BCG

THE BOSTON CONSULTING GROUP

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

UNECE-FAO Conference

PALAIS DES NATIONS, GENEVA, 13 NOVEMBER 2018

BCG
THE BOSTON CONSULTING GROUP

TACKLING THE 1.6-BILLION-TON FOOD LOSS AND WASTE CRISIS

FOOD NATION
Solutions of tomorrow By Denmark

State of Green
Connect. Inspire. Share. Think Denmark


Esben Hegnsholt

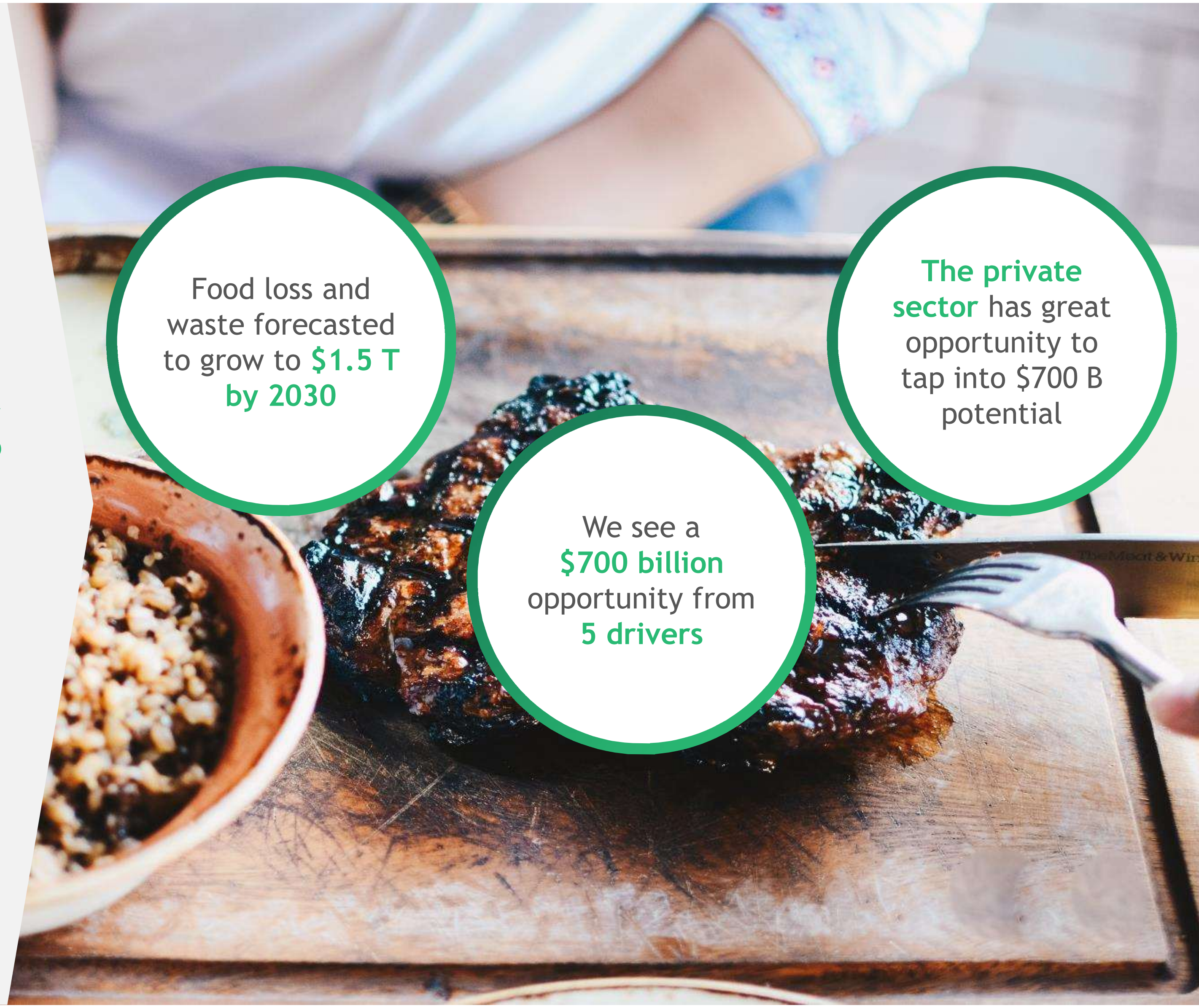

Shalini Unnikrishnan


Matias Pollmann-Larsen


Björg Áskelsdóttir


Marine Gerard

Today's talking points



Food loss and waste forecasted to grow to **$1.5 T by 2030**

We see a **$700 billion** opportunity from **5 drivers**

The private sector has great opportunity to tap into $700 B potential

One third of food produced is lost and wasted

