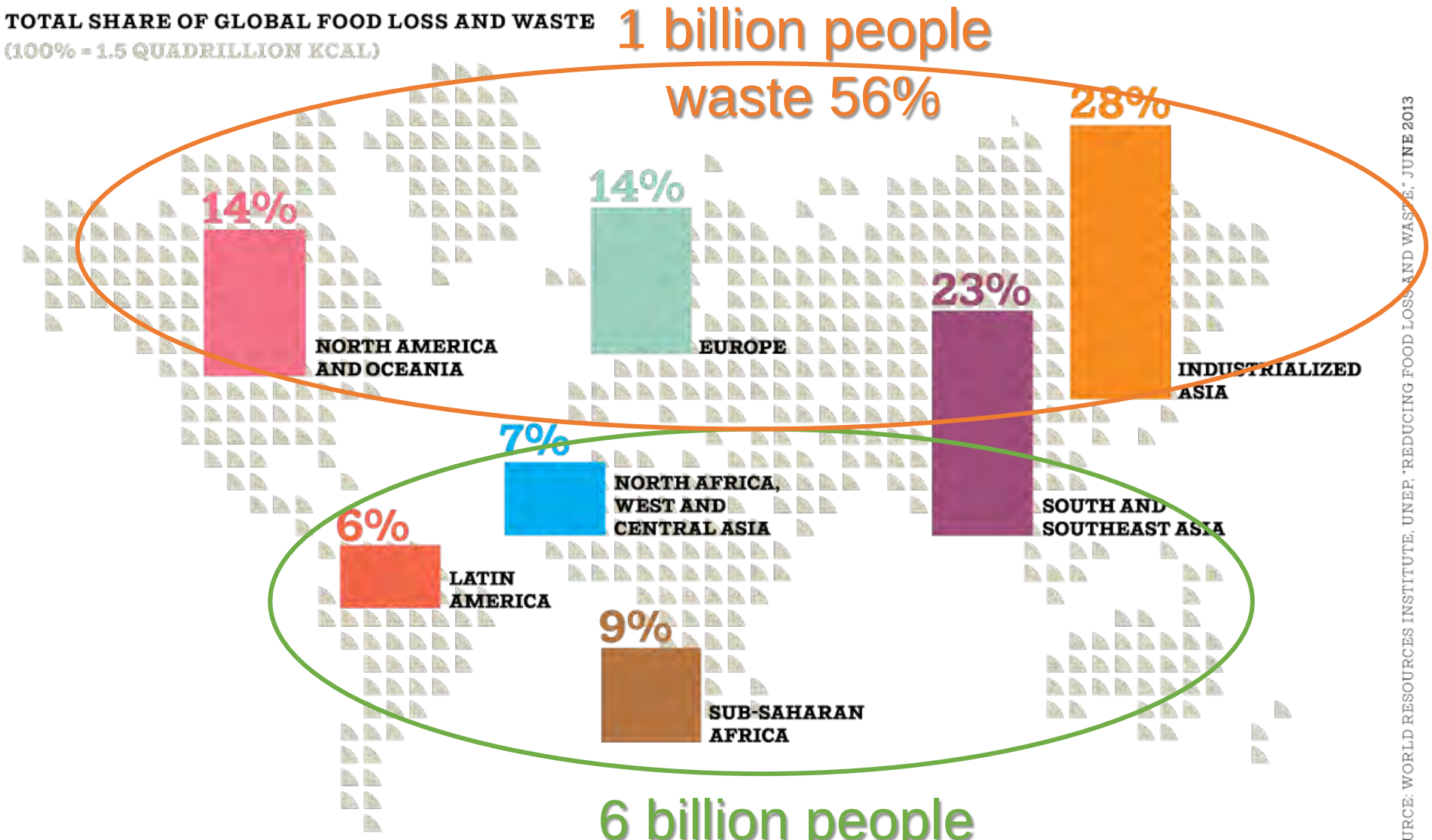
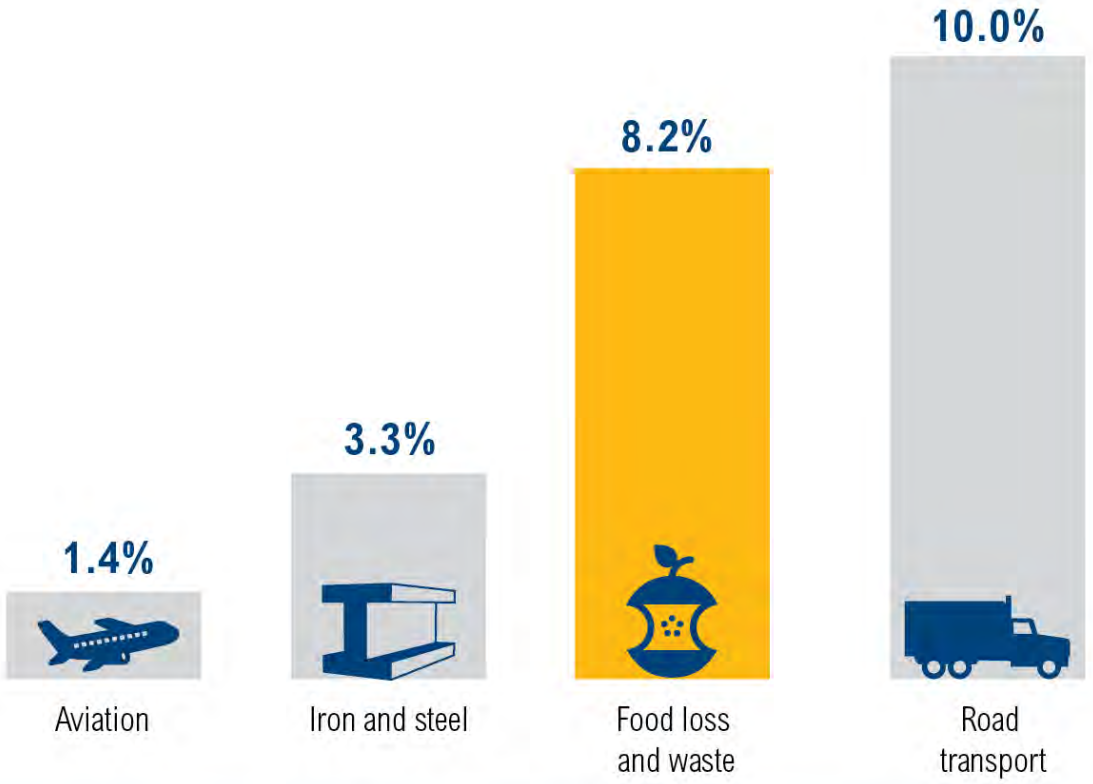
FIGHT FOOD WASTE
Cooperative Research Centre
REDUCE - TRANSFORM - ENGAGE
Dr Steve Lapidge, CEO
Australian Government
Department of Industry, Innovation and Science
Business
Cooperative Research Centres Program

THE GLOBAL CHALLENGE - $1.6 trillion p.a.



THE GLOBAL CHALLENGE

Greenhouse Gas Emissions from Food Loss and Waste Approach the Levels from Road Transport

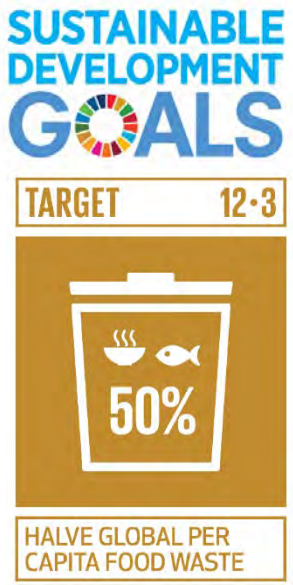


SHARE OF GLOBAL GREENHOUSE GAS EMISSIONS (2011/12)*

WORLD RESOURCES INSTITUTE

Gunders 2012

AUSTRALIA'S COMMITMENT



The Hon Josh Frydenberg MP
Minister for the Environment and Energy

Priority	Outcome	Focus
Policy support	Policies are supportive of food waste reduction and repurposing	Establishing a National Food Waste Baseline and methodology to measure progress against our goal Identifying areas to target investment Establishing a voluntary commitment to reduce food waste Enabling legislation to better support food waste reductions and repurposing
Business improvements	Improvement and adoption of technologies, processes and actions to reduce food waste	Identifying areas for improvement Supporting technology adoption Encouraging collaboration Normalising food waste considerations into business practices
Market development	Development of markets to support the repurposing food waste	Identifying food waste composition and nutritional value to develop new markets Encouraging new innovations Connecting food waste sources to users
Behaviour change	Practices and attitudes towards reducing food waste are being adopted and sustained	Changing consumer behaviour Engaging the workforce on food waste

WHY REDUCE FOOD WASTE?

SAVE MONEY

An analysis of 1,200 sites across 700 companies in 17 countries found that 99 percent of sites had a positive return on their investment in food loss and waste reduction, and half of the sites had a return greater than 14-fold.

COMPANIES

−	+
EVERY $1 INVESTED	YIELDED $14 IN RETURN
Measuring waste	Selling imperfect produce
Training staff	Creating new products
Improving inventory management	Reducing waste management costs
Changing packaging	Avoiding cost of food not sold

The average UK household discards £700 of edible food each year. Country- and city-led efforts to reduce this waste led to big savings for consumers and local authorities.

UNITED KINGDOM

−	+
EVERY £1 INVESTED	YIELDED £250 IN RETURNS

LONDON

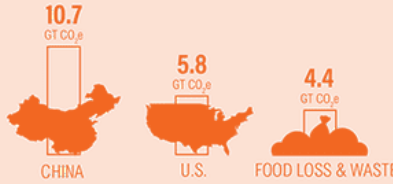
−	+
EVERY £1 INVESTED	YIELDED £92 IN RETURNS

FIGHT HUNGER

The world throws out **1 billion tons** of food each year while **1 in 9 people globally remain malnourished.**

CURB CLIMATE CHANGE

Food loss and waste produces **8% of global greenhouse gas emissions**; if it were its own country, it would be world's **third-largest emitter.**



CONSERVE RESOURCES

It takes **land the size of China** to grow food that's ultimately lost or wasted.

