

**BRIEFING PAPER**

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# Addressing Food Loss & Waste for a Sustainable Agriculture Value Chain in India<sup>1</sup>

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## 1. Introduction

According to the Food and Agriculture Organization (FAO), *food waste* is defined as wastage occurring at the retail and consumption levels; and *food loss* along the food supply chain from harvest up to, but not including retail. A 2013 FAO report observes that volumes of wasted food are higher in downstream phases of the food chain (consumption phase) in high-income countries. Whereas in low-income countries, food loss is higher in upstream phases (production, handling, storage and processing)<sup>3</sup>. Precise causes of food loss in the handling and storage stage include infrastructural limitations<sup>4</sup>, over-production, timing of harvesting, method of harvesting amongst others. Causes of food loss in low-income countries are mainly linked to financial, managerial and technical limitations in harvesting techniques, storage and cooling facilities, infrastructure, packaging and marketing systems. Food waste in medium/high-income countries relate mainly to consumer behaviour as well as to a lack of coordination between the various actors in the supply chain<sup>5</sup>.

The per capita availability of fruits and vegetables in

India is low and post-harvest losses are high<sup>6</sup>. According to a report Food and Nutrition Security Analysis, 2019 released by the Ministry of Statistics and Programme Implementation (MoSPI), Government of India and the World Food Programme (WFP)<sup>7</sup>, although there has been considerable increase in production of rice, wheat and other cereals, their per capita net availability has not increased due to food loss and wastage, among other reasons.

This paper advocates for greater attention to food loss and waste as an important component of sustainable agriculture in India. Food loss and waste (FL&W) is embedded into Sustainable Development Goals as a specific component of sustainable consumption and production (SDG target 12.3). The paper provides an overview of role played by public and private sector actors on this topic in India and recommends exploring stakeholder collaboration to address FL&W red-flags in specific value chains. In conclusion, the paper suggests using principles of circular economy to set food loss and waste targets, act on them and monitor progress – to meet the aspirations of SDG 12.3 in India.

<sup>3</sup>The State of Food and Agriculture (2019). <http://www.fao.org/3/ca6030en/ca6030en.pdf>

<sup>4</sup><http://www.fao.org/3/i3347e/i3347e.pdf>

<sup>5</sup>Ishangulyyev, R., Kim, S., & Lee, S. H. (2019). Understanding food loss and waste—Why are we losing and wasting food?. *Foods*, 8(8), 297.

<sup>6</sup>Grotto, F., Alibardi, L., & Cossu, R. (2015). Food waste generation and industrial uses: a review. *Waste management*, 45, 32-41

<sup>7</sup><https://www.forbesindia.com/blog/technology/how-to-turn-indias-food-waste-problem-into-opportunity/>

<sup>8</sup><http://www.indiaenvironmentportal.org.in/files/file/Food%20and%20Nutrition%20Security%20Analysis.pdf>

## 2. Food Loss & Waste and Sustainable Agriculture in India

A review of the agriculture scenario in India today clearly highlights the legacy of the green revolution as a dominant factor, even after 60 years. The emphasis continues to be on boosting production, rather than ensuring that the produce is well stored or processed and finds the right price in the market thereby reaching consumers in time without difficulties. As has been suggested by various scholars and practitioners, there is a need for fundamental reforms to help transition the sector to achieve sustainable and broadly distributed agricultural growth that will add to India's GDP, increase export earnings, help conserve increasingly scarce resources of land and water, and enable orderly movement out of agriculture and into other productive sectors (Gulati *et al*, 2019). Four areas are to be prioritised to evolve sustainable agriculture and food value chains in India<sup>8</sup>:

- focus of agricultural policies must shift from production *per se* to farmers' livelihoods and welfare
- policies to improve the allocation and efficiency of land and water are essential for natural resource conservation
- reforms are needed to help farmers cope with the growing risks of weather and price volatility
- agricultural markets must be opened to greater and fair competition and provided with right infrastructure, for better returns to farmers and nutritional security of the marginalised

An overhaul of the construct of agriculture markets as has recently been initiated by the Government of India, needs to be accompanied with considerations of the choice of agricultural practices and systems, in order to promote a holistic model of sustainable agriculture in India leading to benefits especially for the farming communities. It is clear that planning and practice of agriculture cannot be driven by the usual imperative of boosting production and building a strong buffer stock only. Rather such plans should consider other important contemporary 'needs', e.g., preserving resources needed for farming; helping farmers reduce post-harvest losses through appropriate techniques; investment in processing facilities<sup>9</sup> near production areas; easy access to government welfare schemes and extension programmes; and assurance of the right price for their produce. Meeting the needs of the farming community is fundamental to build a stronger foundation of sustainable agriculture in our country.

