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Sustainable Consumption and Production and the Circular Economy in India

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A discussion paper on Ahead of the Curve – Sustainable Consumption and Production and the Circular Economy in India

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Ahead of the Curve

Sustainable Consumption and Production and the Circular Economy in India

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This paper provides an overview of sustainable consumption and production (SCP) in India and identifies interventions that could be initiated through a partnership with the government and private sector stakeholders. The status of SDG 12 in the Indian context has been mapped through desk work and consultations. The SCP landscape has been analysed and potential interventions identified for the UN's engagement with the public and private sectors on SCP.

The report also presents proxy indicators for monitoring frameworks on SCP in India in the context of SDG12. It is critical to emphasise that the work on SDG indicators, including for Goal 12, is already ongoing with significant decision on selection of the targets completed by the Government. This report starts from this base and offers indicators grounded in real circumstances of data availability within the relevant processes while keeping in mind core concepts behind SDG 12 targets. Further prioritisation, refinement as well as additional selection of the indicators will be possible upon consultations with relevant responsible entities.

CONTENTS

1.

Sustainable Consumption and Production In The Indian Context

Sustainable Consumption and Production (SCP) is at the core of sustainable development. It highlights the well-recognized fact that sustainable development will not be possible without adopting production and consumption systems that, while leading to improved quality of life for millions, radically reduce environmental and resource pressures. Goal 12 of the Sustainable Development Goals (SDGs) – Ensure Sustainable Consumption and Production Patterns – is essential for the success of all the other SDGs. UN DESA (2015)[1] demonstrated that by linking SDG12 targets with targets of other goals, SDG12 remains one of the two most integrated and integrating goals of the 2030 Agenda for Sustainable Development[2].

In practice, Goal 12 is more obviously connected with economic and ecological implications of growth and, more explicitly, to Goals 2, 4, 6, 7, 8, 9, 11 and 17. Goal 12 is seen from the beginning as the one that opens opportunities for the disadvantaged, eliminating inequality, thus addressing Goal 10. Yet, there might be a risk of reducing discussions of circularity to just technical and economic questions, forgetting the issues of power and distribution. In the context of India, the Agenda, with its goals of 'reaching the furthest behind first', ensuring that 'no one is left behind' and 'care about environmental sustainability', is critical and has as its core growth, modernization, self-reliance and equity. Clearly, aspirations of creating a better quality of life for all Indians can only be met if there is physical and financial access to natural resources as well as human capital to put financial, natural and physical resources to use.

The growth of Indian economy at the current and projected rate will make it (as per data from 2010) the third largest economy after China and the United States. Fifteen billion tonnes of resources are needed to support such growth by 2030 and more than 25 billion tonnes by 2050. Many of the resources required for development have to be imported. This view is supported by a variety of arguments, perhaps the most striking one being that India occupies just 2.4% of the world's surface while supporting 18% of the world's population.

In addition to the growing resource demands, the urgency of SCP becomes even more obvious if one considers the implications of air, water and land pollution leading to significant health problems, loss of resources, livelihoods and, violation of ecosystem integrity. From the perspective of economic development and poverty eradication, health problems attributed to pollution (downside of unsustainable production-consumption systems) can cancel productive gains of a growing economy. In India, air pollution is responsible for 1.81 million premature deaths and water pollution for 0.64 million deaths (the Lancet Commission report on pollution and health, 2015[3]). Health issues affect the capacity of children to study and develop and of adults to earn a livelihood.

Climate change adds yet another point of urgency into SCP. The need to reduce greenhouse gas (GHG) emissions (Box) – a reduction closely associated with the ways of producing and consuming materials and energy – is extremely pressing. A delay in taking action in this regard by 8-10 years (from 2011) would require doubling the speed of reduction, and this can be beyond current technological means. At the moment, India is likely to overachieve its "2˚C-compatible" rated Paris Agreement NDC climate action targets[4]. However, according to the Climate Change Tracker, there is "substantial uncertainty in India about coal power capacity and whether all renewable energy projects in the pipeline will be completed on time and integrated with the grid. In 2017, coal consumption increased by 4.8% or 27 MtCO2e and the new NEP forecasts coal capacity additions (The Economist, 2018)."

As in the case of pollution and health, climate change will dramatically redefine relations of societies with resources and delay desired development.

> The global community has agreed that a two-degree increase in global temperature brings us to the threshold of catastrophic changes (The Cancun Agreement under UNFCCC). This means that a 50% reduction in GHG emissions (from the 1990 level) has to happen by 2050. The target level of 450 ppm CO^2 concentration would require 1.5% emission reduction per year, from 2011.

From the perspective of consumption, it is clear that increase in consumption, including critically needed consumption for fulfilment of basic needs related to food, shelter, transportation, healthcare and education, have to be secured for the millions of citizens. The concept of 'consumers' is also not limited to the end (private) consumers but extends to the business and private sector. Consumption in India is attributed to both products and, critically, services that deliver benefits of development to all segments of the society. The growing 'consumer classes' in India rapidly drive the consumption demands and impact the economy. The sustainability of their consumption patterns and their impacts on natural resources need greater attention.

Nation-wide programmes and policies reflect India's commitment to make SCP its priority. Many of these programmes and policies will be highlighted in the following sections. Here it is sufficient to mention that India is a supporter of the Ten-Year Framework of Programmes (10YFP) on SCP. Indian organisations are particularly active in Sustainable Building and Construction, Sustainable Tourism and Sustainable Lifestyle and Education programmes of the 10YFP.

1 http://www.un.org/esa/desa/papers/2015/wp141_2015.pdf
2 https://sustainabledevelopment.un.org/post2015/transformingourworld
3 https://www.thelancet.com/commissions/pollution-and-health
4 https://climateactiontracker.org/countries/india/)

2.

Circular Economy

To address core challenges of unsustainable development, India looks into the paradigm of Circular Economy that changes the model of linear economic development (extract-make-use-throw away) into a circular one (extract-make-use-recover and restore).

Circular economy is based on inter-dependence in an industrial and social ecosystem – production processes are seen not as isolated cycles but as interconnected multiple cycles which are linked to the use of water, energy and materials. Such an approach must pay attention to the wellbeing, including livelihood opportunities, of the economically poor, making sure that the circularity fulfills the goal of the 2030 Agenda to provide a better life to those who were left behind.

While the paradigm of circularity is enthusiastically accepted by many, it is often perceived as any form of recycling. To correct, or rather to expand the perspective, three principles of circular society must be considered (Van Berkel 2018[5]):

1. *Go renewable and eliminate harmful inputs* – This principle refers to maximisation of use of renewable materials and energy as well as prevention of the input of harmful materials into supply chains.

2. *Closing the loop through perpetual recovery and reuse* – This principle is concerned with the flow of materials throughout society by utilising discarded materials as a (secondary) resource. The ultimate ambition is to extend to the maximum the life (or 'presence') of the materials in the system. The whole chain of products and services, including 'design for circularity'[6] should be considered. Closing the loop requires differentiation between biological and technical cycles where biological cycles feed materials back into the system and technical cycles recapture, recover and restore the value of products, components and materials.

3. *Do more with less by minimisation of intensity of use of natural, non-renewable, materials and energy* – The fulfilment of this principle closely correlates to two principles (out of four) of the Natural Step[7] that highlight the importance of minimisation of substances concentration from the earth's crust (such as fossil CO2, heavy metals and minerals) and of substances produced by society.

The Ellen MacArthur Foundation (2016)[8] stated that, for India, the circular economy path can bring an annual value of Rs.14 lakh crore (USD218 billion) in 2030 and Rs. 40 lakh crore (USD 624 billion) in 2050, against current development scenario. Product design, reverse logistics and innovative business models will become the main drivers for unlocking economic value. The World Business Council for Sustainable Development (2018)[9] highlights innovative models of product life extension, sharing platforms, resource recovery, product as service and circular supplier. Similar information comes from within the country, e.g. FICCI 2018)[10].

2.1 Go renewable and eliminate harmful inputs

Use of renewable resources

India's efforts to facilitate use of renewable resources is particularly evident in the area of alternative energy solutions. A number of notable policies and schemes spearheaded by different ministries facilitate uptake of renewable resources:

The Ministry of New and Renewable Energy (MNRE) creates a **framework and policies** to develop and deploy new and renewable energy.

Draft National Energy Policy (2017)[11] NITI Aayog, Government of India, states India's aspirations to energy security, linking it with sustainability. The policy brings to the fore the twin interventions of energy efficiency and renewable energy. The National Electricity Policy and Integrated Energy Policy adopted earlier stress the importance of renewable sources of energy.

Integrated Energy Policy (2016) aims at increased exploitation of renewable energy sources, including by development of appropriate infrastructure. The goal will be helped by appropriate policies and adequate funding.