IMPROVE REPUTATION

Reducing food loss and waste improves relationships with **customers, vendors** and **other stakeholders.**

COMPLY WITH LAWS

Food is sometimes included in waste disposal regulations, **providing a legal incentive.**

UPHOLD ETHICS

Executives, staff and consumers recognize preventing and reducing food loss and waste is **"the right thing to do."**

Source: Champions 12.3 – The business case for reducing food loss and waste (2017)

ECONOMIC GROWTH POTENTIAL

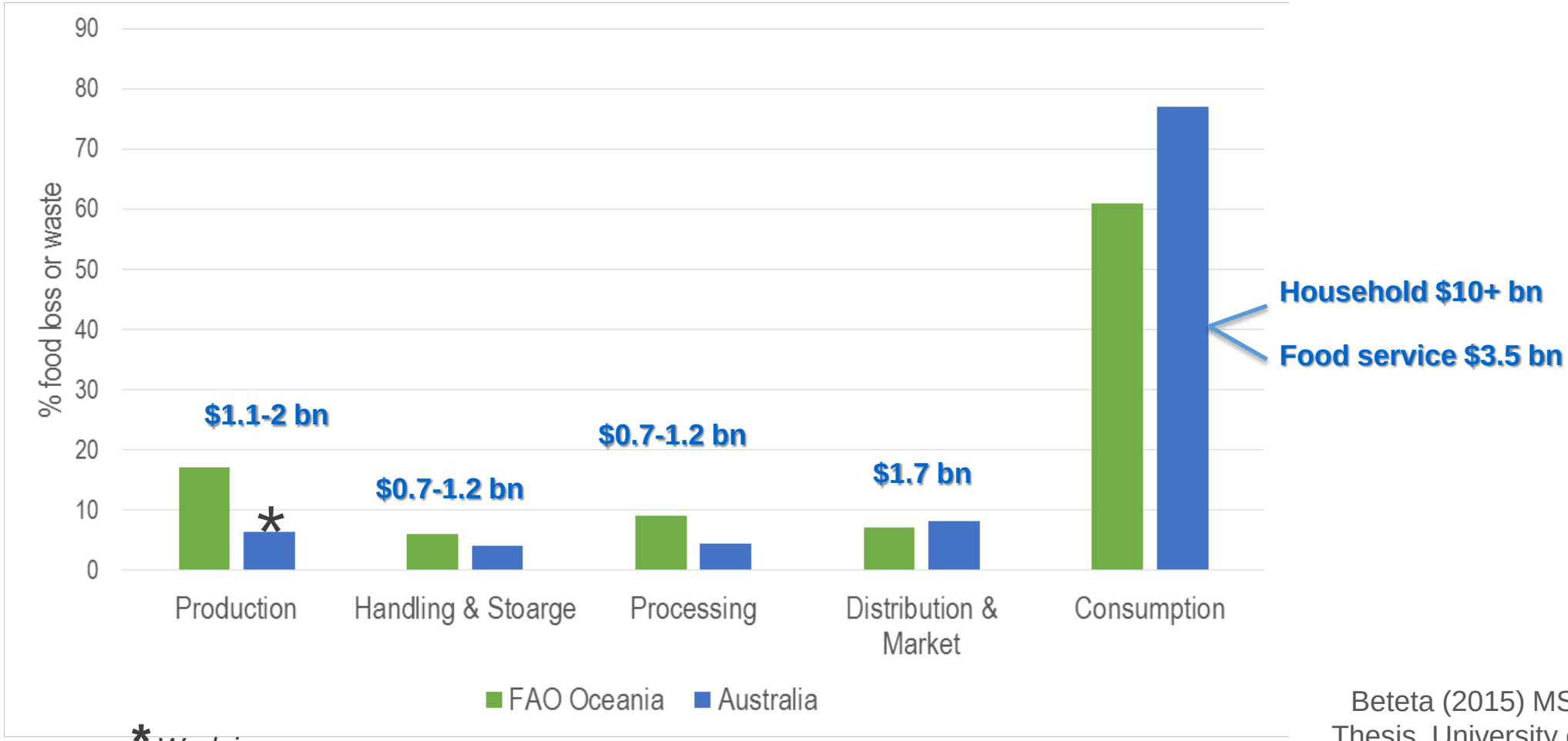
Largest Opportunities	Value 2015[1] *A$ billions; 2015 values*	Value 2025[1] *A$ billions; 2015 values*	Growth Rate *CAGR; Percent; 2015-25*
Global Consuming Class	1,225 - 1,635	2,730 - 3,640	8-12
Health and Wellness	2,550	3,400	3
Energy Smart Food	135-265	250-785	7-11
Food Waste	40	465-775	28-35
Targeted Eating	345-360	695-770	7-8
Urban Agriculture	135-290	185-395	3
Sustainable Aquaculture	185	240	3
Supply Chain Transformation	30-40	135-200	16-21
Direct to Consumer Model	65-80	160-195	9-12
Precision Agriculture and Big Data	35-45	110-135	12
Advanced Breeding and Fertilization	45	125	11
Sustainable Input	25	105-110	15-16
Animal Feed Additives and Health	40-45	75-90	8
Food Safety	45-65	60-90	3
Soil and Land Management	30-70	65-85	2-10
Reducing Packaging Waste	5-10	10-80	7-32

Food security & sustainability
A global marketplace
Enhanced production & value addition
The future consumer

1 Based on estimated savings or projected market sizings in each area. Rounded to nearest A$5 billion.
Source; Literature search; AlphaBeta analysis

THE OPPORTUNITY IN AUSTRALIA

Beteta (2015) estimated $18-20 billion p.a. from farm to fork based on industry expert opinion



* *Work in progress*

Beteta (2015) MSc Thesis, University of Adelaide

THE ROLE OF THE FIGHT FOOD WASTE CRC

Food Recovery Hierarchy

Most Preferred

Source Reduction & Reuse
Reduce the volume of surplus food generated

Feed Hungry People
Donate extra foods to food banks, soup kitchens and shelters

Feed Animals
Divert food scraps to animal feed

Industrial uses
Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy

Composting
Create a nutrient-rich soil amendment

Landfill / Incineration
Last resort to disposal

Least Preferred

To maximise the environmental, economic & social returns from food waste

~70% still goes to landfill (NSW EPA)

FIGHT FOOD WASTE CRC

CRC Interview, February 8, 2018
Canberra

CRC Announcement, April 12, 2018
Sydney

THE STATS

$64 M cash
$66 M in-kind

48 Industry
10 Research

200+ people

10 years

$2 billion

THE

TECHNOLOGY/SERVICE PROVIDERS

ChemCentre
efi
PLANET PROTECTOR PACKAGING
KARMA
TRUST PROVENANCE
Honey & Tex
PiperAlderman
KPMG
Sampano
empauer
chameleon

FOOD & AGRICULTURE COMPANIES

THE MITOLO GROUP
favco
peats
costagroup
SAPotatoCo
Woolworths
THOMAS FOODS
Zerella FRESH
Whitsunday Regional Council
QUEENSLAND GOVERNMENT
UrbanUtilities

STATE GOVERNMENT & COUNCIL ORGANISATIONS

Government of South Australia
Government of South Australia

TRANSFORM

EPA

ENGAGE

HQ & FOOD SAFETY

Sustainability Victoria

REDUCE

PRODUCER ASSOCIATIONS

SOWEN GUMLU
Abalone
POTATOES
FoodCluster
Australian Council of Prawn & Fisheries
Abalone Council Australia Ltd
CCIC CENTRAL COAST INDUSTRY CONNECT

PEAK INDUSTRY ORGS

APPMA
AFGC
aora
FIAL
FOOD SOUTH AUSTRALIA
AUSTRALIAN FOOD & GROCERY COUNCIL
AIP

NUTRACEUTICAL COMPANIES

Swisse
GRETALS

FOOD RESCUE ORGS

FOOD BANK
OZHARVEST

INTERNATIONALS

wrap

RDC'S/RDA'S

Regional Development Australia
FRDC

RESEARCH PROVIDERS

THE UNIVERSITY of ADELAIDE
Curtin University
SWINBURNE
UNIVERSITY OF SOUTHERN QUEENSLAND
CQUniversity
RMIT UNIVERSITY
THE UNIVERSITY OF QUEENSLAND
QUT

EIGHT FOOD WASTE CRC

THE GOVERNANCE TEAM

- **Audit, Risk & Finance**
- **Remuneration & Nominations**
- **Research & Commercialisation**
- **CRC Impact**

Independent Chair
John Webster
Retired (Sydney)

Non-Exec Director
Sandra Hook
Pro NED (Sydney)

Non-Exec Director
Geoff Starr
Retired (Sydney)

Non-Exec Director
Alain Pillay
Nexus Stratgem
(Brisbane)

Non-Exec Director
Robbie Davis
Potatoes SA
(Adelaide)

Non-Exec Director
Christine Giuliano
Naturex Aust
(Sydney)

Non-Exec Director
Toine Timmermans
Wageningen Uni
(The Netherlands)

THE MANAGEMENT TEAM

BOARD OF DIRECTORS

Research Director
Prof Andy Lowe
Uni of Adelaide
(Adelaide)

CEO
Dr Steve Lapidge
(Adelaide)

Business Manager

Programs

REDUCE
A/Prof Karli Verghese
RMIT Uni
(Melbourne)

TRANSFORM
Dr Bronwyn Laycock
UQ (Brisbane)

ENGAGE
A/Prof David Pearson
CQU
(Sydney)

Theme

Food Safety & Integrity
Dr Valeria Torok
SARDI (Adelaide)

ESTABLISHMENT ACTIVITIES

	2018						2019
Activity	**July**	**August**	**September**	**October**	**November**	**December**	**January**
FFW CRC commenced	1						
Grant Agreement executed		8					
Indicative Initial Research Portfolio released		10					
Participant Agreement & Constitution negotiations		10					
Project development							
Participant Agreement & Constitution execution							
FFW CRC Launch & Participants meeting				24/25			
Participant contributions invoiced							
Project finalisation & sign off							
Projects commence							