The importance of post-harvest food loss management/reduction as defined above is not only central to sustainable agriculture – but aligned with the concept of sustainable consumption and production, as defined by the Sustainable Development Goal (SDG) 12. SDG target 12.3 specifies, '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'.<sup>10</sup> National indicators for SDG12.3 have been developed in India under the national indicators framework, though with a limited focus on stocks of rice and wheat<sup>11</sup>. A stronger set of indicators to measure food loss across important food crops would help better monitor and report progress towards reducing food loss and waste in India.

Two comprehensive food loss studies have been done so far in India under the aegis of the Indian Council of Agricultural Research. A 2005 study done under the All India Coordinated Research Project on Post Harvest Technology and the Indian Agricultural Statistics Research Institute (IASRI) covering 46 crops. And a 2013-14 study done by Central Institute of Post-Harvest Engineering and Technology (CIPHET) and IASRI covering 45 crops. Magnitude of food loss has been quantified for various crops and other agricultural commodities, as presented in the below table<sup>12</sup>. Food loss at farm level operations involve harvesting, collection, sorting, grading, drying, packaging and transportation. While food loss in storage channel include storage at farm level and go-down/cold storage, wholesaler, retailer and processing unit. A number of more recent studies have been conducted with limited geographical and crop coverage. However, there is a fair amount of discrepancy across these studies vis-à-vis food loss data, mostly likely due to differences in defining food loss and the metrics/methodology used in assessing food loss. According to one estimate (Jha *et al* <sup>13</sup>), the economic cost of post-harvest losses in India annually is over INR 900 billion.

Experts and scholars have repeatedly highlighted the need for accurate and adequate data to understand the magnitude of food loss and to design appropriate policies to curtail food loss. Further, there is a need to adopt commodity specific approaches as food loss occurs at different stages in different value chains.

<sup>8</sup> [https://casi.sas.upenn.edu/sites/default/files/research/REFORMING%20INDIAN%20AGRICULTURE%20-%20CASI%20WP%20-%20Gulati%2C%20Kapur%2C%20Bouton\\_0.pdf](https://casi.sas.upenn.edu/sites/default/files/research/REFORMING%20INDIAN%20AGRICULTURE%20-%20CASI%20WP%20-%20Gulati%2C%20Kapur%2C%20Bouton_0.pdf)

<sup>9</sup> Overall food processing in India was only 47 percent in 2017-18. Comparatively the share for other developing countries such as Brazil (70 percent), Malaysia (80 percent) and Philippines (78 percent) is much higher (Reserve Bank of India, 2020)

<sup>10</sup> <https://sdgs.un.org/goals/goal12>

<sup>11</sup> <http://mospi.nic.in/sites/default/files/National%20Indicator%20Framework%20for%20circulation.pdf>

<sup>12</sup> <https://thewire.in/agriculture/india-agricultural-produce-wasted> (Article written by Siraj Hussain and published by The Wire, 1st January 2021)

<sup>13</sup> World Resources Institute India (2021), 'Working Paper: Food Loss and Waste in India: The Knowns and the Unknowns'



**Table 1: Magnitude of Food Loss (commodity-wise), CIPHET Studies**

| S. No. | Commodity    | 2012-13                 |                         | 2005-07    |            |
|--------|--------------|-------------------------|-------------------------|------------|------------|
|        |              | Loss in Farm Operations | Loss in Storage Channel | Total Loss | Total Loss |
| 1.     | Wheat        | 4.07                    | 0.86                    | 4.93       | 5.93       |
| 2.     | Paddy        | 4.67                    | 0.86                    | 5.53       | 5.19       |
| 3.     | Potato       | 6.54                    | 0.78                    | 7.32       | 8.99       |
| 4.     | Soybean      | 8.95                    | 1                       | 0.96       | 6.26       |
| 5.     | Tomato       | 9.41                    | 3.03                    | 12.44      | 12.47      |
| 6.     | Mango        | 6.92                    | 2.24                    | 9.16       | 12.74      |
| 7.     | Apple        | 9.08                    | 1.31                    | 10.39      | 12.26      |
| 8.     | Eggs         | 4.88                    | 2.31                    | 7.19       | 6.55       |
| 9.     | Inland Fish  | 4.18                    | 1.05                    | 5.23       | 6.92       |
| 10.    | Poultry meat | 2.74                    | 4                       | 6.74       | 3.65       |
| 11.    | Milk         | 0.71                    | 0.21                    | 0.92       | 0.77       |