Box 1. Critical aspects in accelerating India's Circular Economy Shift (FIICI 2018)

Business Models supporting CE
1. Circular Supply Chain
2. Recovery and Recycling
3. Product Life Extension
4. Sharing platforms
5. Product as a Service

Critical factors for acceleration of CE
1. Better Awareness
2. Disruptive technologies – physical, digital and biological
3. Enabling policy landscape
4. Innovative funding models
5. Collaboration and partnership

5 'Design" for circularity' - to look at how products and processes may be designed in the first place to ensure extension of useful life (durability and repair-ability) to reuse and recycle (being able to de-construct, modulate, add); and to share

6 https://www.ellenmacarthurfoundation.org/publications/india
7 https://docs.wbcsd.org/2017/06/CEO_Guide_to_CE.pdf
8 FICCI (2018) Accelerating India's Circular Economy Shift A Half-Trillion USD Opportunity Future-proofing growth in a resource-scarce world
9 Presentation Materials Recycling for Circular Economy at the Conference on Sustainable Growth through Material recycling: Policy Prescriptions, 6 August, Organised by NITI Aayog
10 https://thenaturalstep.org/approach/
11 http://niti.gov.in/writereaddata/files/new_initiatives/NEP-ID_27.06.2017.pdf

National Policy for farmers[12] aims at sustainable development of agriculture with the focus on creating sustainable rural livelihood, improving quality of land and soil, alternative energy sources and sustainable use of ground water. It relates to the National Agricultural Policy (2000) that highlights the importance of sustainable use of natural resources.

Department of Science and Technology (DST) of the Ministry of Science and Technology has a number of schemes, notably Clean Energy Research Initiative, that support SCP. To advance policy agenda, the new programmes of 2018 specified focal areas of waste management. DST supports State Science and Technology (S&T) Councils that have led to a number of novel initiatives including Cleaner and Fuel-Efficient Technologies (Punjab), Solar Passive Housing Technology (Himachal Pradesh), etc.

Renewable Energy Certification (RECs) (2010): The Renewable Purchase Obligations (RPO) (2010) was one of the key driving forces for promotion of renewable energy. The State Electricity Regulatory Commissions (SERCs) have defined their respective RPO Regulations.

The number of **non-governmental** organisations, including businesses, that seek inputs about renewable energy sources and how to incorporate green initiatives into their operations is steadily growing (see Figure 1), though remains somewhat limited to the larger players. They often attend not only to the characteristics of the procured (more sustainable) input but also to practices of suppliers that are responsible from the sustainability point of view.

Taken broader, the use of renewables is focused not only using nature as mentor and as an input but within ecosystem limits. Many applications using nature as supply of water, materials, energy, land and biodiversity have recently emerged with new applications of agro-resedues, production of biomaterials such as bioplastic or bio-solvents and production of renewable energy. A number of certification schemes, such as Forest Stewardship Council or Marine Stewardship Council, prevent sustainable input of nature materials into production.

Important applications are emerging around fast developing technologies. For example, low to medium temperature heat can be directly brought to the range of industries (food processing, dairy, pharmaceutical, chemical, leather and textiles) through the solar thermal collectors[13, 14, 15]. For example, Concentrating Solar Thermal units are operational at Mothers Dairy in New Delhi, deploying 16 parabolic dishes producing 120,000 litters of hot water daily for the cleaning in place system, and at Amul Dairy in Gandhinagar, using parabolic through collectors with total collector area of 615 square meters to produce steam that feeds directly into the steam system[16]. S4S Technologies, for example, developed advanced solar dehydration units that combine conductive, convective and radiative heat transfer for fruit and vegetable drying units[17].

Using nature as a mentor is about developing manmade processes on the bases of natural processes. A recent innovation in the industrial area is engineering of horizontal gas flames with radiant heat transfer, mimicked from charcoal burning, which has recently been commercialized by Agnisumukh in India for commercial kitchens. Such application delivers 30% fuel savings[18]. Watsan has engineered small scale water purification system that mimics natural purification materials and avoids use of energy and chemicals[19].

The idea of nature as mentor also found its way into Green Chemistry and Engineering as well as in industrial parks that demonstrate their applications in India.

Figure 1. Examples of businesses seeking renewable and more sustainable inputs

Coca Cola India	Local procurement and sourcing of fruit and other raw materials directly from the farmers. Development of supply chain infrastructure.
Hanjer Biotech Energies	Set up a green power plant in Surat that uses green fuel also known as refuse derived fuel (RDF)
Levis	Uses 100% renewable energy in its facilities
Godrej Industries and Chemicals	Has a procurement policy that includes use of renewable energy, reduction of material and energy use, and reduction of usage of hazardous and toxic materials and substances
Panasonic	Green Procurement Standards, Green Plan 2018 initiative.
ABB India Ltd.	Suppliers Code of Conduct, Compliance to ISO 9001, ISO14001 and ISO 18001
ITC	E-Choupal initiative facilitating direct communication with supplying village communities
Hindustan Unilever	Sustainable sourcing from the farming communities; compliance with "Sustainable Agriculture Code (SAC)"
Ikea India Pvt. Ltd.	Sourcing from smaller producers in India; raw materials recycle and reuse.
L'Oréal	Sustainable sourcing of mica
Indian Railways	Compliance with Green Public procurement policy
Godrej	Sustainable Procurement Policy
Hindalco Industries Ltd	Sustainable Procurement Policy
Maruti Suzuki India Ltd	Green Procurement Guidelines for suppliers
Nestlé India	Established Supplier Code and Responsible Sourcing Guidelines (RSG); plans to train farmers on the NESCAFÉ Better Farming Practices
Larsen & Toubro	Green Supply Chain Policy, Environmental & Social Code of Conduct for Suppliers
Subway India	Supplier Code of Conduct and Supply Chain Employment Practices Policy to ensure sustainable production

12 http://agricoop.nic.in/sites/default/files/npff2007%20%281%29.pdf
13 IRENA. (2015). Solar Heat for Industrial Processes: technology brief. Abu Dhabi: International Renewable Energy Agency.
14 UNIDO. (2017). Reducing pollution load in leather processing - demonstrating cleaner technologies in Kanpur India. New Delhi: United Nations Industrial Development Organization.
15 UNIDO. (2017). Circular Economy. Vienna: United Nations Industrial Development Organization.
16 Van Berkel, R. (2018). Solar Heat for Industrial Processes. Renewable Energy Invest 2018. Noida: Ministry of New and Renewable Energy.
17 UNIDO. (2018). A compendium of clean technology innovations in India. New Delhi: United Nations Industrial Development Organization.
18 UNIDO. (2018). A compendium of clean technology innovations in India. New Delhi: United Nations Industrial Development Organization.
19 UNIDO. (2018). A compendium of clean technology innovations in India. New Delhi: United Nations Industrial Development Organization.

Management of Hazardous Substances

India is a signatory to a number of agreements including the Montreal Protocol on Substances that Deplete the Ozone Layer, The Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC), Basel Convention on the Transboundary Movement of Hazardous Wastes and their Disposal and the Basel, Rotterdam and Stockholm (BRS) Conventions which have the common objective of protecting human health and the environment from hazardous chemicals and wastes. The Conventions require national reporting on obligations that are already part of the system of indicators under SDG12.

With respect to the national practices, the government is looking at measures to regulate and guide different stakeholders. To consolidate governance of chemicals, measures have been mooted for consolidation of regulatory Acts into an Integrated Chemical Legislation in line with REARC[20]. Capacity development of different stakeholders, establishing a specialty chemicals forum, development of stringent consumption standards across various end-use markets and encouragement of the private sector to voluntarily seek "Responsible Care Certification" (Ministry of Chemicals and Fertilizers)[21] are among other suggestions.

Box 2. Waste management rules that relate to disposal:

- Management and Handling of Municipal Solid Waste (2000),
- The Plastic Waste (Management and Handling) Rules, 2011
- Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 (last amended 2010)
- E-Waste (Management and Handling) Rules, 2011 (amended 2016)
- The Fly Ash Notification (1999, last amended in 2016)
- Bio-medical Waste Management Rules, 2016
- Construction and Demolition Waste Management Rules 2016
- Batteries (Management and Handling) Rules, 2001

2.2 Closing the loop

In the context of India, policies and business practices have already paved the way for closing the materials and energy loop. The National Environment Policy (2006), that serves as an umbrella for many specific waste management rules, lays down principles of waste management, and makes prevention of final disposal a priority. Handling of different wastes is governed by rules of the Environmental Protection Agency (see Box 2).

Some rules, such as Construction and Demolition Waste Management Rules, promote circular economy by obligating local bodies to use a percentage of construction and demolition (C&D) waste in municipal and government construction contracts. The goal of circularity is promoted through the rules for solid waste management that, through 2016[22] amendments, is now applicable beyond municipal areas and mandates source segregation (into wet, dry and domestic hazardous wastes) and recovery, reuse and recycling of the segregated streams. The waste pickers/ragpickers and waste dealers/*Kabadiwalas* are to be integrated into the formal system.

Modification of the waste management rules for e-waste and plastic waste aim at improving circularity and safety of materials flow by making producers more responsible for the end of product life of various products. Today, two Extended Producer Responsibility (EPR) legislations focusing

20 Registration, Evaluation, Authorisation and Restriction of Chemicals is a European Union regulation dating from 18 December 2006

21 Indian chemical industry – XIIth five year plan (http://chemicals.nic.in/sites/default/files/XIIth%20Five%20Year%20Plan-Yr%202011_0.pdf)

22 http://pib.nic.in/newsite/PrintRelease.aspx?relid=138591

Figure 2. Examples of businesses contributing to closing the loop

TATA Motors	1.Buys back, or exchanges used vehicle parts like engine, gearbox or alternators. 2. Refurbishes the returned part and offers it with a warranty.
Maruti India	Recycling of scrap generated from shop operations
Nissan	Recycling of steel, soda bottles, cloth, plastic
Mahindra	Increasing use of recycled input material including recycled scrap, to approach zero landfill target
Hanjer Biotech energies	Extracting value from municipal waste
Sony India	Established fourteen e-waste collections centres for safe disposal and recycling
PepsiCo India	Waste to Wealth (WTW) Programme
Samsung	Take-Back & Recycling (STAR) Program
Hindustan Unilever	The Unilever Sustainable Living Plan
Indian Oil Corporation	At Panipat Refinery treated water is put back into process or used for irrigation of green belt
Indian Textile Industry (Panipat Cluster)	Recycling of discarded textiles from abroad
ITC	'Wellbeing out of waste' Programme
eBay	eBay Valet service simplifying transfer of used (free) items
Maruti India	Recycling of scrap generated from shop operations

on e-waste and plastic are already in operation and EPR law for end-of-life vehicles is under discussion. EPR rules for plastic waste require producers, importers and brand owners to contribute to the collection of plastic waste but do not mandate collection targets. EPR guidelines on e-waste have collection targets. These targets were raised for producers who entered the scheme recenty.