Source: United Nations Food and Agriculture Organization

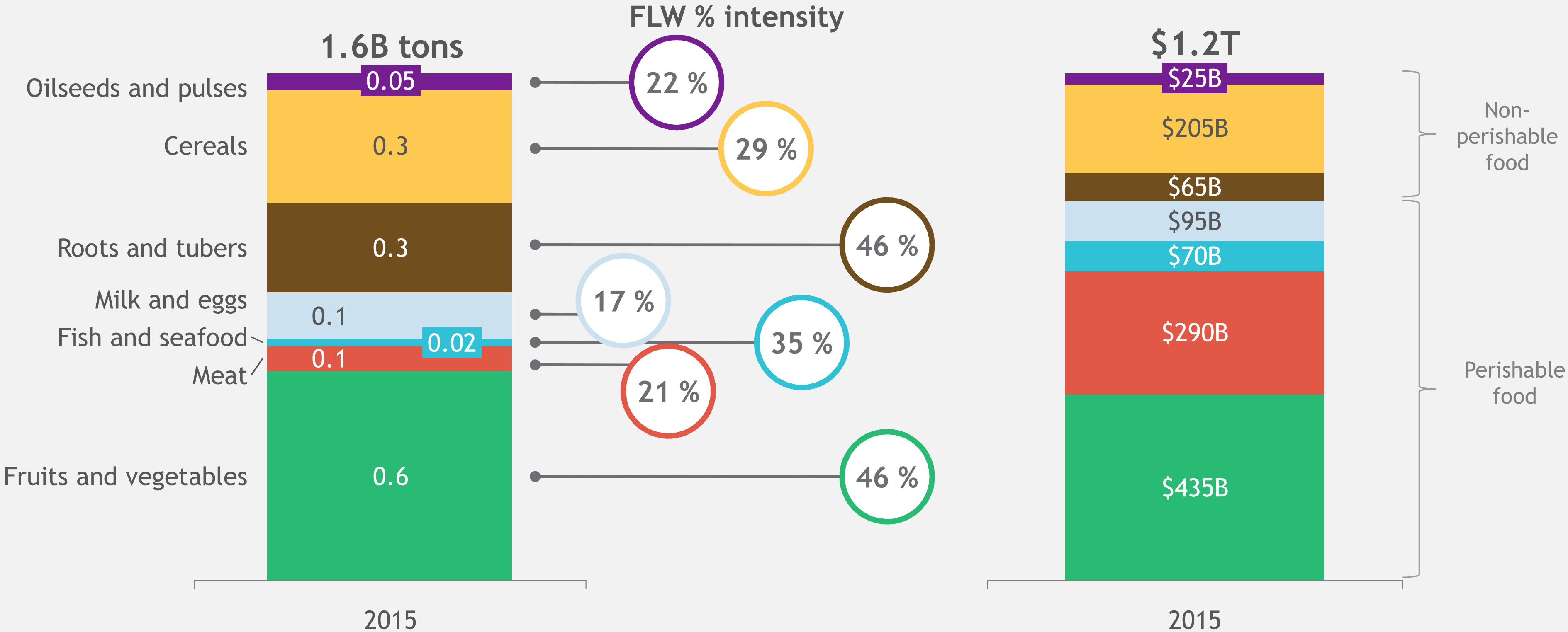
Food is lost and wasted at each step of the value chain

Production	Handling & Storage	Processing & Packaging	Distribution & Retail	Consumption
				
• Early harvesting • Inadequate harvesting methods • Disease	• Inadequate environmental control • Long transport • Spillage and degradation in handling	• Accidental spillage • Process interruptions • Antiquated and wasteful techniques	• Inaccurate demand forecast • Expiration of products • Damage of products	• Volume promotions • Expiration of products • Poor meal planning
Food Losses			Food Waste	

1/3 lost

Source: United Nations Food and Agriculture Organization

Food loss and waste worth over $1.2T with meat, fruit and vegetables as main contributors