ESTABLISHMENT Q1 ACTIVITIES

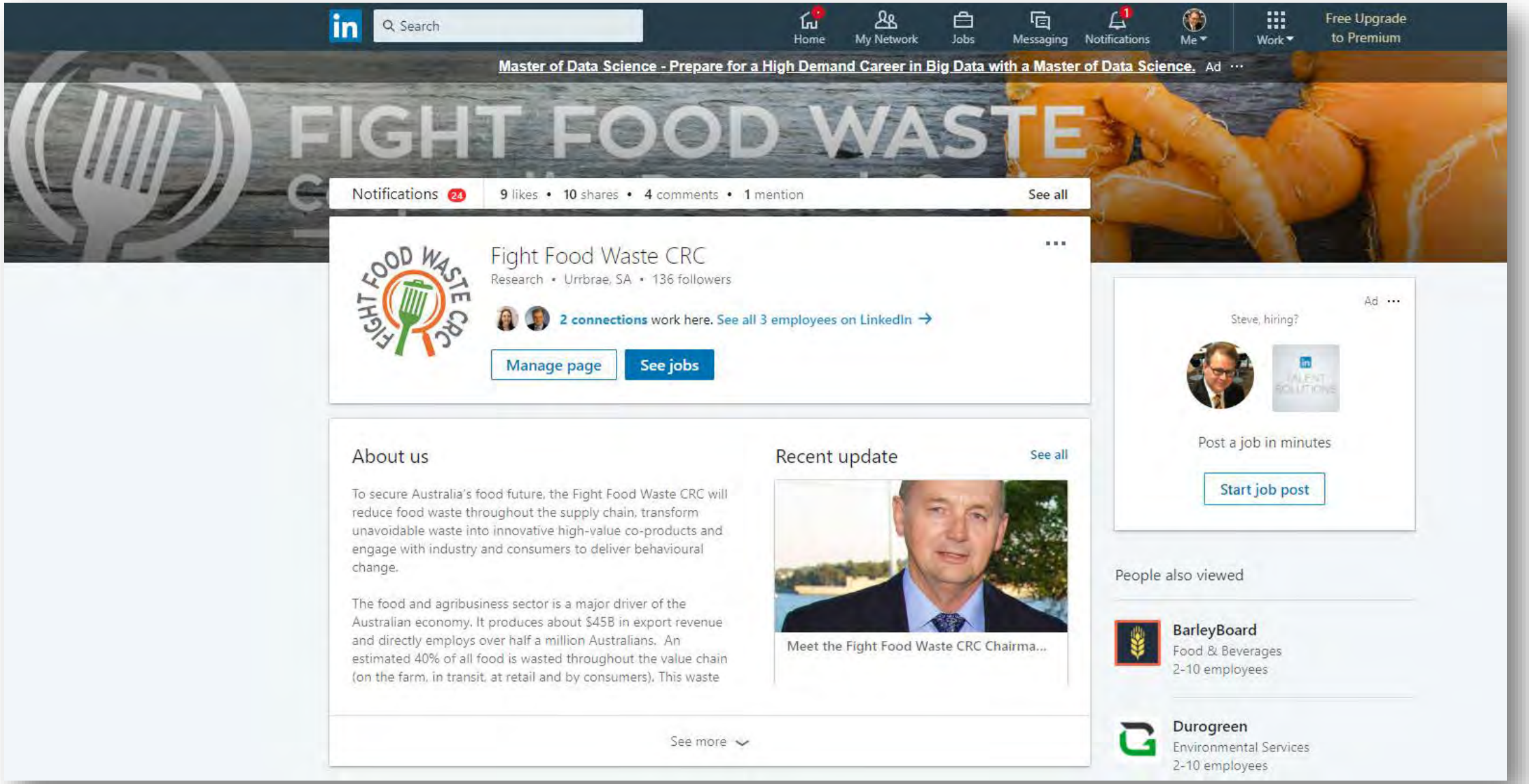
1. Execute Grant Agreement and invoice CRC Program for first payment
2. Establish banking, financial and reporting systems & appoint auditor
3. Apply for and achieve ACNC status.
4. Establish office- lease, IT system/corporate email, phones, new staff/visitor access.
5. Establish policies and procedures for the CRC, including HR, travel, credit card etc
6. Establish Risk Management Plan and Fraud Control Plan
7. Obtain insurance consistent with Grant Agreement requirements
8. Prepare Year 1 Operational Plan and budget
9. Establish website and social media
10. Organise October Board meeting, CRC launch and Participants Meeting
11. Complete Participant Agreements (Core & Supporting) and Constitution process
12. Establish project management system & project application processes
13. Prepare Board and Board Committee Charters
14. Complete Commonwealth Q1 Report (due October 30).