National Urban Sanitation Policy: This defines sanitation in broad terms, and covers integrated management of sewage and solid waste, recycling

and reuse of treated waste water and engagement of formal and informal sectors in achieving policy goals.

The Swachh Bharat Mission (clean India mission) aims at the cleaning of urban and rural spaces, with the focus on waste management, among other core issues, in urban areas. The criteria relate to MSW collection, processing and disposal.

There are a number of initiatives related to the management of specific materials or waste streams that deserve mention. Entities generating **biomedical waste** were requested to phase out some of the hazardous materials in a given time period and prevent discharge of contaminated sewage into common sewage systems. A Common Biomedical Waste Treatment and Disposal Facility (CBWTF) was set up to reduce adverse impact on human health and the environment. The treated recyclable waste is sent for secure disposal or recycling.

A material that gained political and public attention is plastic. The Plastic Waste and Management Policy, 2016, applies to every waste generator, local body, Gram Panchayat, manufacturer, importers and producer. A number of rules and regulations are being framed to govern recycling and phasing out of different plastic materials. For example, in March 2018, the MEFCC came out with the Plastic Waste Management (Amendment) Policy that deals with the phasing out of Multi-layered Plastic (MLP) which is "non-recyclable, or non-energy recoverable, or with no alternate use."

Sectoral policies also address closing the resource loops and minimising loss of materials. For example, the **National Mineral Policy** includes zero-waste mining as a national goal and emphasises the need to upgrade mining technology. Company practices provide a business case in closing the materials and energy loops (Figure 2).

Recycling is a well-practiced by industries by applying the 3R methods of Reduce, Reuse and Recycling, for a diversity of materials. It relates not only to practices of individual facilities but to the aspirations to unlock large scale opportunities provided by industrial sectors, e.g. cement making, or through industrial symbiosis.

The 3Rs also provide a framework for cleantech innovation and entrepreneurship. For example, in its denim production in India, Arvind Textiles was able to achieve 70% circularity in water use, 50% circularity in fuel, 20% fibre circularity while recovering and reusing significant amounts of salts and other processing chemicals. NoWasteTextiles was able to produce knitwear from 100% post-consumer recycled garments. Examples of other Indian cleantech start-ups that achieving significant success in circularity include Saathi (producer of fully biodegradable sanitary pads from waste banana fibre), Aspartika (recovering Omega 3 fatty acids from silk worm pupae) and Brisil (extraction of silica from rice husk ash)[23].

2.3 Minimising resource consumption

The National Environment Policy (NEP) framed by the Ministry of Environment and Forests (MoEFCC) aims at introducing environmental considerations in development. It emphasizes the importance of preventing resource degradation, equity in the use of resources and the need for multi-stakeholder approaches. Among other considerations, it highlights efficiency in the use of environmental resources as well as their importance for livelihood creation.

The Strategy on Resource Efficiency formulated in 2017 by NITI Aayog[24] with support from the European Union Delegation suggests a framework for enhancing resource-use efficiency in the Indian economy and industry, highlighting key elements.

Figure 3. Examples of businesses working on resource and energy efficiency

Mahindra	Adopting appropriate migratory steps using less inputs and less harmful materials in manufacturing. Life Cycle approach to product design, aims at less energy intensive products.
Towering Heights	Captures power lost during transmission and distribution to supply electricity to the telecom towers. Uses a combination of solar and wind power to operate the telecom tower site and cut fuel expensesby 40 per cent.
Coca Cola India	Replacement of HFC in refrigeration, development recyclable packaging, water stewardship.
Cement Sector	Work on energy and water saving measures, development of environmentally superior products.
Indospace	Indospace has energy efficient buildings and also promotes the use of non - hazardous and recyclable materials to reduce the environmental impact. Increases the energy efficiency by utilizing T5 lighting fixtures, using passing lighting, utilising rain water.
FM Logistics	Developing environment friendly and sustainable cargo transportation in India.
PUMA	Use of solar energy by PUMA's stores; use of geothermal cooling system, natural and LED lighting.
The Aditya Birla Retail	Use of LED lights, paper reduction initiatives.
Mahindra Logistics	Warehouse management system that includes space optimisation; Mahindra optimises its reverse logistics.
IKEA	Launched its fleet of solar powered delivery vehicles.

Through Bureau of Energy Efficiency (BEE), the Ministry of Power has initiated a number of energy efficiency initiatives including for commercial buildings, industrial sectors, municipalities as well as for selected appliances.

India's commitment to minimising resource consumption and to goals of resource efficiency is illustrated by the setting up of **the Indian Resource Panel (InRP)** by the MoEFCC, with support from the International Climate Initiative. It is an advisory body on strategy for resource efficiency. Its recommendations

23 UNIDO. (2018). A compendium of clean technology innovations in India. New Delhi: United Nations Industrial Development Organization.

24 http://niti.gov.in/writereaddata/files/document_publication/StrategyOnResouceEfficiency_0.pdf

are yet to be more broadly available in the public domain. Yet, frequent references to its existence in national and international forums point to its future significance.

European Union Resource Efficiency Initiative (EU-REI) is a project aimed at supporting India in implementing the SCP agenda. It emphasises mobility, building and construction, renewable energy (PVs) and resource recovery (e-waste, plastics and packaging). The core activities are focused on facilitation of collaboration between Indian and European businesses around issues of resource efficiency and facilitation of dialogue among different stakeholders on the issue. The project, which will continue till 2020, sees standards and benchmarks in good business practices for resource efficiency as key for transition to a circular economy.

The National Forest Policy looks at conservation of natural heritage, maintenance of ecological balance and checking soil erosion and denudation. It also addresses problems related to "increasing the productivity of forests to meet essential national needs and encouraging efficient utilisation of forest produce and maximising substitution of wood."[25]

The National Manufacturing Policy (2011) emphasizes the need for the growing manufacturing sector to ensure use of green technology, energy efficient practices and optimal utilisation of natural resources and restoration of damaged/degraded ecosystems.

The National Mission for Sustainable Agriculture targets issues of water use, management of nutrients and livelihood. Knowledge sharing, better agricultural practices, enabling of digital technology and regenerative agriculture are seen as elements of circular economy in agriculture and food production.

The National Mission on Sustainable Habitat will have, among other targets, the Energy Conservation Building Code that will address the design of energy efficient new and large commercial buildings and will aim at retooling existing building stock[26].

Auto Fuel Policy and Vision for 2025 was introduced to improve fuel quality as well as tighten emission norms for the sector (MoPNG 2015).

The National Electric Mobility Mission Plan envisages introducing 6–7 million battery-operated electric/hybrid vehicles on Indian roads by 2020.

The business case for resource use minimisation is widely presented globally and in the context of Indian economy. A sample of initiatives is presented in Figure 3.

2.4 Programmes with multiple foci in SCP and circular economy

City programmes

In the area of rapid urbanisation there are a number of programmes aimed sustainable cities that are of significance for the SCP and circular economy. Among them are:

Smart Cities Mission[27] - A five-year programme aiming at improving cities liveability and sustainability. The goals (including energy and water efficiency, alternative energy solutions, inclusive and sustainable transportation and housing) of the individual actions are to be selected by the participating cities and towns.

Mission for Rejuvenation and Urban Transformation (AMRUT)[28] - Focuses on water recycling and reuse and capacity development in relation to waste management.

National Heritage City Development and Augmentation Yojana (HRIDAY)[29] – This initiative is "bringing together urban planning/ economic growth and heritage conservation in an inclusive and integrated manner with special attention on livelihoods, skills, cleanliness, security, accessibility and service delivery."

A number of rules and regulations, including waste management rules, are now extended to include urban and industrial areas[30].

Initiatives for Private Sector

Several overarching policies, e.g. **National Mineral Policy**, **Agenda for Affirmative Action** by FICCI, **Indian Standard on Guidance on Good Governance** by the Bureau of Indian Standards, **Guidelines on Corporate Governance** for Central Public Sector Enterprises (Ministry of Heavy Industries and Public Enterprises) and **National Action Plan on Climate Change** provide a good foundation for SCP practices. To highlight a few initiatives:

The Securities and Exchange Board of India (SEBI)[31] requires the 100 largest listed entities to submit **Business Responsibility** Reports that contain details about resource efficiency, among other things.

National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business[32] (2011) by the Ministry of Corporate Affairs encourages businesses to become responsible citizens in society, so that their every action leads to sustainable growth and economic development.

The Companies Act 2013[33] and its amendments in 2017 mandate companies to spend a percentage of their profits on Corporate Social Responsibility (CSR) activities and programmes.

