Tackling the 1.6-Billion-Ton Food Loss and Waste Crisis

UNECE-FAO Conference

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TACKLING THE 1.6-BILLION-TON FOOD LOSS AND WASTE CRISIS
Today's talking points

- Food loss and waste forecasted to grow to $1.5 T by 2030
- The private sector has great opportunity to tap into $700 B potential
- We see a $700 billion opportunity from 5 drivers
One third of food produced is lost and wasted

Source: United Nations Food and Agriculture Organization
Food is lost and wasted at each step of the value chain

- Production
  - Early harvesting
  - Inadequate harvesting methods
  - Disease

- Handling & Storage
  - Inadequate environmental control
  - Long transport
  - Spillage and degradation in handling

- Processing & Packaging
  - Accidental spillage
  - Process interruptions
  - Antiquated and wasteful techniques

- Distribution & Retail
  - Inaccurate demand forecast
  - Expiration of products
  - Damage of products

- Consumption
  - Volume promotions
  - Expiration of products
  - Poor meal planning

Source: United Nations Food and Agriculture Organization
Food loss and waste worth over $1.2T with meat, fruit and vegetables as main contributors

Source: FAO Report "Global food losses and food waste" (2011), FAOSTAT database and BCG FLOW Model
Findings for 2015, in 2015 USD
Where in the value chain are the largest food losses and waste, in terms of volume?

A. At the start of the value chain, due to inefficiency in harvesting and initial quality loss
B. During transportation and storage, due to insufficient cold chain infrastructure, especially in developing countries
C. At the processing stage, as processing companies regard utilization above waste
D. At the retail stage, when most produce would not make it to the consumer to maintain fresh products on display
E. At the consumer stage, as we throw out a lot of waste at home
While FLW volumes are highest at ends of value chain, FLW value is highest downstream as unit price increases.

In developed regions, need to act at the "fork" and in developing regions, need to act at the "farm"
Food Loss is a massive problem growing to $1.5 T by 2030.

BCG FLOW* Model: Robust forecast across dimensions

*BCG Food LOss and Waste Model is a proprietary tool for long term forecasting

1. Food types
   - Cereals
   - Fruit and vegetables
   - Meat
   - Fish and seafood
   - Milk and eggs
   - Roots and tubers
   - Oilseeds and pulses

2. Regions
   - Europe and Russia
   - China, Japan and South Korea
   - Latin America
   - North Africa, Western and Central Asia
   - North America and Oceania
   - South and Southeast Asia
   - Sub-Saharan Africa

3. Value chain steps
   - Agricultural production
   - Postharvest storage and handling
   - Processing and packaging
   - Distribution and retail
   - Consumption

4. Time
   - 1990 to 2030

Objectives

- Forecast scale of global food losses and waste in 2030
  - Determine volume (tons) and value (2015 USD)
- Identify major contributors to global FLW in 2030
  - Across regions
  - Across food types
  - Across steps in the value chain

Design Principles

- Compute food losses and waste as food volumes multiplied by loss intensities, after FAO method¹
- Forecast food volumes and loss intensities separately, based on fundamental drivers of each
- Use existing economic and demographic projections² as basis for food loss and waste forecast
- "Business as Usual" (BAU) Scenario: Assume currently-observed trends will continue through the time horizon of the forecast

¹ Report by the Food and Agriculture Organization of the United Nations, "Global food losses and food waste - extent, causes and prevention" (2011)
² World Bank, United Nations, International Monetary Fund (compiled by Oxford Economics)
Value of food losses and waste to hit $1.5T in 2030

Source: BCG FLOW Model
Which region is expected to be the largest contributor to 2.1b tons FLW by 2030?

A. North Africa, Western and Central Asia driven by FLW of cereals
B. China, Japan and S Korea driven by FLW of Fruits and vegetables
C. South and Southeast Asia driven by FLW of Milk and eggs
D. Sub-Saharan Africa driven by FLW of Roots and tubers
Loss and waste of fruits and vegetables in Asia forecast as 625M tons in 2030

<table>
<thead>
<tr>
<th>Food Group</th>
<th>Europe and Russia</th>
<th>North Africa, Western and Central Asia</th>
<th>North America and Oceania</th>
<th>Latin America</th>
<th>China, Japan and South Korea</th>
<th>South and Southeast Asia</th>
<th>Sub-Saharan Africa</th>
</tr>
</thead>
<tbody>
<tr>
<td>Oilseeds and pulses</td>
<td>4</td>
<td>2</td>
<td>6</td>
<td>4</td>
<td>4</td>
<td>35</td>
<td>11</td>
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<tr>
<td>Cereals</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Roots and tubers</td>
<td>48</td>
<td>34</td>
<td>33</td>
<td>28</td>
<td>100</td>
<td>150</td>
<td>33</td>
</tr>
<tr>
<td>Milk and eggs</td>
<td>35</td>
<td>7</td>
<td>13</td>
<td>20</td>
<td>51</td>
<td>75</td>
<td>114</td>
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<tr>
<td>Fish and seafood</td>
<td>1</td>
<td></td>
<td></td>
<td>1</td>
<td>13</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Meat</td>
<td>14</td>
<td>6</td>
<td>12</td>
<td>14</td>
<td>31</td>
<td>15</td>
<td>7</td>
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<tr>
<td>Fruits and vegetables</td>
<td>71</td>
<td>77</td>
<td>31</td>
<td>75</td>
<td>376</td>
<td>247</td>
<td>46</td>
</tr>
</tbody>
</table>

Source: BCG FLOW Model

M tons of FLW in 2030
BAU Scenario
Volume increase mainly driven by developing regions