FFW CRC ESTABLISHMENT - OFFICE

FFW CRC ESTABLISHMENT - WEBSITE

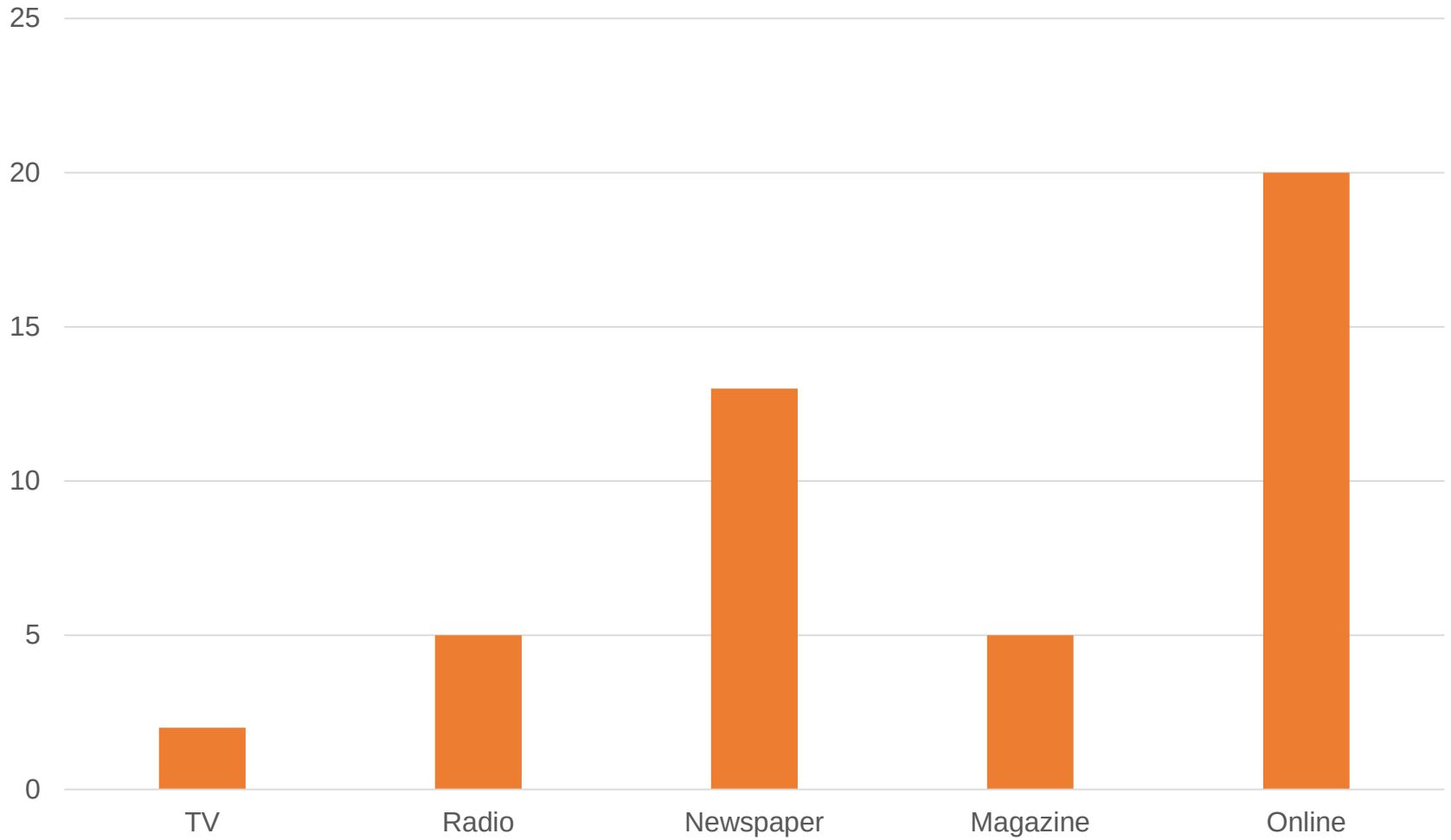
www.fightfoodwastecrc.com.au

FFW CRC ESTABLISHMENT - LINKEDIN



FFW CRC ESTABLISHMENT - TWITTER

FFW CRC ESTABLISHMENT - MEDIA



Global Fight Against Food Loss and Waste

Toine Timmermans

Fight Food Waste CRC, 25 October 2018

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UNIVERSITY & RESEARCH

100years
1918 — 2018

Partnerships to deliver impact

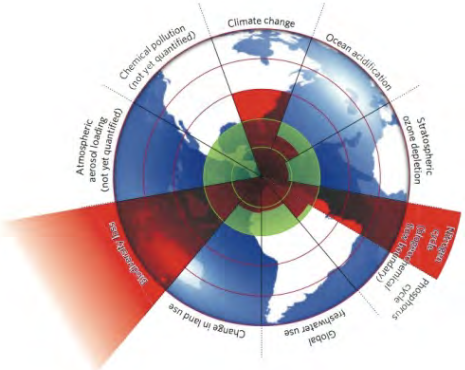
wage
ningen
campus

Think global, act local

WAGENINGEN
UNIVERSITY & RESEARCH

100years
1918 — 2018

Drivers for change



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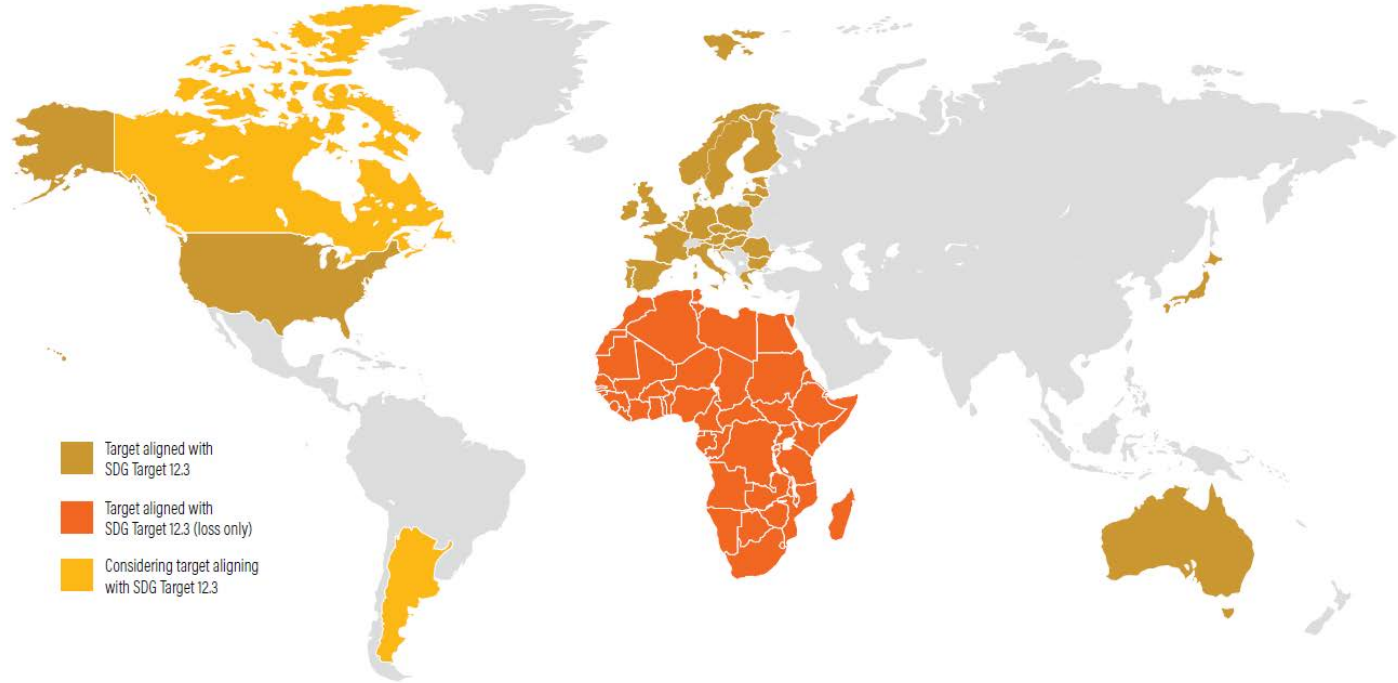
100years 1918 — 2018

Targets set ambitions

CHAMPIONS 12.3

FIGURE 3. **National and Regional Governments with Food Loss and/or Waste Reduction Targets Aligned with SDG Target 12.3** (as of September 2018)



Source: WRI authors.

Companies commitments

CHAMPIONS 12.3

COMPANIES	2016–2018 MILESTONE	2018 HIGHLIGHTS	PROGRESS BY 2018 RELATIVE TO 2015	CALL TO ACTION
TARGET	**60%** of the world's 50 largest food companies by revenue have set specific FLW reduction targets aligned with Target 12.3. Among those setting targets, half are working with their suppliers to set their own targets.	Nearly **2/3** of the world's 50 largest food companies participate in programs that have a FLW reduction target.	✓	More companies need to encourage and support their suppliers in setting their own reduction targets.
MEASURE	**20%** of the world's 50 largest food companies have quantified base-year FLW and have started measuring and reporting on FLW. Among those measuring and reporting, half are engaged with their suppliers to quantify the latter's FLW.	**More than a quarter** of the world's 50 largest food companies now measure FLW within their operations, with the vast majority of these companies also publicly reporting.	✓	More of the world's largest food companies (and their suppliers) need to publicly report their FLW inventories.
ACT	**10%** of the world's 50 largest food companies have active FLW reduction programs. Among those taking action, half are engaged with their suppliers to reduce the latter's FLW.	**20%** of the world's 50 largest food companies have established FLW reduction programs.	✓	More companies need to actively engage with their suppliers to reduce FLW at every stage of the supply chain and increase financial investment in new technologies and programs.

“business case” of FLW

1. SAVE MONEY

An analysis of 700 companies in 17 countries found that investing in food loss and waste reduction yielded a 14-fold return.

COMPANIES

−	+
EVERY **$1** INVESTED	YIELDS **$14** IN RETURN
Measuring waste	Selling imperfect produce
Training staff	New products
Buying storage equipment	Reducing waste management costs
Changing packaging	Avoiding cost of food not sold

2. FIGHT HUNGER

The world throws out **1 billion tons** of food each year while **1 in 9 people globally remain malnourished.**

3. CURB CLIMATE CHANGE

Food loss and waste produces **8% of global greenhouse gas emissions**; if it were its own country it would be world's **third-largest emitter.**

4. CONSERVE RESOURCES

It takes a **China-sized amount of land** to grow food that's ultimately lost or wasted.

5. IMPROVE REPUTATION

Reducing food loss and **waste** improves relationships with customers, vendors and other stakeholders.

6. COMPLY WITH LAWS

Government agencies and **companies** sometimes must adhere to regulations on disposing organic waste, including food.

7. UPHOLD ETHICS

Executives, staff and consumers increasingly recognize food loss and waste reduction as **'the right thing to do.'**

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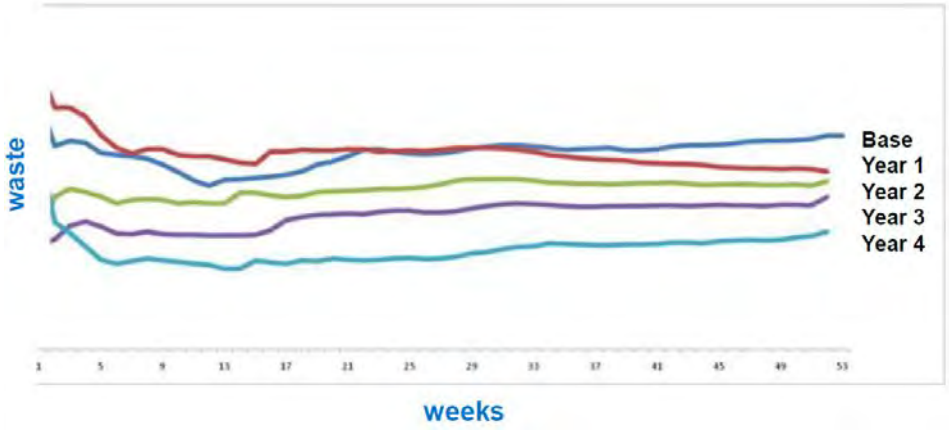
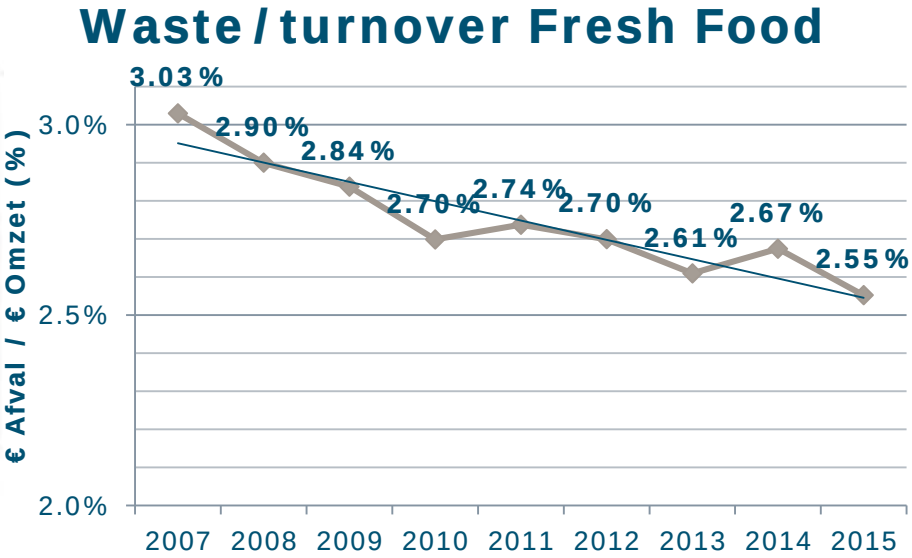
CHAMPIONS 12.3

Target, Measure, Act

European Retailer X



European Retailer Y



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Wageningen Food & Biobased Research

Food waste – latest estimate EU-28

EU-28 PRODUCES

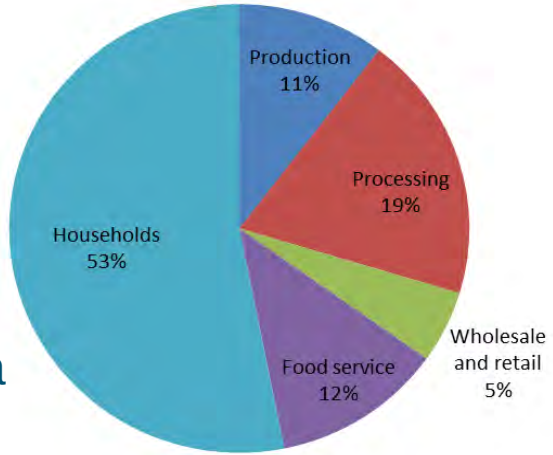
FUSIONS

88 MILLION TONNES of food waste per year

amounting to an estimated 143 BILLION EUROS

For more information on data and quantification, access the March 2016 FUSIONS reports **"Estimates of European Food Waste"** & **"Food Waste Quantification Manual to monitor Food Waste Amounts and Progression"**