### 3. Initiatives to address Food Loss and Waste

The problem of food loss and waste continue to stifle benefits to the farming community, in spite of several initiatives implemented by public agencies and the private sector in India. An overview of some of these initiatives have been presented in the table below. Further, the table below also presents some international (country specific) initiatives, which could provide valuable lessons.

**Table 2: Overview of Various Initiatives on FL&W**

| Types of Initiatives | Initiatives  | Details  |
|----------------------|--|--|
| Public               | Model Food Processing Policy, Ministry of Food Processing Industries <sup>14</sup> (MoFPI) | Emphasises the importance of reducing waste by: <ul style="list-style-type: none"> <li>Increasing value-addition</li> <li>Ensuring better prices for farmers while ensuring availability of affordable and quality produce to consumers</li> <li>Realising the sector's enormous potential in creating benefits to the economy by improved use of agricultural produce</li> <li>Minimising post-harvest losses and creating employment opportunities</li> </ul>  |
|                      | Creation/Expansion of Food Processing & Preservation Capacities (CEFPPC) scheme, MoFPI     | The main objective of this Scheme is creation of processing and preservation capacities and modernisation/expansion of existing food processing units with a view to increasing the level of processing, value addition leading to reduction of wastage  |
|                      | Various initiatives of the Food Standards Safety Association of India (FSSAI)              | <ul style="list-style-type: none"> <li><i>Food Safety and Standards (Recovery and Distribution of Surplus Foods) Regulations (2019)</i> specify the responsibility of food donor and surplus food distribution organisations engaged in distributing surplus food<sup>16</sup></li> <li>The Indian Food Sharing Alliance, (IFSA) is a social initiative by the Food Safety and Standards Authority of India (FSSAI) to help solve India's food waste and hunger crisis by integrating various partner organizations, Food Recovery Agencies and NGOs<sup>17</sup></li> </ul> |

<sup>14</sup> <https://mofpi.nic.in/sites/default/files/sejda-52v.pdf>

<sup>15</sup> <https://mofpi.nic.in/Schemes/about-cefppc-scheme>

<sup>16</sup> [https://www.fssai.gov.in/upload/uploadfiles/files/Gazette\\_Notification\\_Surplus\\_Food\\_06\\_08\\_2019.pdf](https://www.fssai.gov.in/upload/uploadfiles/files/Gazette_Notification_Surplus_Food_06_08_2019.pdf)

<sup>17</sup> [https://sharefood.fssai.gov.in/what\\_ifsa.html](https://sharefood.fssai.gov.in/what_ifsa.html)