FLW/capita still highest in developed regions in 2030, BAU scenario

- North America & Oceania: 270 kg/capita (2015: 268 kg/capita, 2030: 277 kg/capita, +2%)
- Latin America: 235 kg/capita (2015: 224 kg/capita, 2030: 248 kg/capita, +22%)
- MENA + Central Asia: 240 kg/capita (2015: 218 kg/capita, 2030: 285 kg/capita, +32%)
- Sub-Saharan Africa: 165 kg/capita (2015: 120 kg/capita, 2030: 230 kg/capita, +40%)
- Europe & Russia: 260 kg/capita (2015: 265 kg/capita, 2030: 255 kg/capita, -3%)
- China, Japan and S Korea: 375 kg/capita (2015: 360 kg/capita, 2030: 515 kg/capita, +70%)
- South & South East Asia: 215 kg/capita (2015: 200 kg/capita, 2030: 300 kg/capita, +27%)

Source: BCG FLOW Model
Upstream improves, but consumption waste increases

<table>
<thead>
<tr>
<th>Supply Chain Step</th>
<th>Increased Food Volume (M tons)</th>
<th>Lower Loss Intensity (M tons) at all steps except consumption</th>
<th>FLW difference 2015-2030F (M tons) BAU Scenario</th>
<th>Total FLW 2030F (M tons) BAU Scenario</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production</td>
<td>230</td>
<td>-50</td>
<td>180</td>
<td>680</td>
</tr>
<tr>
<td>Handling &amp; Storage</td>
<td>200</td>
<td>-150</td>
<td>50</td>
<td>400</td>
</tr>
<tr>
<td>Processing &amp; Packaging</td>
<td>35</td>
<td>-5</td>
<td>30</td>
<td>190</td>
</tr>
<tr>
<td>Distribution &amp; Retail</td>
<td>80</td>
<td>-45</td>
<td>35</td>
<td>235</td>
</tr>
<tr>
<td>Consumption</td>
<td>70</td>
<td>130</td>
<td>200</td>
<td>540</td>
</tr>
</tbody>
</table>

Source: BCG FLOW Model
We see potential impact of $700 B by 2030 from 5 drivers

Source: BCG analysis
5 drivers with potential impact of $700 B

<table>
<thead>
<tr>
<th>Driver</th>
<th>Examples</th>
<th>Estimated impact</th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness</td>
<td>• Consumers lack information on how to minimize food waste</td>
<td>260</td>
</tr>
<tr>
<td></td>
<td>• Excess purchasing encouraged by grocery promotions</td>
<td></td>
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<tr>
<td>Supply Chain Infrastructure</td>
<td>• Cold-chain logistics non-existing in many emerging markets</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Many companies have limited capabilities within recycling/re-purposing</td>
<td>225</td>
</tr>
<tr>
<td>Supply Chain Efficiency</td>
<td>• KPIs not designed to identify and address food loss and waste</td>
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</tr>
<tr>
<td></td>
<td>• Efficiency improvements tend to focus on large levers rather than food loss, where high effort is required and yield is lower</td>
<td>150</td>
</tr>
<tr>
<td>Collaboration</td>
<td>• Lack of collaboration between farmers and food processors</td>
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</tr>
<tr>
<td></td>
<td>• Purchasing contracts and agreements encourage overproduction</td>
<td>120</td>
</tr>
<tr>
<td></td>
<td>• Regulations and standards not put in place to minimize FLW</td>
<td></td>
</tr>
<tr>
<td></td>
<td>• Expiration dates and cosmetic standards are unnecessarily conservative</td>
<td>110</td>
</tr>
</tbody>
</table>

Source: BCG Analysis
Opportunities along entire value chain

- Agriculture
- Restaurants & catering
- Grocery & Retail
- Transport & Logistics
- Food processing
- Bio-chem
- Technology & Infrastructure
- Energy
### Menu of 13 initiatives along 5 drivers

<table>
<thead>
<tr>
<th>Awareness</th>
<th>Production</th>
<th>Handling &amp; Storage</th>
<th>Processing &amp; Packaging</th>
<th>Distribution &amp; Retail</th>
<th>Consumption</th>
</tr>
</thead>
<tbody>
<tr>
<td>Educate farmers</td>
<td>1</td>
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<tr>
<td>Train employees to handle and manage inventory more efficiently and repurpose and recycle food waste</td>
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<tr>
<td>Facilitate recycling/purposing by consumers</td>
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<tr>
<td>Improve and expand cold chain infrastructure</td>
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<tr>
<td>Adapt technologies from large commercial operations to be suitable for smallholder farming</td>
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<tr>
<td>Develop and implement technology to repurpose and recycle food loss and waste</td>
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<tr>
<td>Localize supply chains to reduce time to market and storage</td>
<td>8</td>
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<tr>
<td>Adopt digital, big data, and related tools, metrics, and processes to prevent food loss and waste</td>
<td>9</td>
<td></td>
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<tr>
<td>Collaborate on supply-demand forecasts to adjust production plans</td>
<td>10</td>
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<tr>
<td>Develop new purchasing agreements and models</td>
<td>11</td>
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<tr>
<td>Advocate for regulation and industry alignment on issues such as date labels and cosmetic standards</td>
<td>12</td>
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<tr>
<td>Advocate for regulation that enables food waste donations and increases cost of discarding food</td>
<td>13</td>
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</tbody>
</table>

Source: BCG Analysis
Several conditions need to be met to reduce FLW

Local governments need to support and subsidize key food loss and waste reduction opportunities.

International bodies need to optimize cross border relationship to reduce food loss and waste.

Companies need to concretize their opportunities to lower food loss and waste and take responsibility.

Consumers need to adapt practices to reduce food waste and hyper convenience.

Source: BCG analysis
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