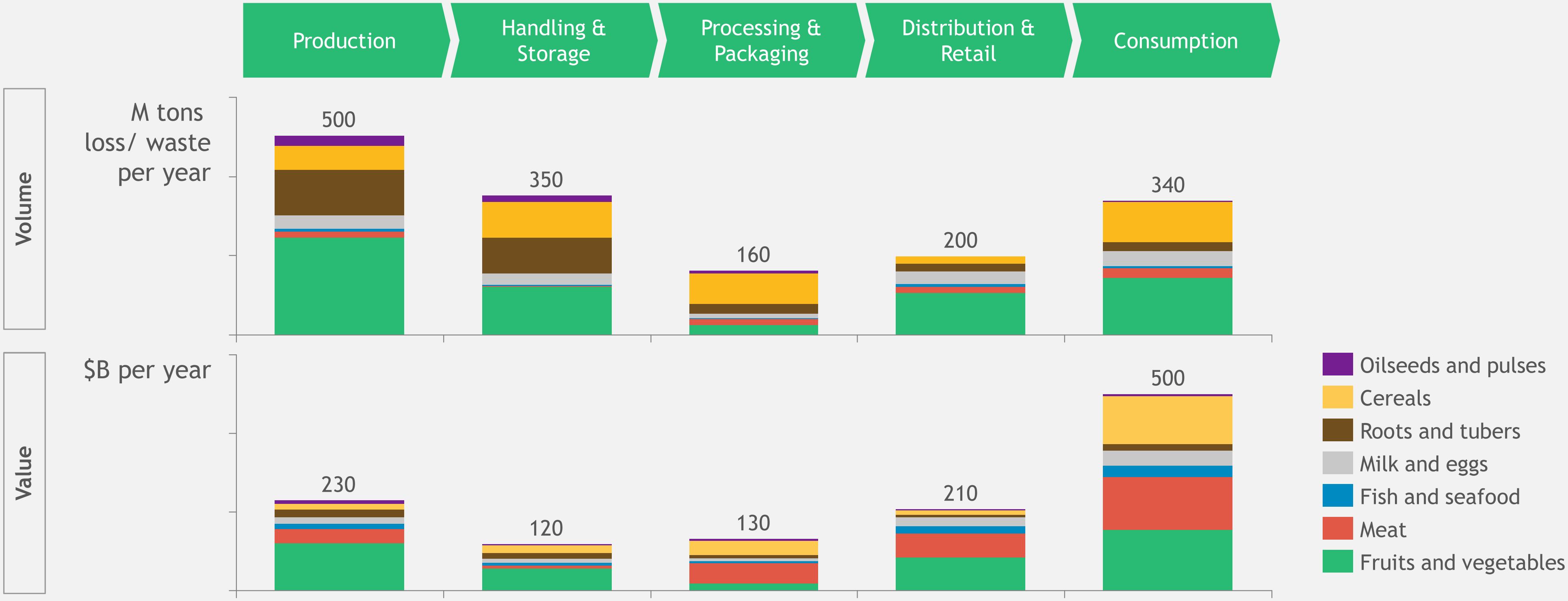


Source: FAO Report "Global food losses and food waste" (2011), FAOSTAT database and BCG FLOW Model Findings for 2015, in 2015 USD