The MoEFCC has developed criteria for categorising industrial sectors[34] based on their pollution load. **The Pollution Index** assigned to each sector takes into consideration air emissions, effluents, hazardous wastes and resource consumption. The purpose of the categorisation is to ensure that industries are established in a manner consistent with the environmental objectives. Re-categorisation based on the new criteria are expected to facilitate industries to adopt cleaner technologies, resulting in less polluting practices.

Consumption and procurement

The consumption aspect of circular economy puts the spotlight on the characteristics of products that enter the system and, importantly, practices that govern selection of such products.

Section 14 of the Energy Conservation Act (2001) empowers the Central Government to enforce efficient use of energy and its conservation. The Bureau of Energy Efficiency is responsible for the Standards & Labelling programme launched in May 2006 which provides for voluntary labels for refrigerators and room air-conditioners. At present, it is applicable to 21 appliances, ten of them mandatory.

The Government of India has instituted the ECO Mark scheme, administered by the Bureau of Indian Standards (BIS), to be awarded to products that are environmentally superior, e.g. using recyclable material, made from recycled products or biodegradable material, thus contributing more to the reduction in use of non-renewable resources, including non-renewable energy sources and natural resources, compared with other similar products. The technical committee administering the scheme identifies the products, defines criteria and makes recommendations to the Steering Committee on notifications. BIS translated the

25 http://www.moef.nic.in/sites/default/files/jfm/jfm/html/national.htm
26 http://www.hpccc.gov.in/msnSustHabitat.aspx
27 http://smartcities.gov.in/content/
28 https://amrut.gov.in/writereaddata/AMRUT%20Guidelines%20.pdf
29 https://www.hridayindia.in/
30 http://pib.nic.in/newsite/PrintRelease.aspx?relid=138591-Pib.nic.in
31 https://www.sebi.gov.in/legal/circulars/nov-2015/format-for-business-responsibility-report-brr-_30954.html
32 http://www.mca.gov.in/Ministry/latestnews/National_Voluntary_Guidelines_2011_12jul2011.pdf
33 http://www.mca.gov.in/Ministry/pdf/CompaniesAct2013.pdf
34 http://pib.nic.in/newsite/PrintRelease.aspx?relid=137373
35 http://www.bis.org.in/cert/prod_cert_scheme.asp;

criteria into Indian Standards, certifies the products and makes contracts with manufacturers, allowing them to use appropriate labels on their products[35].

According to NITI Aayog, "the Bureau of Indian Standards (BIS) has been … professional standard setting organisation with a wide range of standards for quality and performance of manufactured products. BIS standards can have an immediate impact on market acceptance of new resource-efficient (RE) products. BIS has also been working to adapt internationally accepted standards related to RE to the Indian context, but a more coordinated approach within RE is recommended for the future." As a result, BIS becomes a critical player in setting the standards and collecting data in the area of resource efficiency.

Programmes like 'Make in India' are also seen as critical to facilitate energy-efficient, water-efficient and pollution control technologies through, for example, the Technology Acquisition and Development Fund (TADF).

The catalyst for the evolution of Sustainable Public Procurement (SPP) in India was the UNEP-MoEFCC Roundtable on SPP in 2008. The 12th Five-Year Plan (2012-2017) identified 100 products to promote Green Public Procurement (GPP). In April 2018, the National Working Group on SPP was established under the leadership of the Ministries of Finance, Railways and Environment and Climate Change.

Last, but not least, is attention to forming right attitude to sustainable consumption by private citizens. While many initiatives are on the way, more systematic efforts through formal and informal education would be necessary.

Innovations

The Global Cleantech Innovation Programme (GCIP) India - Ministry of MSME-UNIDO-GEF[36] GCIP contributes to nurturing clean technology start-ups, their entrepreneurial ecosystems and policy frameworks supporting such developments. The Programme addresses both economic competitiveness and environmental performance of the companies. It is based on competitions aimed at identifying most promising innovation teams working on indigenous solutions for material and energy efficiency, waste management, transportation and construction, and puts them through an accelerator programme. The programme connects the participants with potential investors, customers and partners as well as working with key local government agencies collaborating with SMEs.

Globally, India is the 3rd largest start-up hub, but only a few of the companies pay attention to clean tech – the area where research and development blends into critically needed products. GCIP identifies opportunities and challenges for start-ups to address issues related to resource efficiency.

The 'Make in India' programme was launched in 2014 to encourage investments in manufacturing products in India. In addition to the commitment of ₹ 16.40 lakh crore foreign direct investments between 2014 and 2016, several states launched their own Make in India initiatives. Renewable energy is a priority area which supports water- and energy-efficient and pollution control technologies.

http://cpcb.nic.in/ecomark-criteria

36 Global Cleantech Innovation Programme India 2013-2017, Stories and Lessons, A GCIP Journal, March 2017

3.

Perspectives on the situation and suggested directions for development

The suggestions, limited by the scope of the analysis, are for development of proxy indicators for SDG12 (see Section 4 of the report). It also aims to identify potential project areas that might accelerate SCP and CE development in India.

This analysis is based, among other factors, on discussions with a number of specialists in the area of SCP in India and abroad. It demonstrates the presence of multiple policy and business initiatives that cover different stages of material and energy flow , some of them simultaneously. The SCP/CE initiatives were studied at the national, state and sectoral levels. They include some national campaigns, sustainable city initiatives and competitions highlighting innovative business cases. With the SCP and CE models gaining visibility, the focus is on actions that could optimise and scale up ongoing processes.

Need for Coordination and Policy Implementation

The SCP and CE models cover a range of actions, sectors and scales. It appears that coordination of these activities often remains with the line ministries, within sectors or geographic areas. At the national level, the aggregation of data and policy work are unfolding with the active participation of the NITI Aayog (another entity, the Indian Resource Panel, designed for analysis and advice on the subject, appears to be dormant) which, currently, is engaged in developing a nation-wide SCP-related strategy. Yet, NITI Aayog does not have a mandate for coordinating *implementation* or complex processes of SCP and CE. As a result, there is a risk that CE actions might remain focused on a limited number of sectors and be restricted in duration, scope and scale. While the suggestion to support consultative process, led by NITI Aayog, to understand the potential of implementing the SDGs and CE has merit, it might be outside the scope of this paper, which focuses, rather, on the support of concerted actions towards coherent implementation of CE at the level of smaller geographic and administrative entities (cities or states where the degree of coordination is unfolding) or at the sectoral level.

Need for a Broader and More Systematic Data Gathering and Analysis

There is a lack of data on resource utilisation and expected changes in key sectors of development, and this gap is of significance in the implementation of CE. Data-informed decisions are present, to an extent, within select sectors, e.g. construction and demolition and cement. Yet, broader and more systematic data gathering and analysis, leading to establishment of a comprehensive baseline, are needed. Moreover, better researched projections of development in the form of potential long-term scenarios will add a measure of realism to planning and implementation processes.

Need for Skill Development

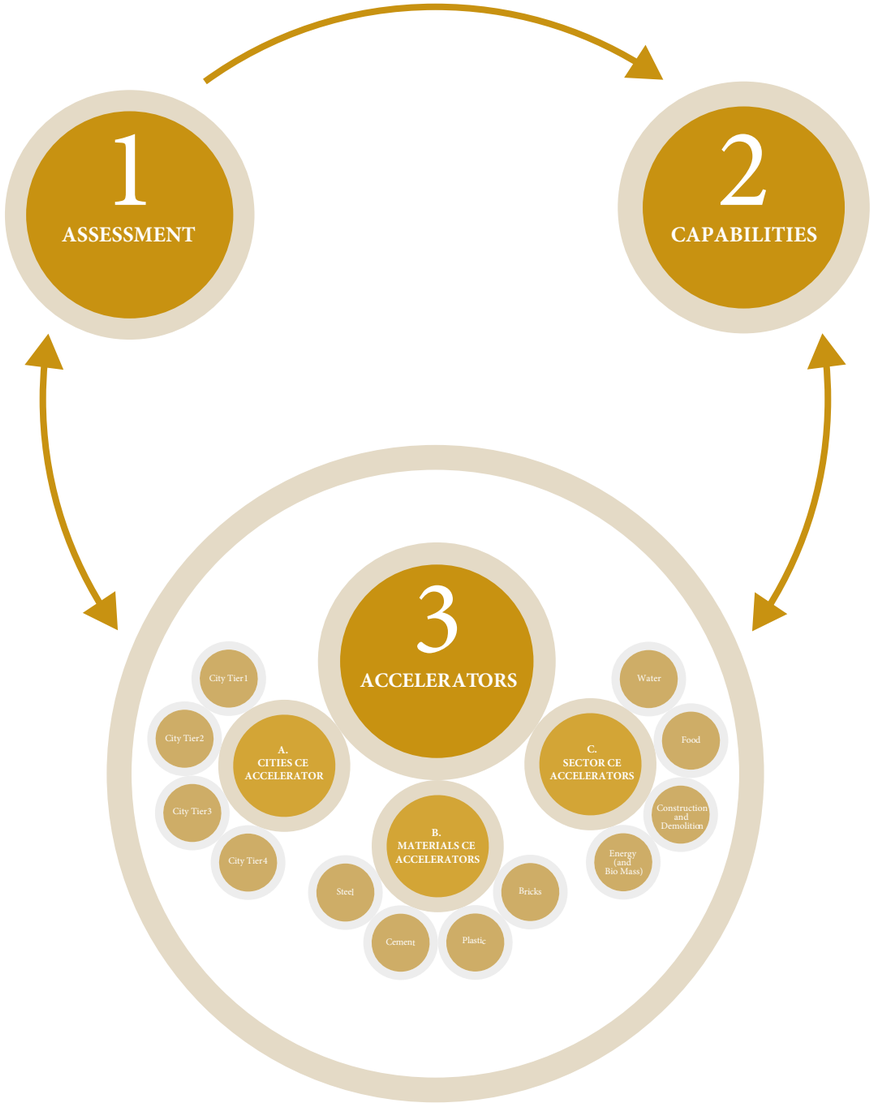
Establishing an SCP and CE system of economy will only be possible if the country as a whole – its regions and its industrial sectors included – effectively addresses skills development for new and emerging jobs. Provision for changes in skills development, based on the changes in qualifications, will occur at all levels right up to higher management positions. Postponing action in this area, including ensuring alignment among industrial, resource, environmental and skills policies, will ultimately result in delay of CE implementation. Action regarding fiscal, market and public information policies are also crucial for guiding consumption (including by the public sector). Differential taxation and fees for different slabs of consumption, mandatory disclosures of products and processes which will attract incentives because of improved efficiency and facilitating better informed consumer choices, will then become possible.

