; UNEP DTIE: Paris, France, 2006; Available online: http://www.unep.fr/scp/publications/details.asp?id=DTI/0919/PA (accessed on 7 July 2018).

Universities, UK. The Impact of Universities on the UK Economy; Higher Education in Focus; Universities UK: London, UK, 2014.

Universiteit Utrecht, 2017a. Business, Sustainability and Innovation. [WWW Document].

Universiteit Utrecht, 2017b. Sociale GeografieEnPlanologie. [WWW Document], Universiteit Utrecht, 2017c. Aardwetenschappen. [WWW Document].

WRAP. WRAP and the Circular Economy. 2017. Available online: http://www.wrap.org.uk/about-us/ about/wrap-andcircular-economy (accessed on 7 July 2018).

World Business Council for Sustainable Development (WBCSD). Sustainable Business: Key Issues in Environment and Sustainability; Kopnina, H., Blewitt, J., Eds.; Routledge: London, UK; New York, NY, USA, 2015.

DEFENITIONS

Refer Ellen MacArthur Report on 'Delivering Circular Economy and Rethinking Circular Economy for SMEs settings (for User understanding and knowledge base)

- **Circular economy** is restorative and regenerative by design and aims to keep products, components, and materials at their highest utility and value at all times

- **Cradle To Cradle** (C2C) Designing products "for continuous recovery and reutilization as biological and technical nutrients

- **Regenerative Design Supporting** "systems which are capable of being restored, renewed, revitalized through the integration of natural processes, community action and human behaviour

- **Circular design** is at the heart of a circular economy, Skills in circular product design and production: Material choice optimized for circular setup
  - ➢Design to last
  - ➢More modularization/standardization
  - ➢Easier disassembly
  - ➢Production process efficiency

- **Eco design** means the integration of environmental aspects into product design with the aim of improving the environmental performance of the product throughout its whole life cycle.

- **Reuse** means any operation by which products or components that are not waste are used again for the same purpose for which they were conceived.

- **Recovery** means any operation the principal result of which is waste serving a useful purpose by replacing other materials which would otherwise have been used to fulfill a particular function, or waste being prepared to fulfill that function, in the plant or in the wider economy.

- **Down cycling** means "to recycle waste materials in such a way that the resulting products are of a lower quality] than the original.

- **Up cycling** means to reuse discarded objects or material in such a way as to create a product of higher quality or value than the original.

- **Closed Loop** Materials, components and products are 'technical or biological nutrients' circulating in closed loops, where nothing is wasted but instead channeled to different processes depending on the remaining properties and characteristics of the materials, components and products.

- **Open loops** are the opposite of closed loops. Therefore, an "open loop system creates waste or by products for which there is no use. Getting rid of unwanted byproducts usually costs money, degrades the environment, or both. Despite the economic efficiency of a closed loop system, most modern-day production is open loop.

- **Waste Hierarchy:** "The waste hierarchy shall apply as a priority order in waste prevention and management legislation and policy: 1. Prevention 2. Preparing for re-use3. Recycling 4. Other recovery, e. g. energy recovery 5. disposal

ACRONYMS

BECE: Back casting and Eco-design Circular Economy

BMC: Business Model Canvas

CE: Circular Economy

CEE: Circular Economy Education

PBL: Project Based Learning

ReSOLVE: Regenerate, Share, Optimize, Loop, Visualize and Exchange

SCAP: Sustainable Clothing Action Plan

SDGs: Sustainable Development Goals

SUP: Single Use Plastics

ToTCE: *Design, Development and Conducting Training Programmes on Circular Economy : The Programme for Training of Trainers on Circular Economy (ToTCE)*

UN: United Nations

WRAP: Waste and Resource Action Plan

ANNEXURE: I

Checklist For Educators & Staff: Requirements for Conducting Exercise/ Implementation of CE in Own Organisation