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

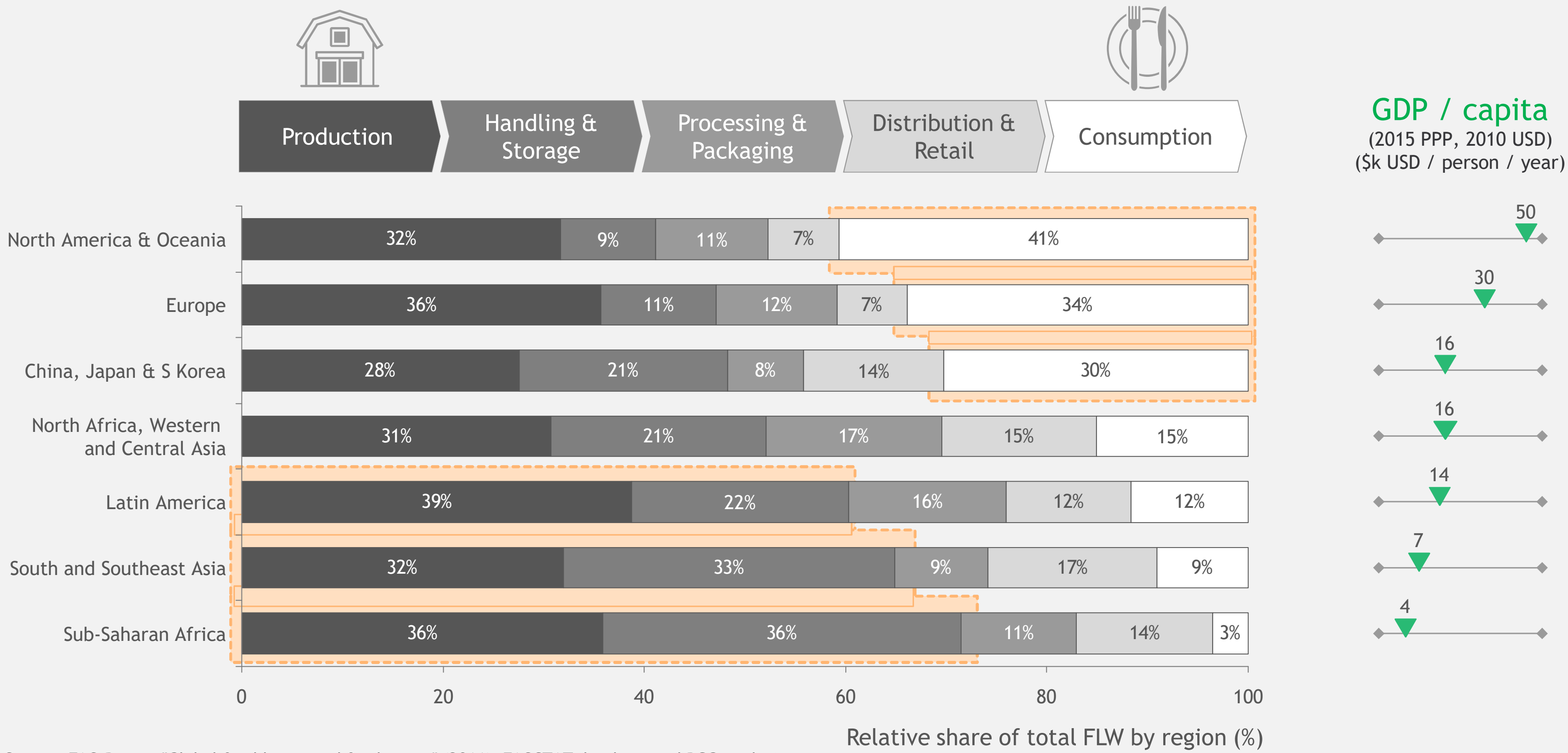
While FLW volumes are highest at ends of value chain, FLW value is highest downstream as unit price increases



Average $/kg:	0.46	0.34	**0.82**	**1.04**	**1.47**

Source: FAO Report "Global food losses and food waste" (2011), FAOSTAT database and BCG FLOW Model. Findings for 2015

In developed regions, need to act at the "fork" and in developing regions, need to act at the "farm"



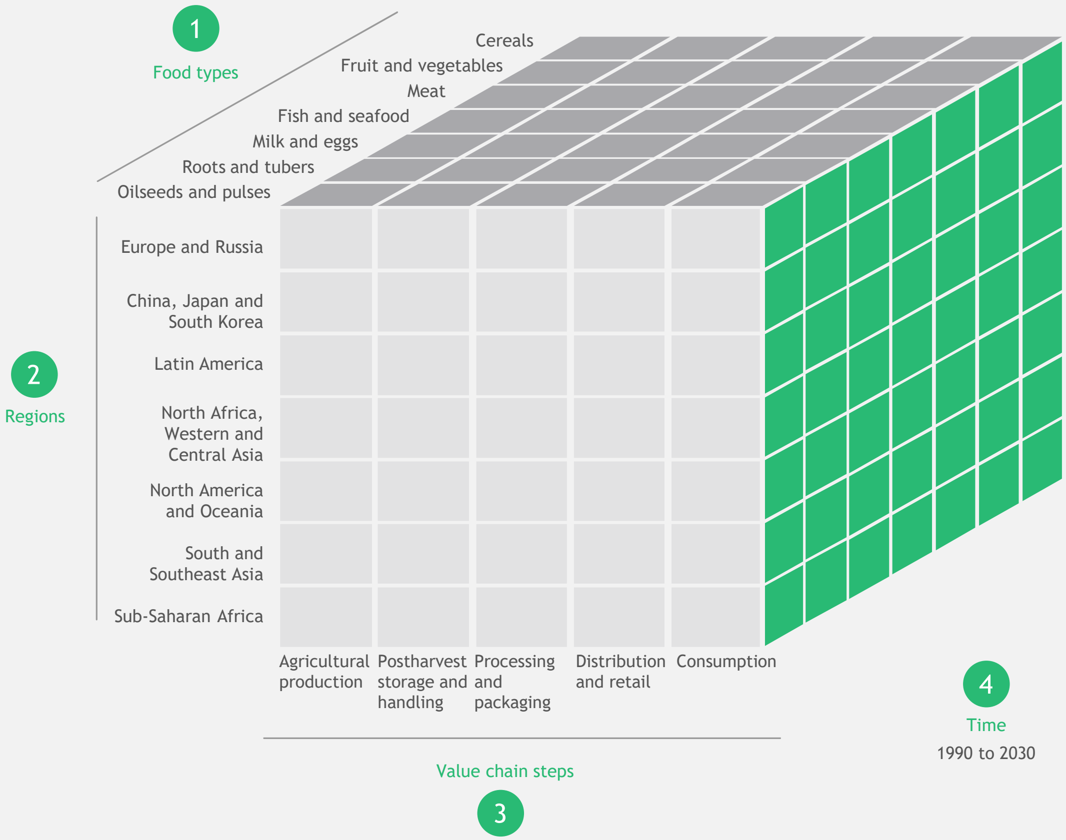
Source: FAO Report "Global food losses and food waste" (2011), FAOSTAT database and BCG analysis