Need for Capability Assessment to Implement Circular Economy

Facilitation of comprehensive assessments and development of capability to implement CE ambitions can be usefully combined with the pilot CE projects at the city/state/sectoral levels. It will become more successful if built on the foundation of successful national and international processes.

The suggested interventions cover three interconnected elements – *Assessment* (development of a knowledge platform), *Capabilities* (capacity and conditions for implementation) and *Accelerators* (processes that comprehensively apply CE principles). [*See Figure 4]*

Figure 4. Strategy Rowards Circular Economy - Suggested Elements



3.1. Assessment

Immediate objective	Improve understanding of resource flows in India and their socio-economic and environmental impact Identify elements of the system for data collection and analysis as vpart of the knowledge platform for CE
Outputs	Mapping resource flow and impact Development of specific KPIs for assessing progress towards circularity
Key activities	Agree, in a collaborative manner engaging key stakeholders, on the methodology and tools that allow mapping of resource flow as well as ways of recording them Establish protocols of data input, including quality control Design KPIs for immediate use and for the future in order to record the trends in resource use Recording data for the sectors/materials where initial progress has been achieved, e.g. through consideration of the focus areas of the EU-resource Efficiency Initiatives (building & construction, waste, etc.), while mapping areas with missing critical data Identifying strategies for collecting required data, including establishing new protocols for data collection. The strategies for data collection would need to take into account several approaches suited to CE at the level of regions/cities (including urban and peri-urban areas), materials and sectors of the economy Explore, and agree on the initial strategies, for setting up analytical/research platforms contributing to data analysis. Such platforms might include input from international experts
Focal areas	At the initial stage the data might be collected for focal areas of suggested Accelerator activities
Potential partnerzs (including UN agencies)	NITI Aayog, MOSPI, UNEP, UNIDO, FAO

3.2. Capabilities

Immediate objective	Improve the capability of government to develop and direct public-private development partnerships for CE
Outputs	Identified requirements in competences, i.e. understanding, skills, attitudes, for CE, together with elements for their development Developed CE training modules for different levels and functions of the government, e.g. procurement and contracting, policy making and planning Adopted an initial set of training materials and approaches for the specific responsibilities of the decision makers; also adopted a process for inputting the latest developments in the educational processes of the decision makers.
Key activities	Consultations on the goals of CE and skills required to achieve it in a number of regions/sectors corresponding to the selected Accelerators Mapping of learning needs and reaching agreement on capacity development strategies Formulating a capacity development strategy for the government in the area of CE Setting up goal-oriented public-private partnership platforms at the national, state and/or sector levels for dematerialisation and circularity Development of pilot materials and training future trainers Formulating capacity development plan/s for various categories of decision makers
Focal areas	Initial focal areas of training will be agreed in consultations. They can be aligned with and built upon focal areas of Accelerators
Partners (including UN agencies)	Relevant training institutes for IAC personnel

3.3. Accelerators

A. Cities Circular Economy Accelerator	
Immediate objective	City-targeted interventions to accelerate dematerialisation and circularity Designing and implementing the CE approach in the three selected cities in India with attention to priorities of the area as well as core activities, i.e. housing, transportation, food, production, consumption. It would be important to consider inclusion of peri-urban areas of the cities in the associated activities. (It would be important to consider inclusion of peri-urban areas of the cities in the associated activities.)
Outputs	Establishment of a CE approach in the cities with all associated learning and recommendations for the broader uptake of EC in other regions
Key activities	Consultative process to identify three willing candidates, representing different tires/types, for the process (to be accompanied by initial data collection) In-depth mapping of activities related to CE-relevant policies and practices, resource and energy flows, ongoing capacity development and skills gaps; notable innovation initiatives; Identification of coordination bodies and priorities for action as well as an evaluation system Identification of skills for the required development and setting up processes for the development of these skills Establishing funding agreement for the road map implementation Development of the CE road map that includes agreed upon pilot projects Piloting a number of agreed upon activities accompanied by evaluation and agreed upon adjustments
Focal areas	Focal cities are to be picked in a consultative way. It would be useful if they represent Tier 1, 2 and 3 types as per national classification

3.3. Accelerators

B. Materials Circular Economy Accelerator	
Immediate objective	Develop and apply the CE approach to materials critical for Indian society with the goal of increasing sustainable (efficient, effective and long-term) use of these materials and other associated resources
Outputs	Road map for CE approach for the selected materials and a (tested) ecosystem for implementation
Key activities	Mapping life cycle of each focal material selected for the Accelerator work, with associated aspects and impacts Identifying factors that facilitate or constrain circularity of the material/s (related to the stages in the supply chain of processes that use the target material/s) Development of programmes addressing bottlenecks Developing, with engagement of key stakeholders, a road map for materials circularity, including policy actions, capacity development and information sharing platforms, research and innovation initiatives. Agreement on funding mechanisms for and coordination of the activities
Focal areas	Potential materials (to be selected in the consultative process) - plastic, cement
Potential Partners (including UN agencies)	Relevant line ministries, UNIDO, ILO, FAO, UNEP

3.3. Accelerators

C. Sector Circular Economy Accelerator	
Immediate objective	Sector-targeted interventions to accelerate dematerialisation and circularity
Outputs	Road map of CE for selected sectors with agreed upon ecosystems for implementation
Key activities	For each of the sectors (chosen in a consultative manner) – mapping of material and energy flow together with existing CE practices as well as and challenges for CE implementation Identification of promising CE activities, barriers for their implementation and strategies to overcome these barriers Development of road maps with agreed upon targets, action plans (including pilot activities), monitoring systems and capacity development activities Agreement on the funding mechanisms for implementing the road map Implementing pilot projects Establishing collaboration with national capacity development and assessment programmes while piloting fitting information exchange processes Piloting sector-specific (and non-sectoral) CE knowledge platforms
Focal areas	A few sectors of significance for India - agriculture and land use, energy, construction. These sectors have been the target of several CE projects which, makes them promising pilots
Potential Partners (including UN agencies)	Relevant line ministries, relevant industry associations, UNIDO, UNEP, ILO

4.

SDG 12
Suggested Proxy Indicators

Introduction

It is widely acknowledged that data availability and reliability present serious challenges to planning and monitoring of activities related to many areas, including development related to SCP and CE aspirations. For example, there are no systematic activities to analyse the waste generation patterns of different geographic regions of India, and because of this there is a tendency to rely on data gathered by institutions like the Central Pollution Control Board (CPCB), New Delhi, National Engineering and Environmental Research Institute (NEERI), Nagpur, Central Institute of Plastics Engineering and Technology (CIPET), Chennai and Federation of Indian Chambers of Commerce and Industry (FICCI, 2009), New Delhi[37], rather than on ongoing data gathering. Such studies may or may not be commissioned frequently and at the scale that enables ambitious and data-driven planning. Also, some data related to resource flow may not be acceptable as it comes from sources other than those endorsed by the government.

While it is difficult, at this stage, to comprehensively assess the impact of various measures in the SCP area, especially relating to resource limitations and carrying capacity, it is possible to monitor development of positive trends using data that is already available at the level of cities, states or nationally for some (sub)sectors. In such cases, the endeavour is to make such data accessible and usable to construct SDG indicators or indicators supporting India's transition towards CE. In some cases, usability of data would require changes in existing procedures of data collection and recording, e.g. though modification of database fields and reporting forms, or provision of

37 http://home.iitk.ac.in/~anubha/H13.pdf

additional questions in already scheduled/planned questionnaires.

Indicators considered in this report point at data that is, in the understanding of the analyst, either available or obtainable with a reasonable degree of effort, and thus, will not overstretch resources at the initial stages of using the indicators. (Needless to say, additional indicators will have to be developed as the data collection system matures). It is believed, that the suggested indicators are significant enough to trace critical processes as they reflect development of the institutional framework (processes) and the results of ongoing and planned SCP and CE efforts (outcomes). The indicators are rooted in ongoing practices and are based on national developmental aspirations.