- Equivalent of **20%** of all produced food in EU
- **143** billion euros
- **~ 304 Mt CO2 eq** (6% of total emissions of GHG in EU28%)



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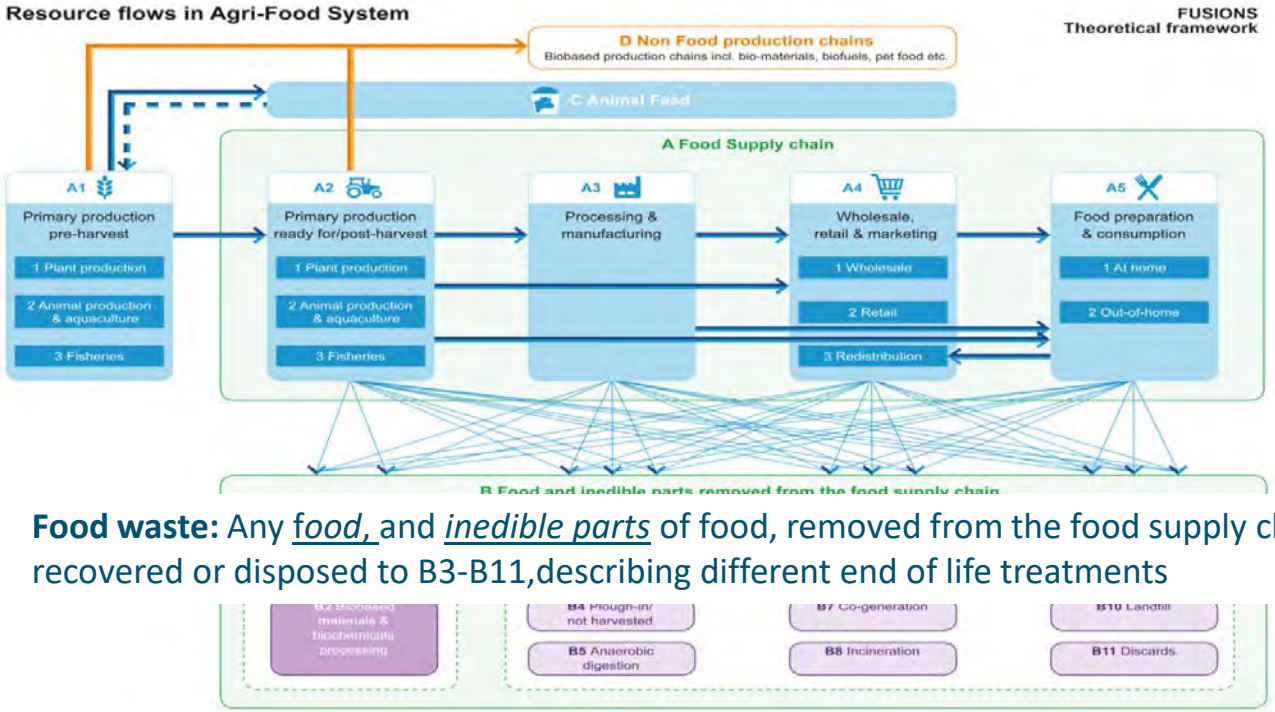
173 kg pro-capita food waste

Wageningen Food & Biobased Research

FUSIONS definitional framework



Food waste: Any *food,* and *inedible parts* of food, removed from the food supply chain to be recovered or disposed to B3-B11,describing different end of life treatments

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FUSIONS

Wageningen Food & Biobased Research

FLW PROTOCOL

Food Loss + Waste PROTOCOL

A multi-stakeholder effort to develop a global *FLW Accounting and Reporting Standard*

FUSIONS · The Consumer Goods FORUM · FAO FIAT PANIS · wrap · World Resources Institute · UNEP · World Business Council for Sustainable Development

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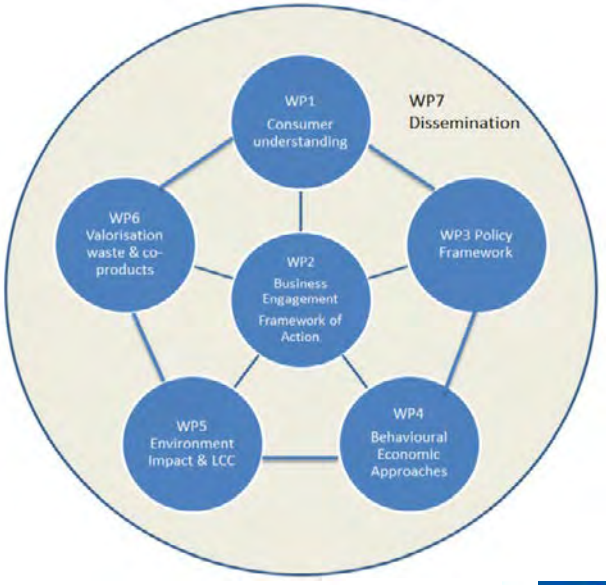
Wageningen Food & Biobased Research

Resource Efficient Food and dRink for the Entire Supply cHain (2015 – 2019)

26 partners, 12 countries

Multi stakeholder platforms: the Netherlands, Germany, Spain, Hungary, China



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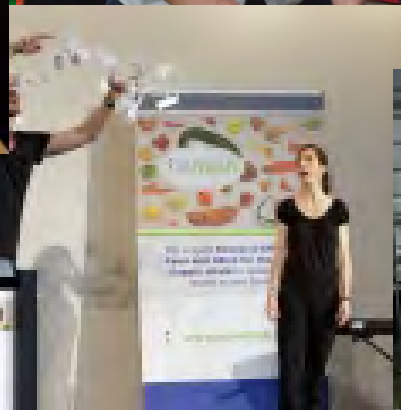
REFRESH is funded by the Horizon 2020 Framework Programme of the European Union under Grant Agreement no. 641933. The contents of this document are the sole responsibility of REFRESH and can in no way be taken to reflect the views of the European Union

The REFRESH Project

A central ambition of the REFRESH project is to develop a ‘Framework for Action’ model that is based on strategic agreements across all stages of the supply chain (backed by Governments), delivered through collaborative working and supported by evidence-based tools to allow targeted, cost effective interventions.

REFRESH



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The REFRESH Project consortium

WP7: Communication, Impact Oriented Dissemination and Exploitation

WP1: Consumer Understanding in Relation to Waste Generation, Handling, Reuse and By Product Valorisation

Pilot learning

WP2 Business Engagement – Development of frameworks for action
National working platforms and pilots (Germany, Hungary, Spain, the Netherlands)

Pilot data

WP5: Environmental Impact & Life Cycle Costing Dimensions of Food Waste

Feedback on policy acceptance

Pilot learning

WP3: Policy Frameworks for Food Waste Prevention

Policy scenarios to analyse

Evaluate policy options

WP4: Behavioral Economic Approaches and Simulation Scenarios for Food Waste Prevention, Reduction and Valorization

Data input on consumer behaviour

Regulation for valorisation

Simulation of consumer dynamics

Modelled processing chains

Acceptance

WP6: Valorisation of Waste Streams and Co-Products

Some outcomes valorisation: compositional database

- Published online as FoodWasteEXplorer*
- Intended to provide a clear user search interface
- Over 25,000 data points from 75 initial food materials (T6.1)
- E.g. Proximates (fat, protein, fibre…), inorganics (sodium, potassium…), vitamins (thiamin, vitamin A…), undesirable compounds (bacteria, toxins…), bioactives (anthocyanins, polyphenols….), others (volatile content, lower heating value

*https://ws.eurofir.org/foodwasteexplorer/login

R&D valorization: Chicory fibre for pilot food products

- Previous period activities
- R&D pilot products deemed acceptable:

1. Hi-fibre bread
   (2% thermophysically-treated pulp)
2. Hi-fibre yoghurt drink
   (~8% addition undried pulp)

Products | sideflows & EU estimates, tonnes.

Raw apple juice

Apple pomace 750,000

Beer

Brewers spent grain 7,000,000

Meat

Blood 2,000,000

Whey protein

Whey permeate ?

Processed tomatoes

Tomato pomace 525,000

Vegetable oil

Press cake (excl soymeal) 16,950,000

Orange juice

Orange pomace 600,000

Meat

ABP fats (cat 3) 2,000,000

Chips/fries/crisps

Potato peel 1,200,000

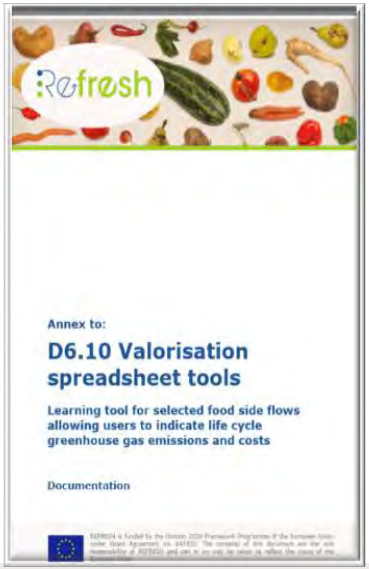
Many Deliverable reports on our website

Background documents:

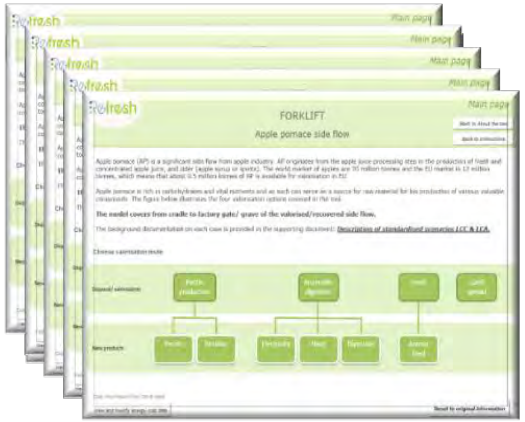
Methodological approach for the tool and generic models

+

Description of selected valorisation options and comparison products including data inventory