Food Loss is massive problem growing to $1.5 T by 2030

Source: FAO Report "Global food losses and food waste" (2011), FAOSTAT database and BCG FLOW Model.

BCG FLOW* Model: Robust forecast across dimensions

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



Objectives

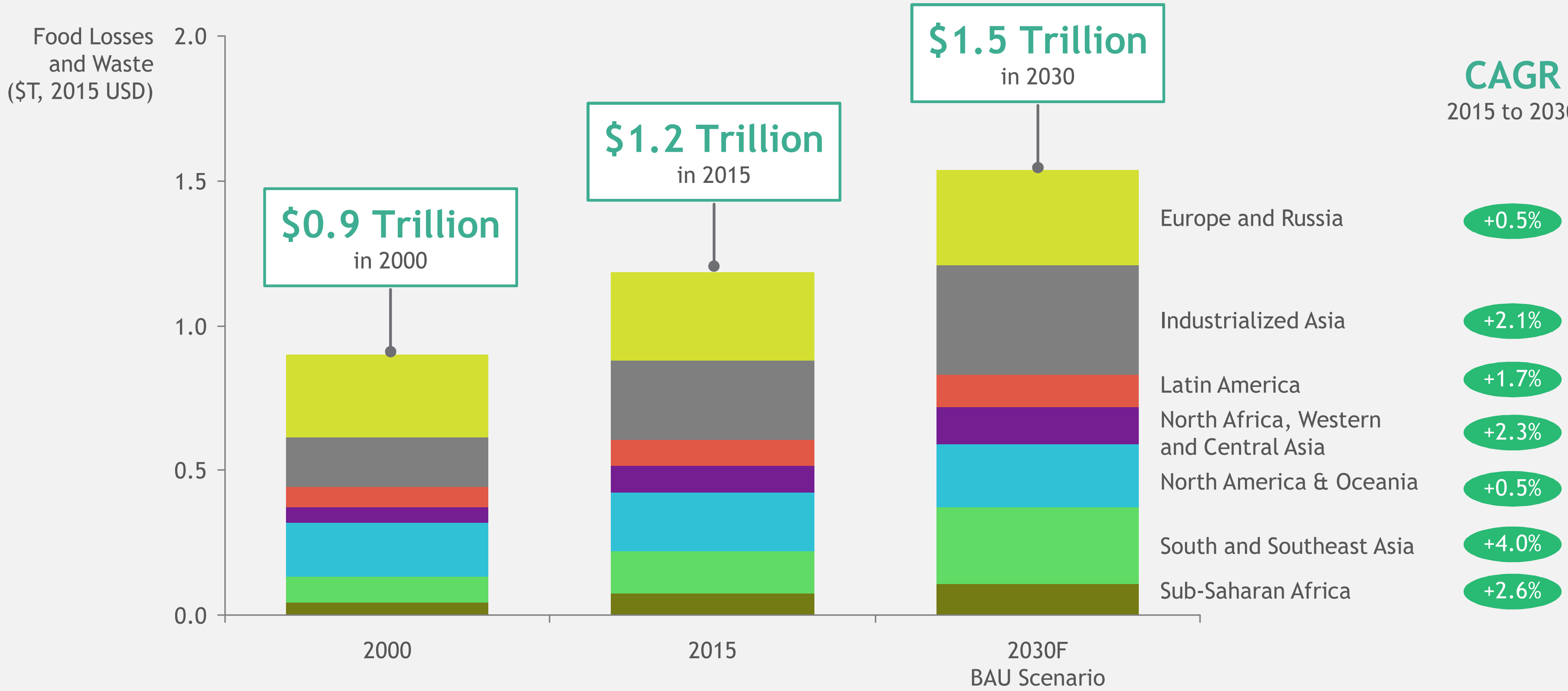
- Forecast scale of global food losses and waste in 2030
  - Determine volume (tons) and value (2015 USD)
- Identify major contributors to global FLW in 2030
  - Across regions
  - Across food types
  - Across steps in the value chain