Suggestions for proxy indicators are presented in the following format: each section starts with a listing of the targets and indicators agreed upon under SDG 12 by the Government of India, followed by considerations of the factors significant for the design of the indicators. Such considerations refer to the areas already reflected under the chosen indicators or those that might be considered. Some suggestions relate to ways to further refine currently chosen indicators. Tables that follow sections identifying complementary elements list suggested indicators, point at the relevant critical ongoing processes on SCP and CE and indicate entities that are responsible for these processes (and could facilitate access to data). Suggested indicators fall into two broad categories – those that indicate presence of a critical policy, processes, allocated responsibility, established entity (to be qualified through 'yes/no' questions and potential qualitative elaboration), and those that require quantitative data.

Further engagement on development of the SDG 12 indicators might be done on the basis of the received suggestions that will indicate preferences, clarify data collection possibilities and further data availability. It will allow more careful definition of the indicators as well as required methods and frequency of data collection.

Target 12.1: Implement the 10-Year Framework of Programmes on Sustainable Consumption and Production Patter ns, all countries taking action, with developed countries taking the lead, taking into account the development and capabilities of developing countries

Selected[38] indicator - 12.1.1: Formulation of national SCP framework and integration of SCP with national/State planning processes

Identifying complementary elements

The indicator addressed creation of institutional conditions that would align and enable actions of different stakeholders at the national, state and sectoral levels. As such, indicators can fulfil a double role – trace development of the institutional system for formulation, coordination and implementation of the SCP actions (critical at the initial stages of development) and monitor and assess efforts across the core areas of SCP identified on the basis of the priority areas of the 10YFP or in relation to national priorities.

To suggest complementary indicators — area (a) – the aspects that need to be taken into account relate to the existence of:

1. Policy instruments at the national level, including visions, SCP policies, etc.
2. Policies that encourage capacity development for local and national authorities as well as for difference sectors
3. Policies and frameworks that incorporate SCP principles in formal and non-formal educational programmes
4. Financial instruments for allocation of resources

Target 12.1 - Suggested Indicators	Critical processes already in place	Potential data holders/source
With respect to the integration of the SCP into planning processes at different levels: Existence of the National Actions Plan/Framework on SCP Inclusion of SCP in State development plans Existence of concept/vision papers focused on SCP-relevant topics Integration of SCP principles into a number of sectoral policies as well as development policies, e.g. poverty reduction, education Establishment of intergovernmental mechanism for SCP coordination (e.g. relating to resource efficiency Establishment of financial mechanisms, allocation of resources for SCP (through themes of resource efficiency, etc.)[39] **With respect to the actions and leadership in the 10YFP and SCP:** Voluntary reporting on SDG12 to the UN Nomination of focal points for the 10YFP Participation in the SWITCH-Asia pwrogramme Number of capacity development programmes on SCP conducted for/with the countries in the region Number of programmes under the priority areas of the 10YFP, i.e. Sustainable public procurement, Consumer information, Sustainable food systems, Sustainable lifestyles and education, Sustainable buildings and construction, Sustainable tourism Resources/fund allocation to the defined priority areas/sectors	The MoEFCC is working on a National Framework on SCP. NITI Aayog has produced a paper on topics such as resource efficiency and SCP. The 10YFP Focal Point has been chosen and a number of related activities and projects are either in progress or have been completed.	MoF (in relation to funds allocation) MoEFCC (in relation to the elements of the institutional framework)

Commitment to implementation of the 10YFP – area (b) – might focus attention on the six priority areas of 10YFP. These are: Sustainable public procurement, Consumer information, Sustainable food systems, Sustainable lifestyles and education, Sustainable buildings and construction and Sustainable tourism. Specific attention might be warranted for some of these areas relevant for India regarding, among other issues, relative investment in each of them. At mentioned earlier, the indicators can also be a marker of attention to development (by indicating relative investment/ budget) of other priority areas that do not necessary fall under 10YFP but are priorities for India, e.g. plastics, construction, etc.

Collaborative actions and partnerships within the country and internationally might be indicative of India's leading role in the SCP and 10YFP areas as well as of developing its own capacities.

38 'Selected indicators' are those that are are already agreed by the responsible governmental entities

39 In addition to financial mechanisms, guidelines and rule for SCP and CE such as those established for waste management (2016), directed at priority sectors and cities are required.

Target 12.2: By 2030, achieve the sustainable management and efficient use of natural resources

Selected indicator - 12.2.1: Percentage variation in per capita use of natural resources

Identifying complementary elements

The target addresses several components including (a) minimization of resource use and (b) resource efficiency. The first relates to the aspects of overall consumption and, thus, to the issue of resource depletion, resulting in environmental impact and economic implications (questions of growing resource prices, access, livelihood). Considerations of resource efficiency address the core question of absolute and relative decoupling of resource consumption and economic growth and environmental impacts.

As a result, the indicators, ideally, would need to consider:

A. Absolute and relative (i.e. per capita) value of material use/material, water and energy footprint at the level of the country/individual states
B. Efficiency in relation to water/energy/material use/productivity
C. Consumption and production sides of market and non-market activities
D. Absolute and relative values of resource use in individual sectors

Accounting for absolute and relative use of key resources is hampered by scarce data on their flow throughout and within the country, which makes construct of many useful indicators, as well as a coherent system of indicators relating use to availability, etc. of all resources, impossible at this stage. *What would be useful and realistic is to focus on the indicators that trace development of institutional conditions for resource efficiency as well as performance indicators in the sectors where data exists*, e.g. *construction materials.* What would also be possible and useful is to *monitor the state of use of non-renewable resources*.

Target 12.2 - Suggested indicators	Critical processes already in place	Potential data holders/source
Monitoring of institutional development: National programmes dedicated to support of energy-efficient, water-efficient and pollution control technologies (volume of financing and coverage) State programmes dedicated to support of energy-efficient, water-efficient and pollution control technologies (volume of financing and coverage) **For selected sectors:** Consumption of different building materials in different public construction projects[40] **On the topic of resource depletion/restoration:** Ecological footprint of India Regulations attributed to the protection of scarce non-renewable resources (river sand)	India has already demonstrated its commitment to resource efficiency by bringing in multiple regulations and programmes related to various aspects of circular economy, including standard setting for products (see section 2.3 of the report).	MoEFCC Ministry of Mines BIS (in the area of product standard setting) Manufacturers' Associations in India

Target 12.3: By 2030, halve per capita global food waste at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses

Selected indicators
12.3.1: Per capita food availability
12.3.2: Post-harvest storage and distribution losses of Central/States pool stocks of wheat and rice

Identifying complementary elements

The indicators 12.3.1 and 12.3.2. provide two points critical for assessment of the effectiveness and efficiency of food production and supply – final product availability, and losses at the stages of storage and distribution. While both are critical, additional consideration can be given to the stages of food processing and, by doing so, linking food losses with other wasteful activities of the processing enterprises. Such indicators can be considered in relation to the priority sectors already identified by the government – wheat and rice. Other considerations can relate to institutional arrangements – elements of specific policy framework relevant for minimisation of food losses and improving access to food. The indicators can highlight how mainstream policies that regulate food production, processing and distribution incorporate SCP principles.

Expanding the scope of the goal, the indicators can be used to monitor to what extent food losses occur due to the loss of agricultural lands to other activities.

Target 12.3 - Suggested indicators	Critical processes already in place	Potential data holders/source
Presence of SCP/production efficiency/waste goals in policy documents that regulate activities along the supply chain of food/s, including post-production storage[41] (related to 12.1) Existence of the food waste strategy/policy Top soil destroyed due to construction activities Agricultural land conversion for buildings and infrastructure development	There is a lot of critical development going on to increase agricultural productivity, optimise supply chains, etc.	MoEFCC Ministry of Agriculture and Farmers' Welfare Indian Council of Agricultural Research

40 Mechanisms that call for mandatory disclosures of material, water and energy footprints of all projects beyond a defined size in production and projected in-use stages of life. These disclosures would add to data and would, if connected with financial incentives and procurement guidelines, nudge development towards SCP

41 Creation of post-production storage infrastructure is critical, some of it requires electricity such as in cold-storages and some of it could be through on-site processing - all of this requires energy at the last mile. While this could be linked to Goal 8 and Goal 2, waste minimization in this sector would benefit hugely from post production processing facilities at the village level with decentralized energy, thus resulting in multiple benefits.

Target 12.4: By 2020, achieve the environmentally sound management of chemicals and all wastes throughout their lifecycle, in accordance with agreed upon international frameworks, and significantly reduce their release into the air, water and soil in order to minimise their adverse impacts

Selected indicators
12.4.1: Developing national secondary resource policy framework
12.4.2: Development of national policy for environmentally sound management of hazardous chemical and waste
12.4.3: Implemention of National Action Plan for fulfilling obligations of various ratified Multilateral Environmental Agreements (MEA) ratified

Identifying complementary elements

The indicator 12.4.3 points to adherence with multilateral environmental agreements governing chemicals and waste management. India was active in the development and implementation of a number of them.

Indicator 12.4.2 reflects some of the processes at the level of policy development. Progress of policy development towards some substances, such as POPs, can be individually reflected in the indicator system.

With respect to national practices, government already has put in place measures that regulate and guide different stakeholders. To consolidate governance of chemicals at the national level, suggestions include consolidation of regulatory Acts into an Integrated Chemical Legislation in line with REARC[42], capacity development of different stakeholders, establishing a specialty chemicals forum, development of stringent consumption standards across various end-use markets and encouraging the private sector to voluntarily seek 'Responsible Care Certification' (Ministry of Chemicals and Fertilizers)[43].