| Types of Initiatives | Initiatives   | Details   |
|----------------------|---|---|
|                      |   | <ul style="list-style-type: none"> <li>FSSAI has embarked on a large-scale effort to transform the country's food system in order to ensure safe, healthy and sustainable food for all Indians through the 'Eat Right India'. Eat Right India adopts a judicious mix of regulatory, capacity building, collaborative and empowerment approaches to ensure that our food is good both for the people and the planet<sup>18</sup></li> </ul>  |
|                      | Under the <i>Make in India</i> initiative <sup>19</sup> , six schemes have been adopted to reduce wastage and benefit farmers | <ul style="list-style-type: none"> <li>Mega Food Parks</li> <li>Cold Chain, Value Chain &amp; Preservation infrastructure</li> <li>Creation of Food Processing &amp; Preservation Capacities</li> <li>Creation of Backward &amp; Forward Linkages</li> <li>Food Safety and Quality Assurance</li> <li>Agro-processing Cluster</li> </ul>  |
|                      | Digital Interventions by the Ministry of Agriculture and Farmers' Welfare   | <ul style="list-style-type: none"> <li>Development of <i>Kisan Rath</i><sup>20</sup> app to facilitate transportation for farmers and traders for the movement of their produce, can potentially help reduce transit losses.</li> </ul>   |
|                      | Storage and handling-level interventions by the Ministry of Consumer Affairs, Food & Public Distribution                      | <ul style="list-style-type: none"> <li>A target for the construction of 100 LMT steel silos was set by the Government in 2015, on PPP basis. Out of this about 2LMT has been developed so far and another 20 LMT is being operationalized. Storage in steel silos would reduce theft, pilferage and transportation losses as compared to storage in conventional warehouses<sup>21</sup></li> </ul>   |
|                      | Ministry of Environment, Forest & Climate Change  | <ul style="list-style-type: none"> <li>India Cooling Action Plan (ICAP)<sup>22</sup> was launched in 2019 with the long-term vision to address the cooling requirement across sectors and help reduce the cooling demand. One of the objectives of this initiative is to provide better cold chain infrastructure to farmers, less wastage and better value of their produce.</li> </ul>  |
|                      |   |   |
| Private              | Sustainability initiatives by Agri-food MNCs and Indian businesses  | <ul style="list-style-type: none"> <li>Businesses have made commitments on various sustainability/SDGs targets for example - food security, nutrition, reduction of food waste, etc. Their implementation on the ground involves collaboration with producers and other value chain actors</li> <li>Collaborative approaches/models like <i>food banks</i> which involves businesses, recovery agencies, local communities, CBOs, etc. are being explored</li> <li>The India Cooling Action Plan (ICAP)<sup>23</sup> provides scope for private and public sector organisations to work together in providing energy efficient cooling solutions for agri-produce in transportation, cold chain and storage.</li> </ul> |
|                      | Sustainable business models   | <ul style="list-style-type: none"> <li>Converting post-consumer waste into manure is being done by several social enterprises across India</li> <li>Collecting surplus food from restaurants and other sources and distributing to less fortunate sections of society in cities, has proven to be extremely effective in some cases</li> </ul>  |

<sup>18</sup><https://eatrightindia.gov.in/eatrightindia.jsp>

<sup>19</sup><http://www.makeinindia.com/six-schemes-adopted-that-would-reduce-waste-benefit-farmers>

<sup>20</sup><https://pib.gov.in/PressReleaseDetail.aspx?PRID=1685570>

<sup>21</sup><https://fci.gov.in/storages.php?view=33>

<sup>22</sup><https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1568328>

<sup>23</sup><https://pib.gov.in/PressReleaseIframePage.aspx?PRID=1568328>

| Types of Initiatives                         | Initiatives  | Details   |
|--|--|---|
|  |  | <ul style="list-style-type: none"> <li>Contract farming - where farmers are supported with technology, capacity building initiatives and good agricultural practices to meet certain set quality and safety standards, has helped reduce food loss</li> <li>Leveraging the FPO model: Given the policy push to FPOs, many organizations are leveraging the FPO model. The benefits of doing so include access to credit-based finance due to collectivization as well as the opportunity to apply a professional approach to farming, including good agricultural practices</li> </ul>  |
|  | Agri-tech driven initiatives   | <ul style="list-style-type: none"> <li>A dynamic agri-tech ecosystem is emerging and facilitating better market linkages for producers, bringing farmers and buyers/consumers together, enabling better input/output side information and opportunities for scaling out/up for producers and/or collectives. Some such solutions also help reduce transit loss especially for perishable farm produce.</li> <li>Food services and facilities management companies have been using tracking tools to measure wastage at any given point of time, thereby help in managing food loss and wastage.</li> </ul>  |
| International (country specific) initiatives | A number of countries have adopted national strategy/policy/actions to reduce food loss and waste, which could provide lessons for India | <ul style="list-style-type: none"> <li><b>Australia:</b> The National Food Waste Strategy (2017) provides a framework to support collective action towards halving Australia's food waste by 2030<sup>24</sup>. A potential driver to address the problem is quantifying the cost associated with food waste, which is estimated at \$20 billion each year.<sup>25</sup></li> <li><b>France:</b> A ban on supermarket food waste has been legislated, whereby retailers have the legal obligation to reduce, reuse, or recycle their extra food<sup>26</sup></li> <li><b>Germany:</b> National Strategy for Food Waste Reduction sets the framework for avoiding/reducing food waste and achieving mindset change in society. It enables better appreciation of the true value of food and resources needed for their production<sup>27</sup>.</li> <li><b>Thailand:</b> The Royal Thai Government in collaboration with FAO initiated a major awareness raising initiative to address food loss and wastage in 2015<sup>28</sup>.</li> <li><b>United Kingdom:</b> The Courtauld<sup>29</sup> Commitment is a voluntary agreement aimed at improving resource efficiency and reducing waste within the UK grocery sector. WRAP is responsible for the agreement and works in partnership with leading retailers, brand owners, manufacturers and suppliers who sign up and support the delivery of the targets.</li> <li><b>United States:</b> In November 2016<sup>30</sup>, the U.S. Department of Agriculture (USDA) and the U.S. Environmental Protection Agency (EPA) announced the formation of the U.S. Food Loss and Waste 2030 Champions group and presented the first set of <i>2030 Champions</i>. This group consists of businesses and organizations that have made a public commitment to reduce food loss and waste in their own operations in the United States by 50 percent by the year 2030</li> </ul> |