Design Principles

- Compute food losses and waste as food volumes multiplied by loss intensities, after FAO method[1]
- Forecast food volumes and loss intensities separately, based on fundamental drivers of each
- Use existing economic and demographic projections[2] 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 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

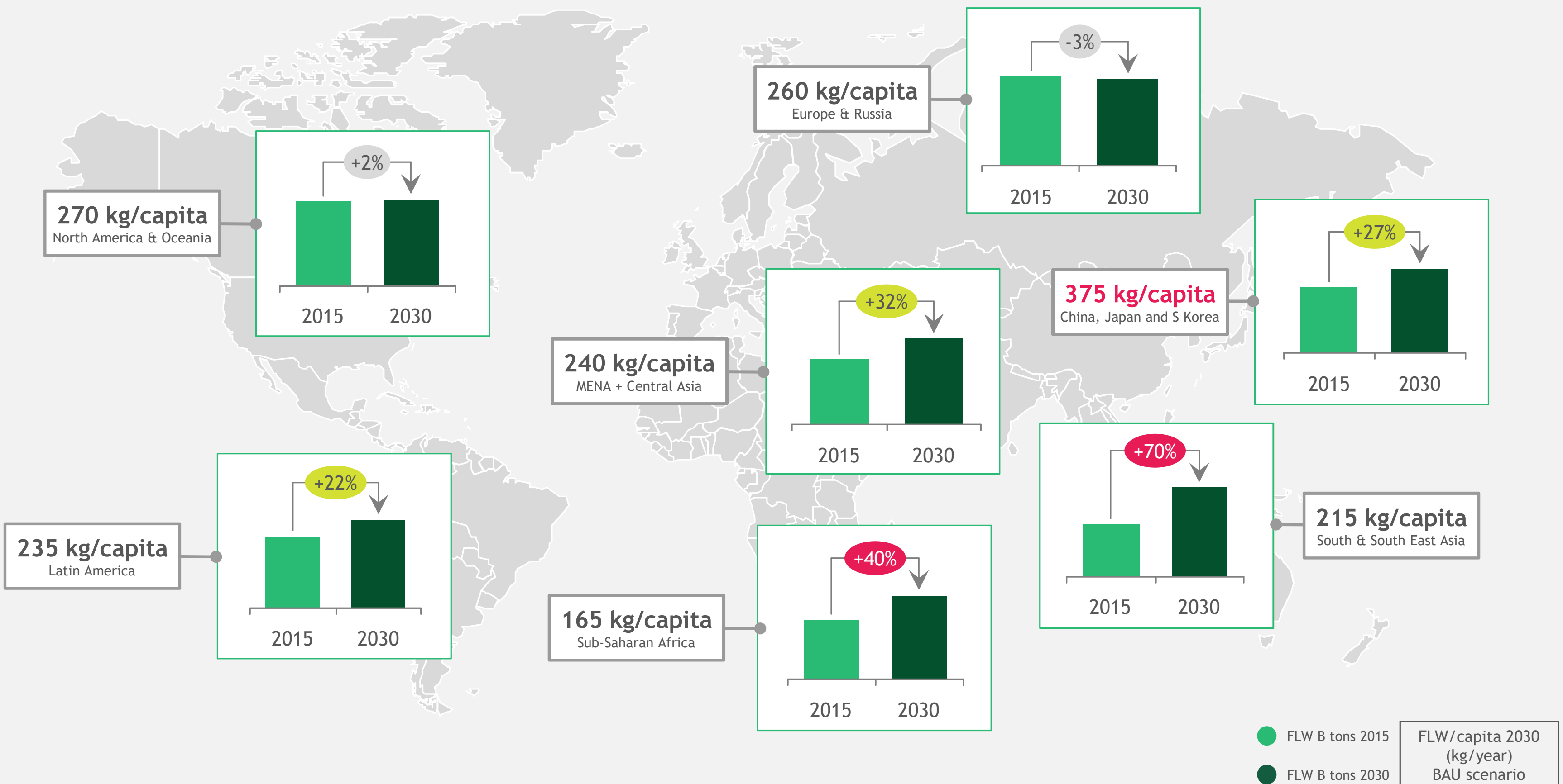
Food Group	Europe and Russia	North Africa, Western and Central Asia	North America and Oceania	Latin America	China, Japan and South Korea	South and Southeast Asia	Sub-Saharan Africa
Oilseeds and pulses	4	2	6	4	4	35	11
Cereals	48	34	33	28	100	150	33
Roots and tubers	35	7	13	20	51	75	114
Milk and eggs	25	16	24	24	22	75	12
Fish and seafood	2	1	1	1	13	11	2
Meat	14	6	12	14	31	15	7
Fruits and vegetables	71	77	31	75	376	247	46