The target also includes creation of a policy framework (also related to the target 12.1) supporting sustainable use of wastes, chemicals and strategies minimising their adverse impact on the environment.

Some other considerations for developing additional (proxy) indicators:

- Management of chemicals seems greater than management of chemical wastes
- Lifecycle principle is the principle consideration
- Consideration of management of routine operations as well as force majeure cases, i.e. disaster management
- Importance of international commitments of the country in the area of chemicals management

Target 12.4 - Suggested indicators	Critical processes already in place	Potential data holders/source
In the area of waste management: Volume of generated waste in the key sectors, e.g. construction and demolition, scrap metals Capacity of existing treatment facilities Number and capacity of waste management 'parks' **In the area of chemicals management:** Number of companies awarded Responsible Care Certification Effective processes of import/export licensing under the Rotterdam Convention Existence of Integrated Chemicals Legislation and procedures for its implementation Establishment of a specialty chemicals forum Number of industries/number of customer standards focused on chemicals safety Regional/national plans for disaster preparedness (hazardous chemicals related) Number of chemical accidents (scale to be determined)	Ongoing efforts are presented in sections 2.2 and 2.1.	Ministry of Chemicals and Fertilizers Ministry records, relevant policies and procedural guidelines Organisations with methodology for estimation of C&D waste validated by IFEU. The Hazardous Substances Management Division (HSMD) under MoEFCC National Hazardous Waste Information System (NHWIS) Chemical Accident Information Reporting System (CAIRS)

42 Registration, Evaluation, Authorisation and Restriction of Chemicals is a European Union regulation dating from 18 December 2006

43 Indian chemical industry – XIIth Five-Year plan (http://chemicals.nic.in/sites/default/files/XIIth%20Five%20Year%20Plan-Yr%202011_0.pdf)

Target 12.5: By 2030, substantially reduce waste generation through prevention, reduction, recycling and reuse

Selected indicators
12.5.1: Number of waste recycling plants installed
12.5.2: Number of municipal corporations using waste segregation techniques
12.5.3: Number of municipal corporations banning use of plastic

Identifying complementary elements

Goal 12.5 is based on considerations of hierarchy of waste management, acknowledging a need to minimise consumption of particularly non-renewable primary materials. To a large extent, this is the Goal that reflects the current focus of India with regard to Circular Economy (CE) (see section 2 of the report). The Goal gives an important role to municipal corporations.

If CE ambitions are to be addressed, the role of other stakeholders has to be looked at critically. While municipal corporations are primary to collecting and segregating materials, their current engagement in these actions is relatively under-fulfilled. It might be useful to consider other partners along the supply chain of materials processing to obtain complementary data to meet the designated goals.

Second, in the light of recent and upcoming development related to EPR legislation – two EPR laws addressing e-waste and plastic were adopted (and an EPR law on the end-of-life vehicles is under consideration) – there might be a possibility of expanding the range of materials targeted by the indicators.

Third, at the moment, the indicators focus predominantly on recycling and, to some extent, reuse. It might be useful to strengthen the preventive aspect. This would be eventually addressed through the focus on EPR and ban on additional materials as is already being suggested with respect to plastic. Livelihood aspects associated largely with the informal recycling sector are other significant areas of focus.

Target 12.5 - Suggested indicators	Critical processes already in place	Potential data holders/source
In the area of capacity development: Existence of capacity building and awareness initiatives targeting specific consumers, notably bulk consumers **In the area of recycling:** Reference to the existence EPR-related legislation and processes - Adoption of EPR law/s addressing plastic Adoption of EPR law/s addressing e-waste Specific guidelines on EPR Authorisation and Target calculations Establishing governing standards for recyclers, EPROs, all stakeholders including intermediaries (storage, transportation, informal sector aggregators, bulk consumers) Number of EPR Organisations Number of authorised producers under EPR law/volume of products declared by authorised producers under EPR law Other aspects of recycling not necessarily related to EPR - Development of sector/specific guidelines for use of secondary raw materials Establishing a digital system for tracking waste Number of authorised recyclers for plastic/e-waste/etc. **In the area of livelihood associated with recycling sector:** Policies and initiatives related to the improvement of working conditions in the recycling sector (social/livelihood aspect) Degree of formalisation in the non-formal waste management sector **In the area of promoting use of secondary materials:** Number of initiatives promoting resource efficiency[44] **In the area of municipal recycling:** Recycling rate in municipalities Attitude change to waste recycling	Recycling rules and laws are described in section 2.2. While nation-wide data on recycling is not available, it is accessible at the level of municipalities[45] . This data is collected under some initiatives, e.g. Swachh Sarvekshan.	IPCB – particularly in the area of licencing and authorisation, instructions for good practices along the supply chain BIS – information of standards/guidelines for use of secondary materials Additional surveys. For example, Swachh Sarvekshan, commissioned by Ministry of Urban Development and carried out by Quality Council of India, is an extensive survey across hundreds of cities (500 in 2017)[46] to monitor Swachh Bharat Abhiyan. Among the six parameters, three can be used as indicators for 12.5.2: Municipal solid waste, sweeping, collection and transportation Municipal solid waste, processing and disposal of solid waste Information, education and communication, and behavioural change

44 Including mechanisms to make it more expensive to use virgin resources if alternative recovered resource of comparable quality exist, e. g. access (physical and financial) to recovered mineral and metals (construction, electronics, manufacturing), nutrients (municipal, agriculture processes) water (industrial and municipal processes), etc.
45 http://home.iitk.ac.in/~anubha/H13.pdf
46 http://swachhbharaturban.gov.in/writereaddata/Statewise_status_of_implementation.pdf

Target 12.6: Encourage companies, especially large and transnational companies, to adopt sustainable practices and integrate sustainability information into their reporting cycle

Selected indicator - 12.6.1: Proportion of companies publishing sustainability reports.

Identifying complementary elements

The target already deals with the reporting processes which are to share sustainability achievements of companies. Voluntary sustainability reports would be usefully complemented by CSR reporting keeping in mind that CSR spending is compulsory for a particular group of companies. Offering additional 'facilitating' indicators could lead to the uptake of SCP practices by the private sector –indicators that prompt adoption of more environmentally sound technologies and practices related to product design, resource efficiency and waste management. Inducting SCP-attentive SMEs into supply chains will also be useful. Such initiatives are already being recognized by rating agencies, through resource efficiency competitions and support for innovative start-ups.

Target 12.6 - Suggested indicators	Critical processes already in place	Potential data holders/source
Number of producers participating in EPR schemes Number of companies reporting on sustainability issues under the National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business scheme of the MCA Number of companies, members of international sustainability initiatives under Global Compact, ISO 26000, etc. Number of initiatives in the private sector related to resource and energy efficiency Number of companies, encouraging their suppliers to adopt SCP practices Number of product categories covered by eco-labelling schemes/ volume & value of eco-labelled products independently verified Number of companies in different sectors certified by rating agencie	The Securities and Exchange Board of India (SEBI) requires listed large companies to submit Business Responsibility Reports. The National Voluntary Guidelines on Social, Environmental and Economic Responsibilities of Business (MCA) provide guidance for reporting by all types and sizes of companies. A number of companies are already reporting under the GRI Framework CSR reports are being submitted to the Ministry of Corporate Affairs. There are a number of rating schemes that provide certification to companies exceling in sustainability. There is a notable number of schemes encouraging clean tech innovations and start-ups.	For rating aspects, in the area of construction, there are several schemes dealing with certification: EDGE- Excellence in Design for Greater Efficiencies LEED GRIHA- Green Rating for Integrated Habitat IGBC- Indian Green Building Council PACS-BMTPC For CSR – Corporate Affairs (the reporting format might need to be modified to enable recognition of environmental, social and developmental issues) Sustainability reporting - MCA MoEF&CC FICCI

Some of the larger companies subscribe to internal private sector initiatives dealing with SCP and CSR (that have elements related to environmental and social governance). Capturing their number and role in the SCP area would be an important indicator.

Target 12.7: Promote public procurement practices that are sustainable, in accordance with national policies and priorities

Selected indicator - 12.7.1: Green public procurement policy developed and adopted by the Central Ministries/States/UTs (Numbers)

Identifying complementary elements

The Goal 12.7 deals not only with sustainable procurement policies (SPP) – the aspect that is already reflected by the indicator 12.7.1 – but also with elements of the system that put this policy into practice. Suggested indicators allow support to the system of implementation of the SPP as well as monitoring of results. It also suggests a number of impact indicators, e.g. volume of sustainability procurement that come under ongoing schemes.