Method	Innovation camp	Circular Economy Path	Research Toolers
Number of students	30 – 60 students, maximum 7 students per team	30- 60 students from different fields, 4/7 students per team	About 3 to 7 students from different field
Credit Units (ECTS)	1/2 ECTS per student	About 2 – 15 ECTS per student depending upon the workable hours.	1-5 ECTS depending upon the number of hours used.
Time	Slot based – 1 day, 2 day or three day	12 hours or 24-hour boot camps, which can be extended to 8 week or 9-week programme.	5 months, based on the requirement
Where and How	The camp needs a venue where in there is enough space for all the team members to work as cohorts in cohesion.	Meet ups can happen classrooms but, boot camps efficient conduct needs huge space for a large group or team to work.	The initial meeting or training happens at the organizer level or at the coach/mentor of the institution. Subsequently, detailing and achievable can be shared and communicated online with the organizer or by face-to-face interaction
Number of Coaches/Mentors/Educators	Number of coaches/ mentors/educators depend upon the participants	Mentors and educators from the design, businesses and technology	The workshop is led by a single coach, and have a student's action group in place
Expectations of the clientele / host organisation	The clientele gives a brief up or feedback about the experience with the training and learning	Client or the participant should have themselves available till the completion of projects, so as to hone and upgrade the competencies	The clientele or participant should be available for consultation, though regular brief up does happen during the training.
The number of brief ups done	To be decided by the organizer	To be decided by the organizer	To be decided by the organizer
Tools to use	Innovation, assessment and evaluation tools	Project management and assessment tools	Project management and assessment tools

ANNEXURE: II

Checklist for Educational Institution Administrators and Management - Plan, Do and Check (to implement Circular economy at their own organisation)

Questionnaire Attribute	Yes	No
Does your educational institution have a dedicated team to bring about best practices in sustainability, climate change, energy and aligning it with circular economy and net zero commitment?		
Does your educational institution have any policy statement for implementation of circular economy model at your institute?		
Does the board plan to induct a dedicated team in the upcoming months (If the answer to question 1 & 2, is NO)?		
Does the board or management team has dedicated specialist/advisor as part of board panel to place in key issues and gap and advises on how to resolve it?		
Does the management team have an education officer?		
Does the management team have an environmental officer in the board?		
Does the board have designated charter being communicated to its employees on how to align, apply and implement circular economy?		
Does the board from time to time communicate its requirement to its suppliers, retailers and service providers and other associated stakeholders aligning with circularity?		
Does the board or management team has framed a circular economy policy in consultation with its employees /educators, staff and administrators and other associated stakeholders?		
Does the educational institution have a Sustainable Procurement Policy in place?		
Does the board has inducted pilot / waste segregation/ waste reduction/ recycling / provided professional training to the staff/ faculty?		
Has the board or management team articulated and approved setting waste minimization and recycling targets?		
Has the Board or Management team has established /communicated the organisation's circular economy goals?		
Has the board or management team approved OR willing to approve the fiscal incentives to avoid non-hazardous waste from reaching the dust bins?		
Has the educational institution created a supporting /common platform to share information, exchange best practices?		
Job creation and employment opportunities are the key. Have your educational institutions worked towards placement of your students in sustainable development domain (it can be any- like circular economy, waste management, climate change etc)?		

ANNEXURE: III

Worksheet: Pre–Assessment Tool For Educational Institutions

Has your institute i.e., school/college/university attended /participated in any capacity building /workshop on SDGs and / or Circular Economy in recent time?	Yes/No
Does your institute i.e., school/college/university has competencies to address the issues of Circular Economy?	Yes/No
Does' your Institute have a policy to address the Sustainability, SDGs, Circular Economy?	Yes/No
Does your institute practice waste management, workshop/capacity building/ awareness programme and other associated environmental best practices as a mandatory requirement?	Yes/No

About Mobius Foundation, India

Mobius Foundation is conceptualized to spread awareness about sustainability for the betterment of future generations. The Foundation, is committed to sustainability, strengthening systems with empowering technologies and encouraging healthy behaviour. Their principle focus is on education, environment, and population stabilisation that contribute to sustenance. Mobius has a vision to collaborate with a diverse range of public and civil partners to advance the cause and practices of sustainable consciousness amongst Indian citizens. **Their focus areas are:**

POPULATION STABILIZATION: Mobius believes that population stabilization is a crucial step needed to address global issues like poverty, extinction of species and carbon footprint. Project "Aakar" was initiated in June 2018, covering 200 villages of the two highly populated districts of Uttar Pradesh, Baharaich and Barabanki. It focuses on building awareness on Family Planning and Contraceptives. Concepts such as "Zimmedar Hum" & "Dampatti No 1" provide eligible couples with information and guidance on family planning methods that appeal to the rural populace.