Spreadsheet tool FORKLIFT



Framework for Actions ‘Blueprint’

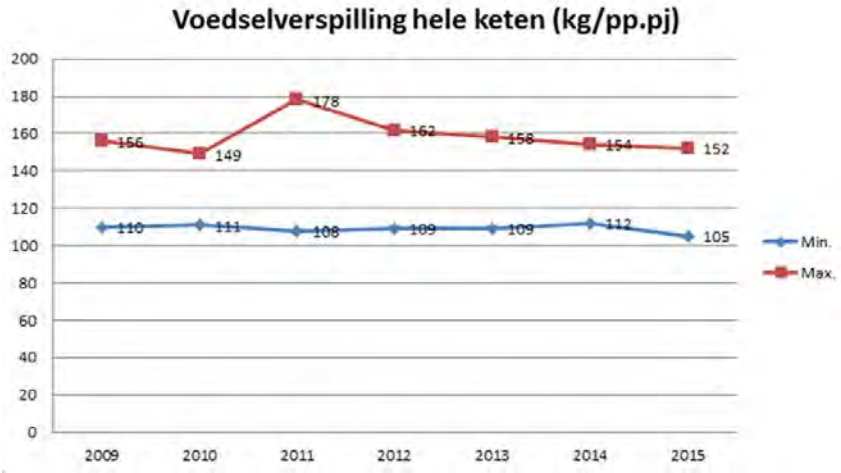
The Netherlands, Cooperation with industry

- Cooperation between industry (sector organisations) and government since 2009
- Joint agenda on reduction food waste
- 2014 year against food waste

Alliantie Verduurzaming Voedsel

Rijksoverheid

The Netherlands, time for a next step (2016)



- Food waste losses on political en business agenda
- Awareness
- Lots of individual actions (research, campains, new businessmodels)
- But: no 20% reduction
- New phase

Dutch Taskforce Circular Economy in Food

Alliantie Verduurzaming Voedsel
DSM BRIGHT SCIENCE. BRIGHTER LIVING.
Rijksoverheid
FOODTECHBRAINPORT
Google
LTO Nederland
MVO NEDERLAND
Hutten Altijd meer aandacht
Kennisinstituut Duurzaam Verpakken
LambWeston SEEING POSSIBILITIES IN POTATOES
Brightlands Knowledge crossing borders
NVRD
milgro the recircle company
MOONEN packaging
NATUUR & MILIEU
PROVERKA vegetable juices & fibres
Rabobank
PROTIX
WAGENINGEN UNIVERSITY & RESEARCH
RIJK ZWAAN
SCELTA MUSHROOMS EST'D 1993
Sligro Food Group
FOOD WASTE XPERTS
Unilever
VNO NCW
eerlijk over eten Voedingscentrum
YOUTH FOOD Movement

UNITED AGAINST FOOD WASTE

WHAT IS THE TASKFORCE?

Prevention and reduction of food waste is a crucial part of achieving a circular economy. All partners in the Taskforce Circular Economy in Food will collaborate and accelerate to minimize food waste, both across the food chain and by consumers, and to contribute in a transparent manner to this aim.

WHY JOIN FORCES TO COMBAT FOOD WASTE?

1/3

A third of the world's food is lost or wasted every year.[1]

Food waste in Europe causes **6%** of all greenhouse gases emitted through human activity.[2]

Wasting less food = helping to achieve climate goals and ensuring there is enough valuable food for the growing global population.

That is equal to **105-152 KG** per capita annually in the Netherlands.[3]

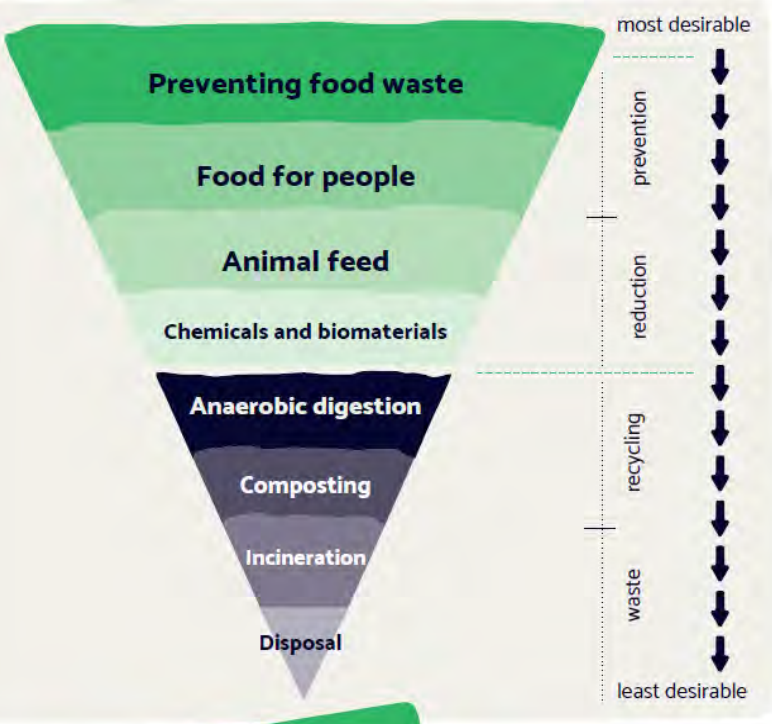
OUR OBJECTIVES

In a joint effort, we aim to make the Netherlands one of the first countries to cut food waste in half. We will make the Netherlands a leader and a global role model in terms of realizing Sustainable Development Goal 12.3.

2015 - 2030
50% reduction

The focus of the Taskforce

The Taskforce focuses on reducing food waste throughout the entire food chain. We will accomplish this by preventing and reducing as much food waste as possible and creating value from side flows according to the "Moerman Food Use Hierarchy".



The Taskforce acts in four distinct ways:

1. Monitoring progress and impact: The Taskforce measures the effects of its individual and joint approach.

2. Joining forces to combat food waste across the food supply chain: Taskforce members and leaders combine their strengths, networks and knowledge to develop innovative solutions.

3. Joining forces to combat food waste by consumers: The Taskforce aims to achieve sustainable changes in behaviour through campaigns, interventions and living labs.

4. Changing the rules: The Taskforce promotes the legislation and instruments needed to create a circular economy.

WOULD YOU LIKE TO PARTICIPATE? Join the Taskforce!

SAMENTEGENVOEDSELVERSPILLING.NL

[1] FAO, Global Food Losses and Food Waste–Extent, Causes, and Prevention, 2011.
[2] FUSIONS, Criteria for and baseline assessment of environmental and socio-economic impacts of food waste, 2016.
[3] Wageningen Food & Biobased Research, 2017, Monitor Voedselverspilling, update 2009-2015, rapport nummer 1747.

Taskforce Circular Economy: Ecosystem & impact

WAGENINGEN UNIVERSITY & RESEARCH

100years 1918 — 2018

Taskforce Circular Economy in Food

Wageningen Food & Biobased Research

Smart mild processing technologies

Shelf life extension + maintain fresh quality perception

Mild conservation: orange juice, 21 days after pressing as healthy and tasty: fresher for longer