<sup>24</sup><https://www.environment.gov.au/system/files/resources/4683826b-5d9f-4e65-9344-a900060915b1/files/national-food-waste-strategy.pdf>

<sup>25</sup>Ibid

<sup>26</sup><https://www.nrdc.org/sites/default/files/france-food-waste-policy-report.pdf>

<sup>27</sup>[https://ec.europa.eu/food/sites/food/files/safety/docs/fw\\_lib\\_fwp-strat\\_national-strategy\\_de\\_eng.pdf](https://ec.europa.eu/food/sites/food/files/safety/docs/fw_lib_fwp-strat_national-strategy_de_eng.pdf)

<sup>28</sup><http://www.fao.org/asiapacific/news/detail-events/en/c/288212/>

<sup>29</sup><https://www.wrap.org.uk/content/what-is-courtauld>

<sup>30</sup><https://www.epa.gov/sustainable-management-food/usa-food-loss-and-waste-2030-champions>

## 4. Role of Various Stakeholders

From the above it is clear that a number of initiatives have been designed by the Government, from developing draft strategy/policy to schemes/initiatives for reducing food loss and wastage. Given the complexity of agricultural value/supply chains, horizontal and vertical coordination/collaboration between public institutions/agencies is an imperative. It is evident that a number of Ministries/government departments have schemes that have implications on food loss and waste – this calls for better inter agency coordination.

Given that nearly 96% of the food is managed through the private sector, collaboration between public and private sector actors will be key to ensure that food loss and wastage are contained within set targets. Government will need to play a key role also as an important procurer of agricultural products in reducing food loss and waste. Various other stakeholders including research organisations, international organisations, NGOs, industry/cluster associations, business support organisations, experts, etc. in the agro-food sector should also accord greater attention to the subject of food loss and waste.

Private sector actors at different levels are taking increasing interest in the subject from large multinationals to SMEs. A number of MNCs operating

in India have made global commitments and set target for reducing food loss and waste, which needs to be implemented in India. This would help these businesses demonstrate their contribution to the



Sustainable Development Goal, specifically SDG12 (sustainable production and consumption) and target 12.3. Private sector contribution to SDGs, is being strongly encouraged by the Government of India – as captured in India's Voluntary National Review of the SDGs (VNR2020)<sup>31</sup>. Further, it is important to adopt a value chain approach to effectively manage food loss and waste.

## 5. The Way Forward

Given the complexity of the topic, multi-stakeholder initiatives at national, state and local levels should be considered to promote collaborative and balanced solutions, good practices, policy engagement/advocacy and performance measurement on SDG 12.3, etc. Such initiatives could consider adopting a **target, measure and act** approach for reducing food loss and waste, as proposed below<sup>32</sup>. Other critical sustainability factors such as gender equality, women's empowerment, smallholder interests, GHG emission reduction, etc. should also be incorporated.

### TARGET:

Government of India should develop more appropriate SDG12.3 indicators (as part of the national framework for SDGs) and an operational framework. Agro-food companies need to set food loss and waste reduction targets aligned with SDG 12.3 and the national indicators.

### MEASURE:

Periodic national survey of food loss and waste covering a wide range of commodities should be undertaken by relevant public agencies/institutions with support from credible private research institutions if needed.

Private sector (agro-food) companies should institutionalise a system to measure food loss and wastage against time-based targets and identify 'hot spots' that need better management.