EDUCATION: Mobius aims to educate people and instil a sense of responsibility for the environment. Projects "Gyan Anant Vidyalaya" and "World Environment School" are being built to shape the future generations by imparting the value of sustainability through constructive and practical education. The International Conference on Sustainable Education (ICSE) 2019 and 2020 provides a global platform for world dignitaries, and intellects to address the current and emerging sustainability challenges and a need for Education for Sustainability (ESD), Climate Change Education (CCE) and Environmental Education (EE) in the current course curriculum.

ECOLOGICAL CONSERVATION: Project "Sanjeevani" is an ecological conservation project towards environmental sustainability with the help of Sustainable Advocacy Team for Human Improvement (SATHI). Each year around World Environment Day (5th June), as many as 150 people, school students, youth, farmers, self-help group members, Kisan club members, officials of various departments and other NGOs take part in this project.

URL: www.mobiusfoundation.in | **TWITTER:** @themobiusfound | **LINKEDIN:** mobius-foundation

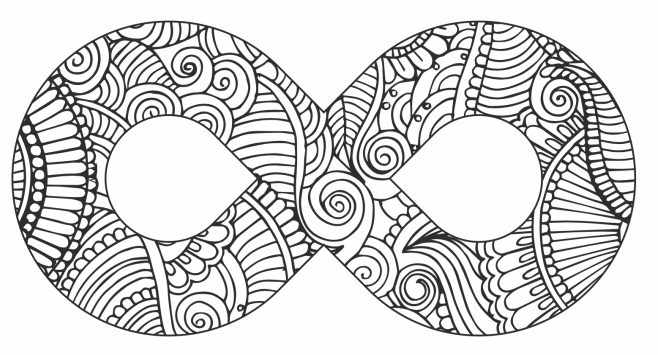
Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs)

The Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs) is an international think tank that works towards the advancement of science and technology through cutting-edge R&D and innovation and foster to the principles of good governance, supporting the business for social good through its service offering.

ICE & SDGs is unique organisation (NGO), dedicated to work on resource efficiency, circular economy and sustainable development goals (SDGs). ICE&SDGs works on circular economy, circular cities, SDG mapping, advisory services for corporates and industry, sustainability reporting, government for policy making, R&D projects, capacity building, CIRCULAR ECONOMY CERTIFICATION for Products, Offices & Manufacturing units, ZERO-WASTE Certification for businesses and offices, GHG accounting and management plan for industry and states, and creating enabling ecosystem to meet the global goals, UNSDGs 2030.

Also, ICE&SDGs has launched 'International Alliance on Circular Economy and SDGs', where we have founder members and mentors (senior officials) from Niti Aayog, Government of India; Tata Chemicals, Government of Telangana, Government of UP; Minion, WeGot, Vascobel Brussels; EEB Europe, Hindalco, Marks & Spencer, Sopra Steria, Cygnus and more.

ICE&SDGs lead the YouTube channel **SUSTAIN, A Leadership Talk Series** **(channel link:** https://bit.ly/3AFXIfs**).**



Published by: Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs)
Designed, developed and distributed exclusively by:

Global Institute for Circular Economy and Sustainable Development Goals (ICE&SDGs

ICE & SDGs

CONTACT: gice.sdg@gmail.com
TWITTER: /SdgIce
LINKEDIN: https://www.linkedin.com/company/icesdgs
URL: www.CE-SDG.org

9 784237 347022
INR: 1000.00