Opportunities for packaging technologies

- Classical

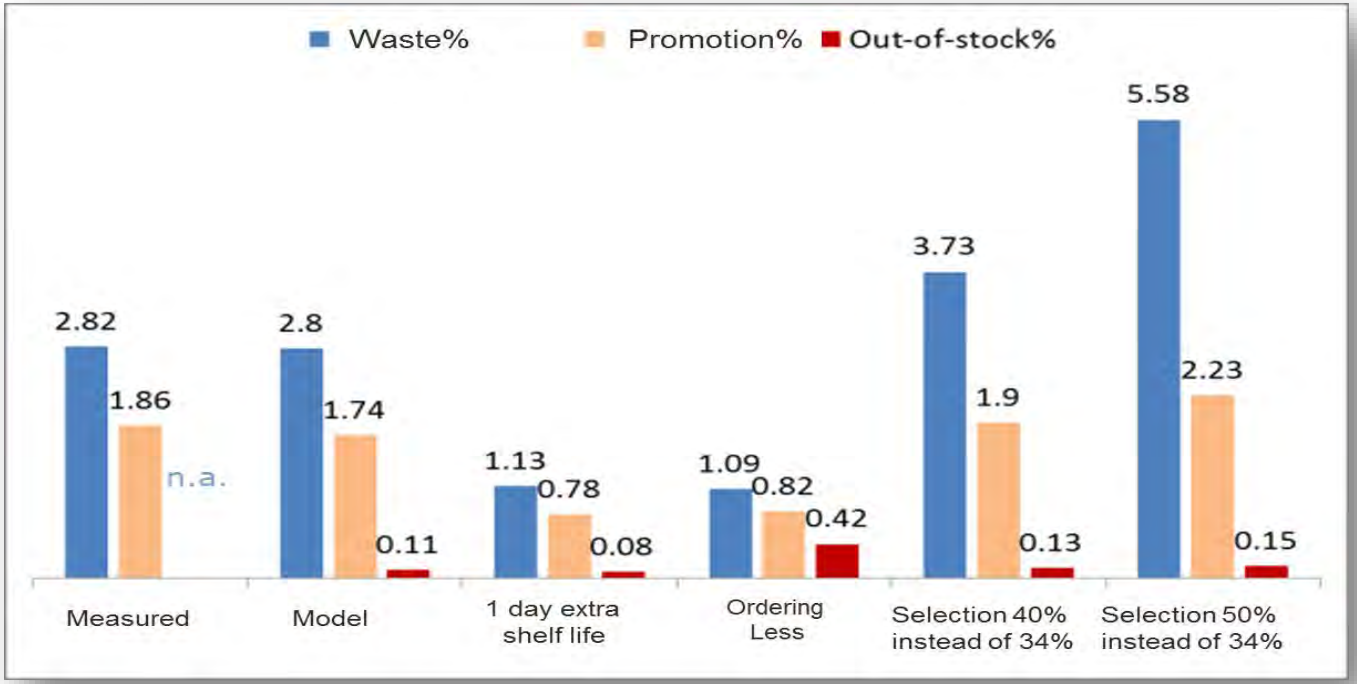
Advanced

Extension of Shelf life with weeks is feasible

Logistic & supply chain design

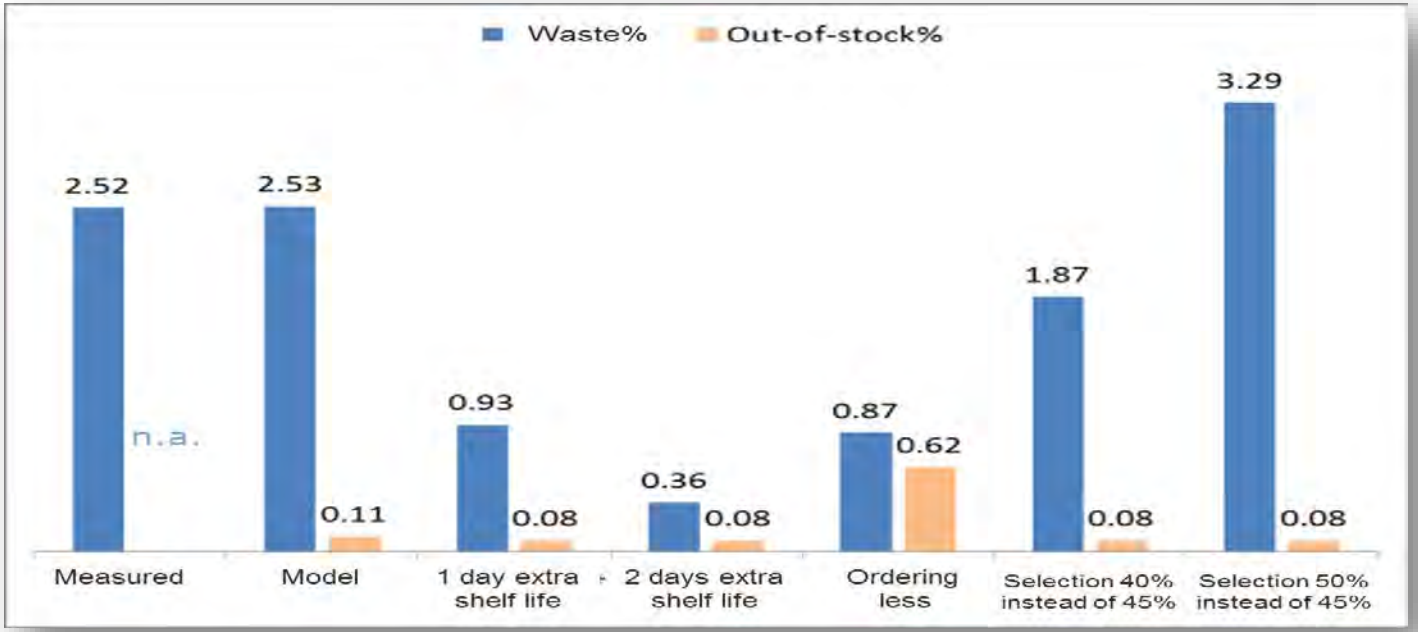
Scenario's	Vegetable chain		Meat chain	
	Retailer	Producer	Producer	Retailer
Change of production season	X	X		
Variation in keep ability / shelf life	X	X	X	X
Variation order unit (combined with 'change of production season')	X	X	X	X
Variation temperature	X	X	X	X
Variation customer demand		X		
Waste vs. Out-of-Stock	X			X
Effect of promotions	X			X
Effect of other (better, smarter) order policies	X	X	X	X

Results Minced Meat



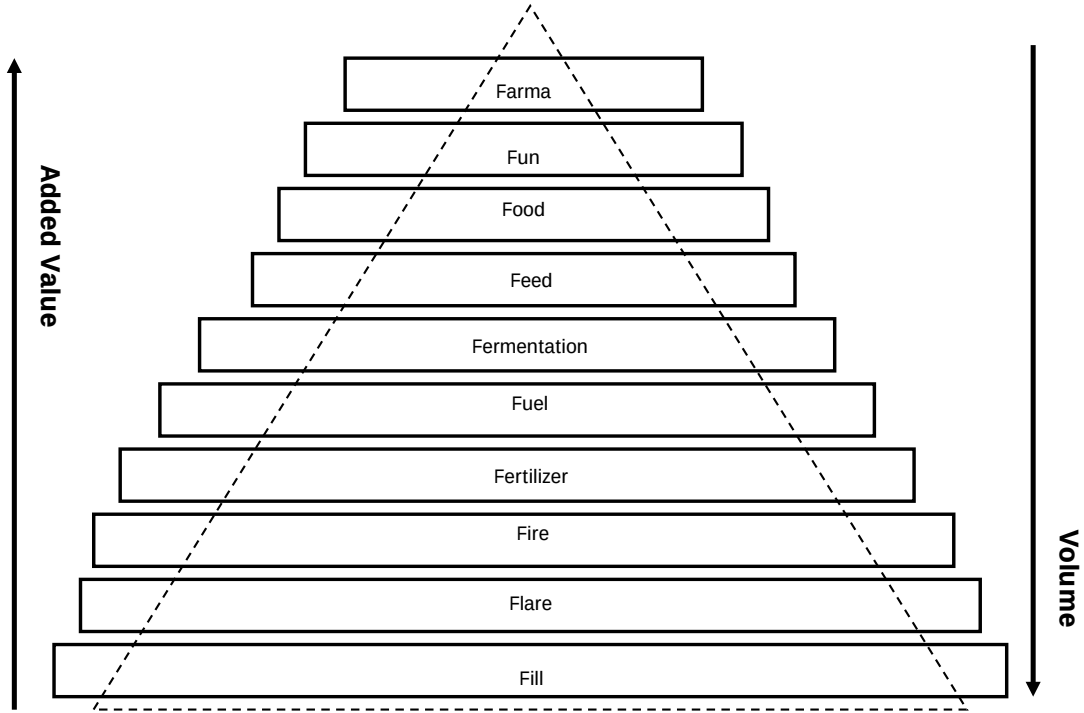
Model shows effect on Out-of-Stock which is in practise hard to determine

Results Iceberg lettuce



Model shows that selection behaviour of the shopping customer has huge impact on waste

Resource efficiency: Biomaterials Use Hierarchy



	€/ton
Farma	High
Fun	High
Food ingredients	5 - 20000
Food nutritional	100-500
Feed young	100-500
Feed pigs	100-300
Feed cattle	50-250
Functional chemical	500-800
Fibre	500
Fermentation	150-400
Fermentation bulk	100-300
Fuel	100-300
Fertilizer	-/- 200-100
Fire	50-150
Flare	0
Fill	-/- 300

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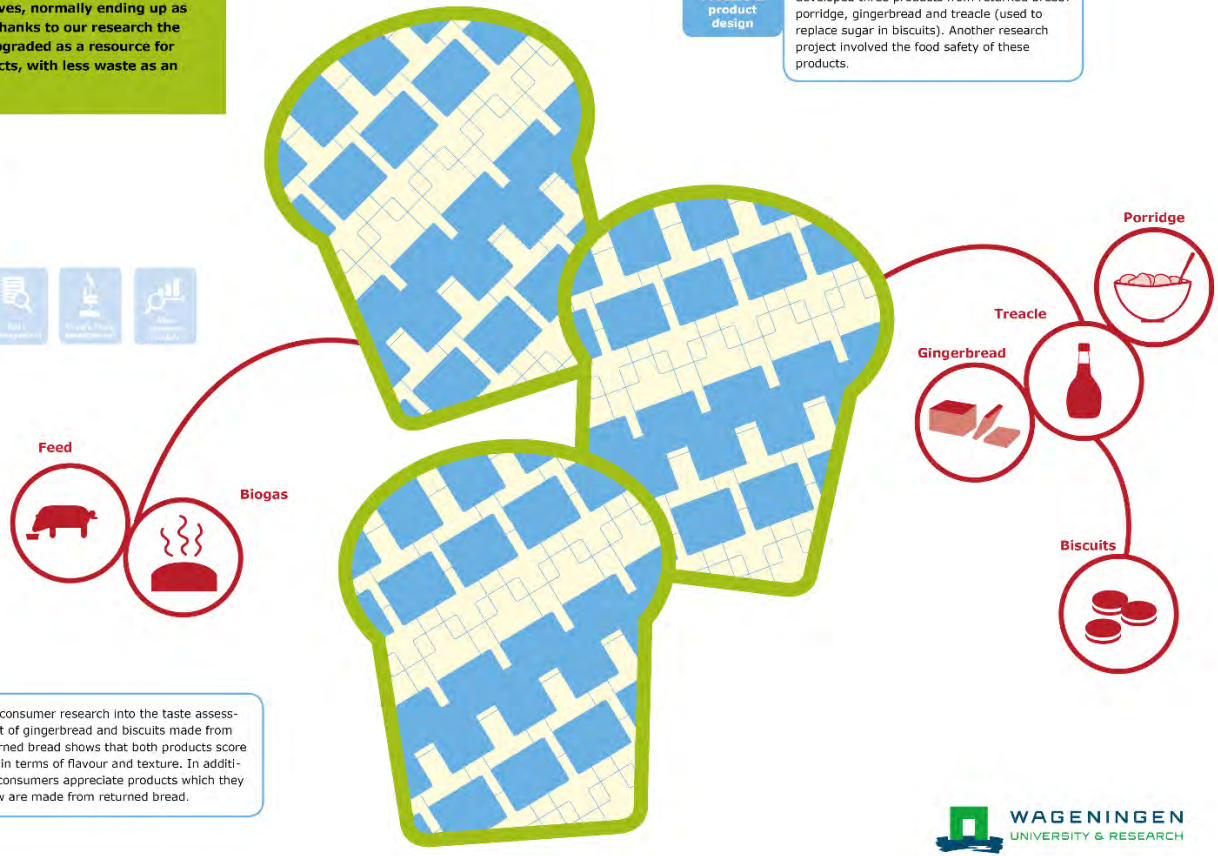
FROM BREAD TO BISCUITS. AND MORE.