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



Source: BCG FLOW Model

Upstream improves, but consumption waste increases

Supply Chain Step	Increased Food Volume (M tons) drives increased FLW	+	Lower Loss Intensity (M tons) at all steps except consumption	=	FLW difference 2015-2030F (M tons) BAU Scenario	➡	Total FLW 2030F (M tons) BAU Scenario
Production	230		-50		180		680
Handling & Storage	200		-150		50		400
Processing & Packaging	35		-5		30		190
Distribution & Retail	80		-45		35		235
Consumption	70		130		200		540

2015
Increase 2015-2030F

Source: BCG FLOW Model

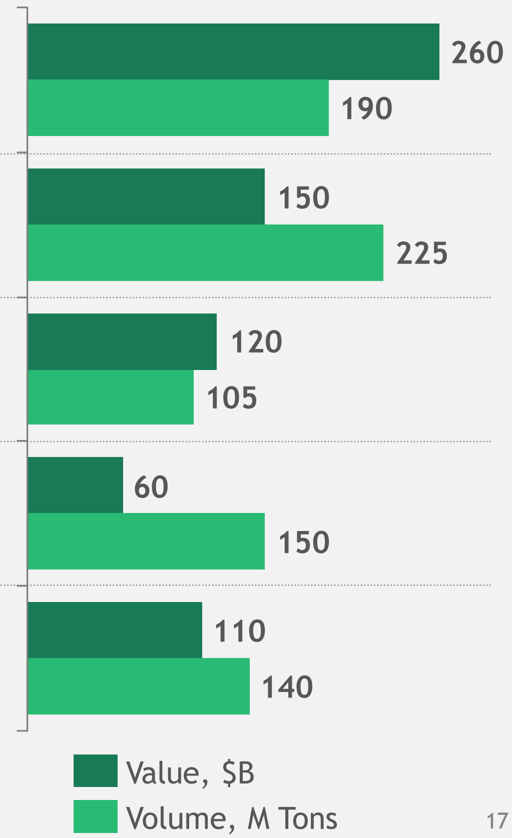
We see potential impact of $700 B by 2030 from 5 drivers

Source: BCG analysis

5 drivers with potential impact of $700 B

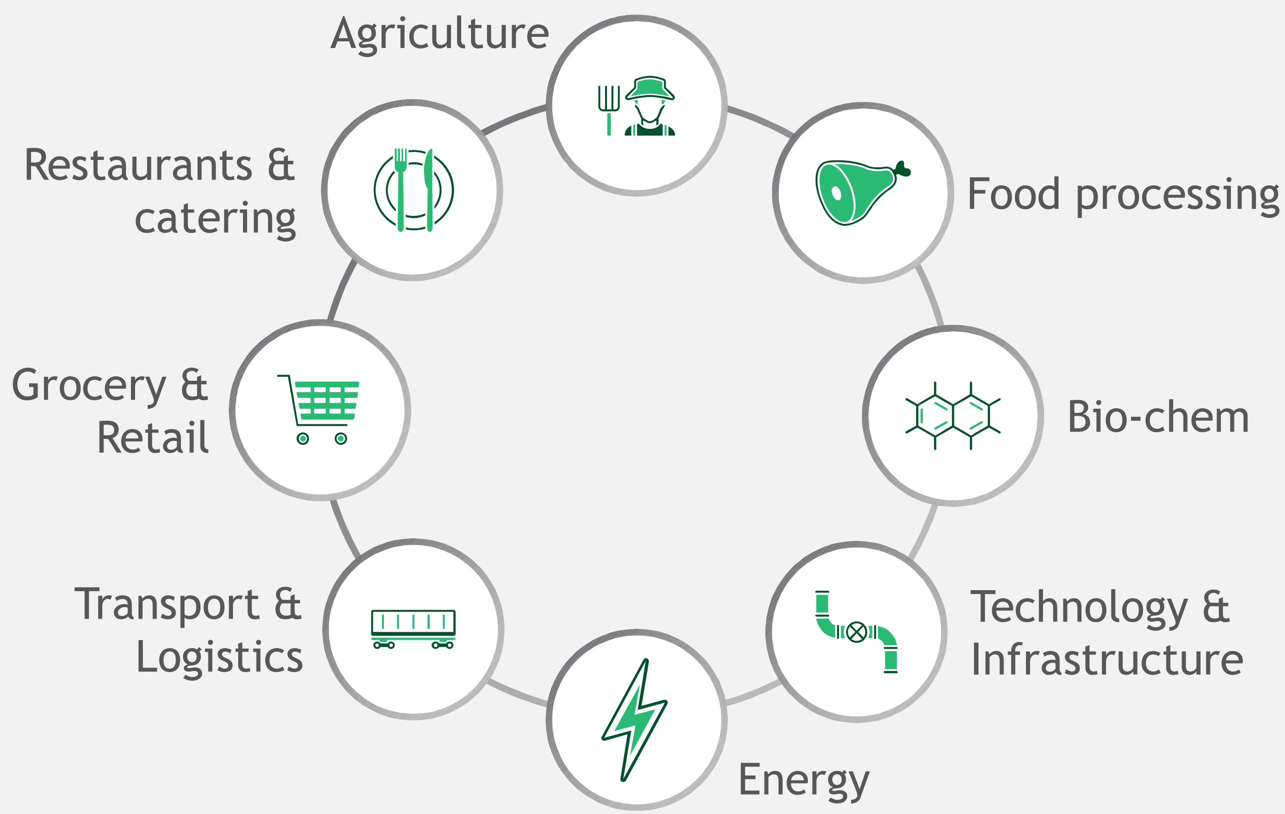
Driver	Examples
Awareness	• Consumers lack information on how to minimize food waste • Excess purchasing encouraged by grocery promotions
Supply Chain Infrastructure	• Cold-chain logistics non-existing in many emerging markets • Many companies have limited capabilities within recycling/re-purposing
Supply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