### ACT:

Government could consider developing a National Food Loss and Waste Reduction Policy, and set an operational plan involving multiple stakeholders. This would involve implementing schemes that have already been created to strengthen storage and related infrastructure including decentralised systems. The implementation of this policy should involve

<sup>31</sup>[https://niti.gov.in/sites/default/files/2020-07/26281VNR\\_2020\\_India\\_Report.pdf](https://niti.gov.in/sites/default/files/2020-07/26281VNR_2020_India_Report.pdf)

<sup>32</sup>[https://www.wrap.org.uk/sites/files/wrap/Report\\_The%20Business%20Case%20for%20Reducing%20Food%20Loss%20and%20Waste.pdf](https://www.wrap.org.uk/sites/files/wrap/Report_The%20Business%20Case%20for%20Reducing%20Food%20Loss%20and%20Waste.pdf)

supporting horizontal (inter-ministerial) and vertical (centre-state-local) coordination among public agencies. Strategies to attract private investment and partnerships should be drawn up and actioned to garner better technical and financial support. As a key procurer, public agencies should endeavour to reduce food loss and waste along the entire value chain (assessment of performance of States should be done through the SDG-Index, NITI Aayog).



Leading agro-food companies should set time-bound food loss and waste reduction targets and adopt strategies to meet them. In the following section a framework based on *principles of circular economy* has been suggested to help businesses. Private sector will have to cooperate with government agencies and other key stakeholders to initiate demonstration pilots, and scale them subsequently. Such pilots could be designed and implemented in partnership with cooperatives, FPOs, PRIs, community-based organisations, etc. involving their supply/value chain.

## 6. Application of Circular Economy Principles in addressing FL&W

In order to design effective and impactful interventions to address the problem of food loss and waste, CRB proposes a *framework* (below) that uses principles of circular economy<sup>33</sup>. Engagement of multiple key stakeholders would be critical for effective implementation of any such intervention and monitor its efficacy. Agro-food businesses could consider using this framework:

| Principles of Circular Economy                  | Actions for Reducing Food Loss and Waste   | Measurable Indicator(s) <sup>34</sup>   |
|---|--|---|
| Principle 1: Design Out Waste                   | Application of good agriculture practices to reduce the volume of farm-level losses        | <ul style="list-style-type: none"> <li>Volume of food loss reduced (per unit land area cropped)</li> <li>Number of farmers who are trained on Good Agricultural Practices</li> </ul>  |
|   | Decentralised storage or processing facility closer to production areas                    | <ul style="list-style-type: none"> <li>Number of storage and processing facility per District/Block</li> <li>Distance in kms (for farmers/FPOs)</li> <li>Fees/charges (if any) to access storage facilities</li> <li>Number of FPOs or farmers groups involved</li> <li>Volume of food loss per facility</li> </ul> |
|   | Availability and extent of cold chain infrastructure                                       | <ul style="list-style-type: none"> <li>Number of cold storages per State/District/Block</li> <li>Number of refrigerated vehicles per State/ District/Block</li> </ul>   |
| Principle 2: Keep Products and Materials in Use | Use of post-consumer food (surplus food) to feed marginalized and impoverished populations | <ul style="list-style-type: none"> <li>Households covered per day/year</li> </ul>   |
|   | Use of post-consumer food waste for energy or composting                                   | <ul style="list-style-type: none"> <li>Volume of compost generation (kg/annum)</li> <li>Energy produced per year</li> </ul>   |
| Principle 3: Regenerate Natural Systems         | Reduce/minimize adverse environmental impacts  | <ul style="list-style-type: none"> <li>Pesticide and fertilizer residue built-up (in soil and ground water)</li> <li>GHG emission data</li> </ul>   |

<sup>33</sup><https://www.ellenmacarthurfoundation.org/circular-economy/what-is-the-circular-economy>

<sup>34</sup>Indicators will need to be refined based on the local context and conditions



**Rijit Sengupta**

*Chief Executive Officer, Centre for Responsible Business (CRB)*

p: +91 (11) 41088853 m: +91 - 9829285928

e: [rijit@c4rb.in](mailto:rijit@c4rb.in) | skype: rijit.sengupta

**Nitya Chhiber**

*Programme Officer, Centre for Responsible Business (CRB)*

p: +91 (11) 41088853 m: +91 - 9818113189

e: [nitya@c4rb.in](mailto:nitya@c4rb.in) | skype: nityachhiber