Target 12.7 - Suggested indicators	Critical processes already in place	Potential data holders/source
In the area of support of SPP implementation Existence of coordination mechanisms in the form of SPP working groups at the national level Number of cities/states that adopted SPP policies and integrated them into their planning processes Adoption of the guiding documents for introduction of sustainability principles into public procurement practices and tendering processes **Identifying results (impact) of implementation of SPP** Value and volume of products and services procured under the SPP in relation to the overall value and volume of procurement Value and volume of products and services procured from MSME sector in relation to the overall value and volume of procurement Value and volume of products and services procured from clean tech innovators in relation to the overall value and volume of procurement, e.g. number of products in the list of ECO Mark Scheme, number of standards with eco-criteria and number of companies with ECO Mark Licences (currently 52)[47] Value and volume of procured eco-labelled products in relation to overall value and volume of procurement	India established an SPP Working Group in April 2018. At the moment, the group focuses on a number of product groups and criteria defining their 'sustainable' character. At the next stage it will focus on procedures for including them into procurement practices. The MoEFCC's Eco-labelling scheme is in place. Yet, due to its limited effectiveness, a Working Group has been established to formulate new strategies for eco-labelling. Recommendations from NITI Aayog [48] to set up certification and eco-labelling with emphasis on resource efficiency.	Practices of developing SPP are reflected by the Ministry of Finance; NITI Aayog Calls for Vendors and de facto procurement actions are already reflected in the databases of the Ministry of Finance Collection of official data on specific products and services (procured on the bases of sustainability criteria) would be possible if some relatively simple modifications would need to be made in the format of the procurement databases, e.g. introducing fields indicating presence or absence of specific desired characteristic of a particular product or service

47 http://www.bis.org.in/cert/prod_cert_scheme.asp; http://cpcb.nic.in/ecomark-criteria
48 http://www.niti.gov.in/writereaddata/files/document_publication/StrategyOnResouceEfficiency_0.pdf

Target 12.8: By 2030, ensure that people everywhere have the relevant information and awareness for sustainable development and lifestyles in harmony with nature

Selected indicators
12.8.1: Developing icon on sustainable development
12.8.2: Government to celebrate Year on Sustainable Development

Identifying complementary elements

Information will have relatively small impact if it is not linked to capability of people/organisations to interpret it and act upon it. To develop such capability, the target has to include educational aspects in relation to SCP in formal and non-formal education and in training activities in all sectors. Training and skills development on resource efficiency, waste management and other aspects of SCP are under the purview of different authorities. For instance, recycling and waste management happens (or are expected to happen) at the level of municipalities, capacity development of government is done by the IPCB or the Ministry of Urban development, Corporate Affairs deals with capacity of MSMEs. Suggested indicators could address progress achieved by these stakeholders. One critical consideration is availability of information/resources in regional languages.

In addition, an important benchmark for providing relevant information along the supply chain of products and services is the existence of a reliable business-to-business and business-to-final consumer information system through labelling and (product) declarations (could have synergy with Goal 12.7). A number of such schemes and their uptake would be interesting to monitor.

While there are a number of ongoing programmes supporting SCP-related entrepreneurship and innovations, there are no information centres where companies, especially MSMEs, can find a range of instructions/information on the good practices, technological developments and financial schemes that can assist innovation at the level of enterprises. Monitoring of potential 'one-stop-shops' of information for MSMEs can constitute an important indicator.

Target 12.8 - Suggested indicators	Critical processes already in place	Potential data holders/source
Presence of materials providing overall guidance for including SCP-related modules in skills development, training and education in high priority areas Number of training events on SCP-related issues done by municipalities Number of training events on SCP-related issues done for MSMEs Number of training events for skills development that include aspects of SCP Number of specialists with SCP-related skills Budget allocated for development of SCP-related curriculum Number of materials (manuals, good practices) on SCP in local languages. Number of educational programmes/teachers who undergo training in education for sustainable development Number of Technical or Administrative Training Institutes designated as hubs for SCP capacity development (in high priority areas) Number of Centres of Excellence/Innovation created for the purpose of training in SCP (in high priority areas) Investment in new technology development and research for resource-efficient and clean production systems Sale of products under environmental labels Number of information centres (one-stop-shops) for MSMEs on SCP, resource efficiency, environmental technologies	There are a number of training events conducted in the area of SCP. Progress in education at the municipal level is already being assessed. Among the indicators of the Swachh Sarvekshan, commissioned by the Ministry of Urban Development and carried out by Quality Council of India, are Information, Education and Communication, and Behavioural Change. Data was collected and progress assessed in 2017, in 500 cities of India. Skills development is a critical aspect for development of India's aspirations. With massive efforts in skilling, it would be useful to tap into the data collection process of the Ministry of Skill Development and Entrepreneurship and its database, known as the Labour Market Information System (LMIS) https://www.msde.gov.in/nationalskillmission.html. The LMIS is a matching portal for skills demand and supply. It will serve as a platform for monitoring the performance of existing skills development programmes (at the state level). The database might be used (with some modification as required) for collecting information on SCP-related training events. Alternatively, budget allocated for development of specific skills in SCP can serve as a measure of progress.	Ministry of Urban Affairs Ministry of Corporate Affairs Ministry of Urban Development Quality Council of India surveys Ministry of Skills Development and Entrepreneurship - the Labour Market Information System (LMIS)

Target 12.A: Support developing countries to strengthen their scientific and technological capacity to move towards more sustainable patterns of consumption and production

Selected indicator - 12.A.1: Amount of support to developing countries on research and development for sustainable consumption and production and environmentally sound technologies

Identifying complementary elements

The indicator 12.A.1 points at the need to provide support for R&D for SCP and appropriate

Target 12.A - Suggested indicators	Critical processes already in place	Potential data holders/ source
Spending on programmes on scientific and technological development towards SCP (or presence of SCP principles in the national research and technology development programme/s) Amount of investment specifically targeting clean technologies, resource-efficient practices/processes, recycling of materials Number (and scale) of competitions promoting companies, especially SMEs, that bring clean technologies to the market Number (and scale) or platforms supporting R&D between Indian and international partners (assessed in terms of – number of members/investment support)	Strategy on Resource Efficiency of NITI Aayog[49] specifically calls for "R&D related to waste management and there is a need to further enhance funding for RE and Secondary Raw Materials (SRM) related R&D." A number of clean tech programmes, and programmes supporting environmental entrepreneurships - i.e. start-ups and accelerators already exist	MoF

49 http://niti.gov.in/content/strategy-resource-efficiency - Niti.gov.in

technologies. We suggest some sub-indicators that will make the selected indicator more relevant. One factor to consider is aspects related to funding of:

- Technological development relevant to SCP
- Programmes supporting launch of SCP-related technologies and innovative practices on the market
- Programmes facilitating international research and innovation

Target 12.B: Develop and implement tools to monitor sustainable development impacts for sustainable tourism that creates jobs and promotes local culture and products

Selected indicator - 12.B.1: Number of sustainable tourism strategies or policies and action plans implemented with agreed upon monitoring and evaluation tools

One aspect worth considering is business-to-business platforms that bring together R&D practitioners from India and abroad. The practice of selling ready-made technologies to India has limited potential. Yet, collective development, accompanied by support to reach domestic markets can improve uptake of appropriate technologies.

Identifying complementary elements

Tourism is recognised internationally regionally and nationally as being capable of contributing to economic growth, providing employment and livelihood. Yet, with the industry frequently dominated by large operators, including hotels and transportation companies, there is a risk of increase in materials and energy consumption, destruction

Target 12.B - Suggested indicators	Critical processes already in place	Potential data holders/source
The number of destinations participating in heritage tourism and sustainable tourism initiatives The number of destinations participating in rural tourism initiatives The number of destinations participating in the Incredible India programme The number of destinations participating in sustainable tourism schemes The number of schemes (and the number of participants/enterprises related to these schemes) with the focus (partial or total) on resource efficiency/employment in the tourism sector; the percentage of tourists participating in eco-tourism activities/cultural tours Existence of financing schemes for tourism enterprises and other stakeholders Availability of guides/manuals for resource efficiency in tourism sector The number of training programmes on resource efficiency in the tourism sector (allocated budget/number of people trained)	Programmes like Incredible India	Ministry of Tourism MoET As per the Indian Constitution, "issues of land, transport, hotels, industry, law and order and the development of tourism infrastructure are handled by the State Governments/ Union Territory Administrations." These would be sources of data too.

of cultural assets and uneven distribution of economic benefits. Focus on community/cultural/ environmental tourism steers tourism development strategy towards practices which are (potentially) more just through empowering different and smaller stakeholders.

Community engagement with productive tourism practices (which thus support the livelihoods of entire communities) in the context of India could be through heritage tourism and sustainable tourism – and that calls for indicators related to the number of heritage/cultural tourism programmes.

The Government of India recognises the potential of tourism to provide sustainable livelihoods in a high population scenario. The 'Incredible India' brand intends to attract tourists to rural communities (going beyond city and heritage tourism). Relevant indicators would relate to the growing number of special tourism programmes and the number of destinations participating in such programmes.

From the resource efficiency perspective, the tourism sector would need to put into account efficiency in water, materials (including food) and energy consumption, and emissions, waste and waste water management, which calls for indicators related to the efficiency of sectoral operations. While it might be challenging to immediately obtain data related to sectoral performance, indicators can monitor emergence of the supportive framework by paying attention to availability of instructive materials and capacity development activity.

Target 12.C: Rationalse inefficient fossil-fuel subsidies that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out harmful subsidies taking into account the specific needs and conditions of developing countries and minimising the possibility of adverse impacts on development in a manner that protects the poor.

Selected indicator - 12.C.1: Quantum of fossil-fuel subsidies per unit of GDP (production and consumption) and as a proportion of total national expenditure on fossil fuels

Identifying complementary elements

An additional area of focus would be assessment of fossil fuel consumption by the identified sectors

Target 12.C - Suggested indicators	Critical processes already in place	Potential data holders/source
Fossil fuel consumption by the sectors, e.g. construction sector[50]		Data available on primary energy consumption across sectors including transport, agriculture, power generation, industry, mining and quarrying, resellers/ retail, miscellaneous services

50 Including investment portfolios designed to phase out fossil use and release other locked capital from brown infrastructure such as land-fill based waste management systems, real-estate etc.

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