Estimated impact



Source: BCG Analysis

Opportunities along entire value chain



Menu of 13 initiatives along 5 drivers

Production | Handling & Storage | Processing & Packaging | Distribution & Retail | Consumption

Driver	#	Initiative
Awareness	1	Educate farmers
	2	Develop products, packaging, and promotions to enable and incentivize consumers to reduce waste
	3	Train employees to handle and manage inventory more efficiently and repurpose and recycle food waste
	4	Facilitate recycling/ purposing by consumers
Supply Chain Infrastructure	5	Improve and expand cold chain infrastructure
	6	Adapt technologies from large commercial operations to be suitable for smallholder farming
	7	Develop and implement technology to repurpose and recycle food loss and waste
Supply Chain Efficiency	8	Localize supply chains to reduce time to market and storage
	9	Adopt digital, big data, and related tools, metrics, and processes to prevent food loss and waste
Collaboration	10	Collaborate on supply-demand forecasts to adjust production plans
	11	Develop new purchasing agreements and models
Policy Environment	12	Advocate for regulation and industry alignment on issues such as date labels and cosmetic standards
	13	Advocate for regulation that enables food waste donations and increases cost of discarding food

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

Disclaimer

The services and materials provided by The Boston Consulting Group (BCG) are subject to BCG's Standard Terms (a copy of which is available upon request) or such other agreement as may have been previously executed by BCG. BCG does not provide legal, accounting, or tax advice. The Client is responsible for obtaining independent advice concerning these matters. This advice may affect the guidance given by BCG. Further, BCG has made no undertaking to update these materials after the date hereof, notwithstanding that such information may become outdated or inaccurate.

The materials contained in this presentation are designed for the sole use by the board of directors or senior management of the Client and solely for the limited purposes described in the presentation. The materials shall not be copied or given to any person or entity other than the Client ("Third Party") without the prior written consent of BCG. These materials serve only as the focus for discussion; they are incomplete without the accompanying oral commentary and may not be relied on as a stand-alone document. Further, Third Parties may not, and it is unreasonable for any Third Party to, rely on these materials for any purpose whatsoever. To the fullest extent permitted by law (and except to the extent otherwise agreed in a signed writing by BCG), BCG shall have no liability whatsoever to any Third Party, and any Third Party hereby waives any rights and claims it may have at any time against BCG with regard to the services, this presentation, or other materials, including the accuracy or completeness thereof. Receipt and review of this document shall be deemed agreement with and consideration for the foregoing.

BCG does not provide fairness opinions or valuations of market transactions, and these materials should not be relied on or construed as such. Further, the financial evaluations, projected market and financial information, and conclusions contained in these materials are based upon standard valuation methodologies, are not definitive forecasts, and are not guaranteed by BCG. BCG has used public and/or confidential data and assumptions provided to BCG by the Client. BCG has not independently verified the data and assumptions used in these analyses. Changes in the underlying data or operating assumptions will clearly impact the analyses and conclusions.


BCG
The Boston Consulting Group
bcg.com