A study by Wageningen Food & Biobased Research showed that consumers like the taste of biscuits made from unsold bread. A quarter of all bread baked is left on the shelves, normally ending up as animal feed or biogas. Thanks to our research the value of bread can be upgraded as a resource for flavoursome food products, with less waste as an added bonus.

OUR SERVICES

Process & product design

Wageningen Food & Biobased Research developed three products from returned bread: porridge, gingerbread and treacle (used to replace sugar in biscuits). Another research project involved the food safety of these products.



Consumer understanding

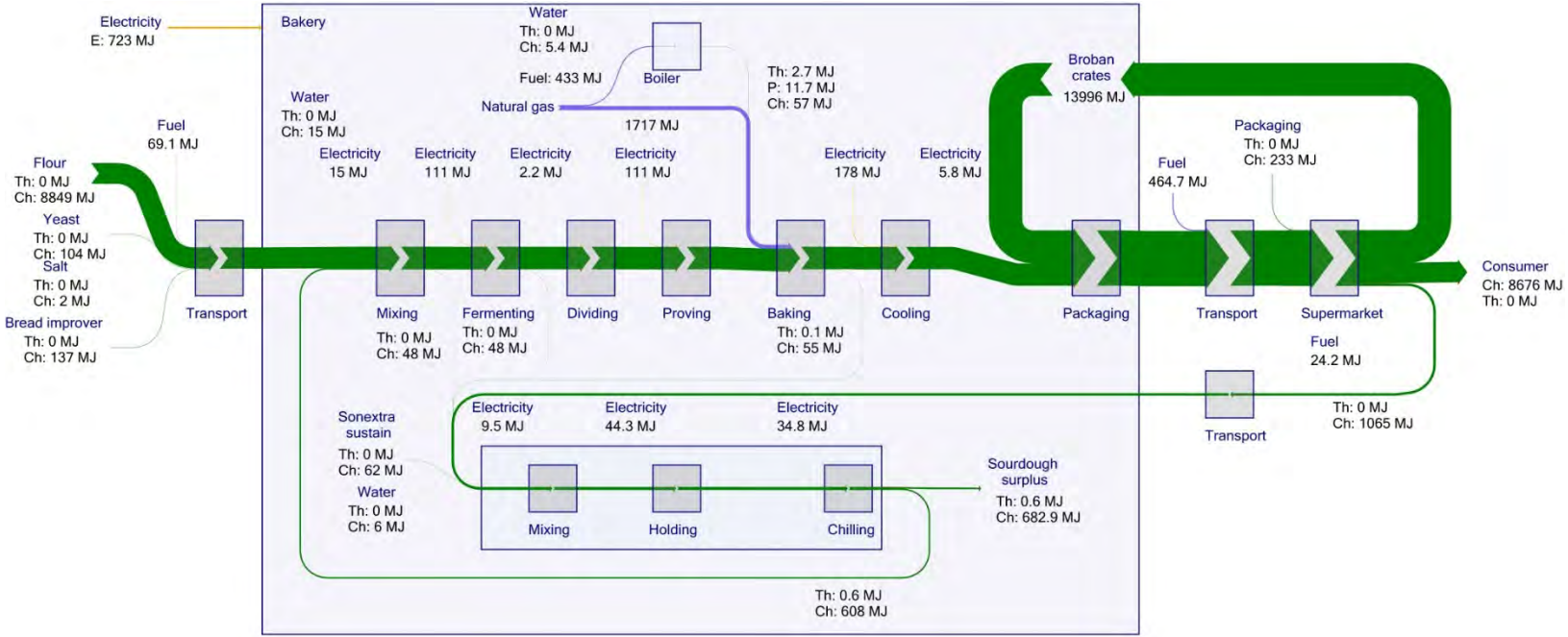
Our consumer research into the taste assessment of gingerbread and biscuits made from returned bread shows that both products score well in terms of flavour and texture. In addition, consumers appreciate products which they know are made from returned bread.

WAGENINGEN UNIVERSITY & RESEARCH

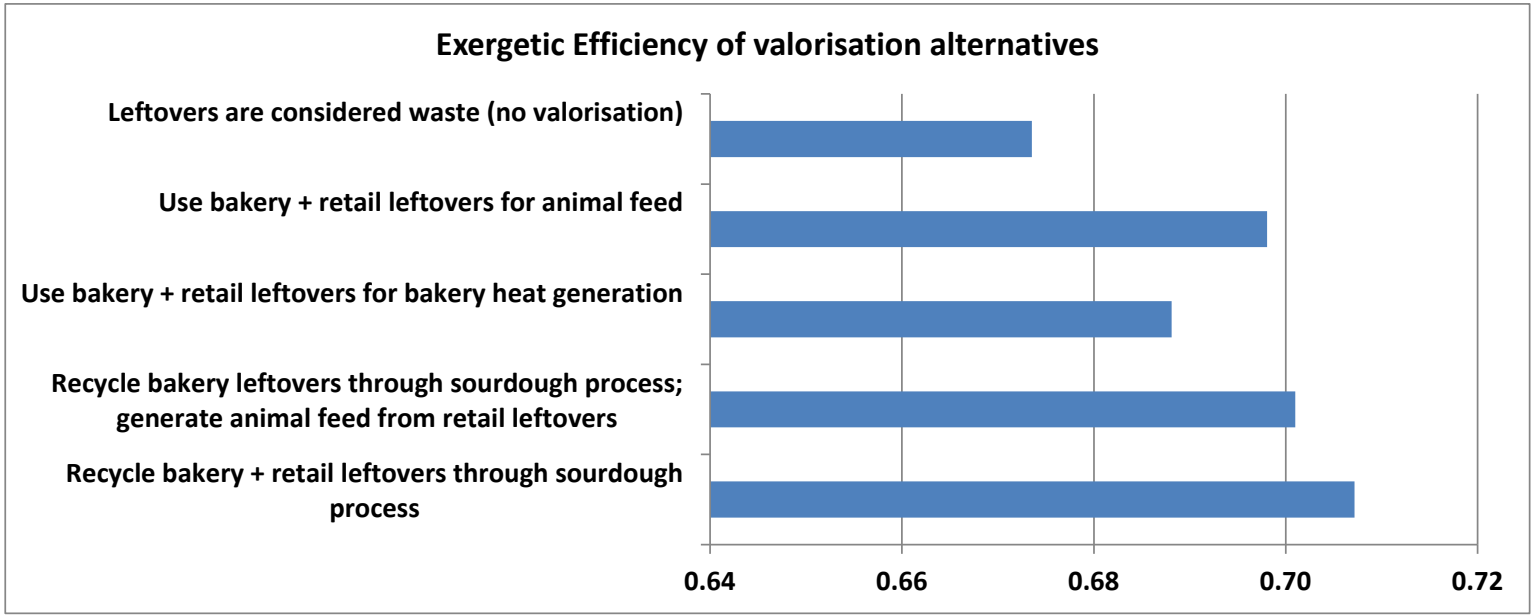
Wageningen Food & Biobased Research

Exergy modelling efficiency: bread chain

Example of a Grassmann diagram – Fermented breadcrumb chain (white)



Exergy modelling efficiency: bread chain



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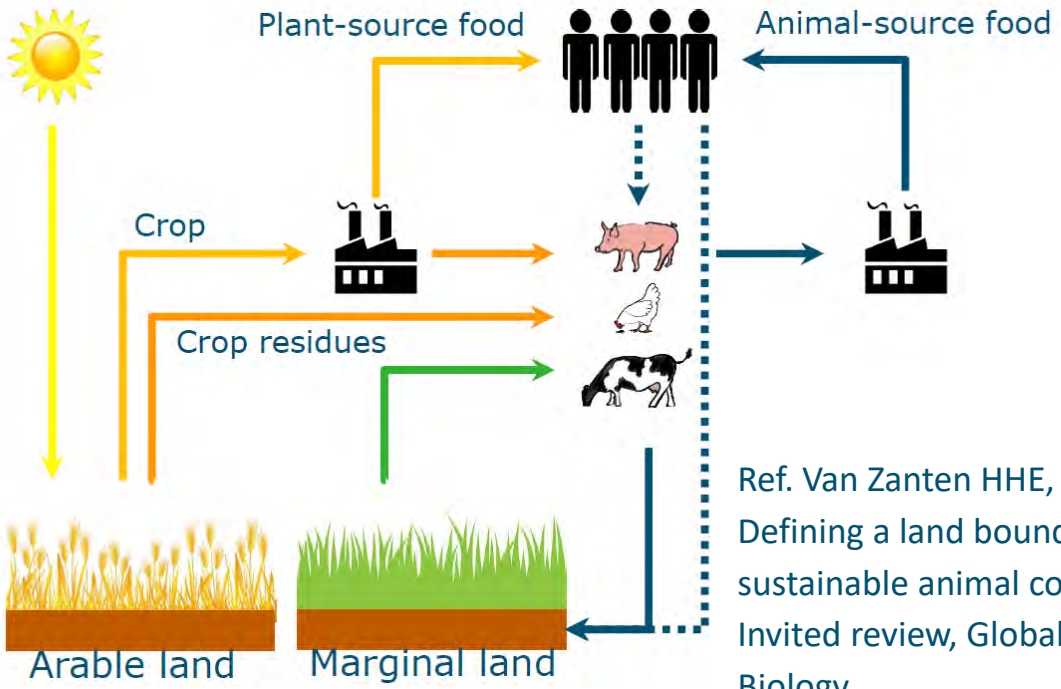
Wageningen Food & Biobased Research

Concept of a Circular Narrative



Ref. Van Zanten HHE, et al (2018) Defining a land boundary for sustainable animal consumption. Invited review, Global Change Biology

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Wageningen Food & Biobased Research

Use of food stuff for animal feed

Expert panel on the risk management of using treated surplus food in pig feed (www.eu-refresh.org)

Environmental impact of food waste recycling

	Pig feed (wet)	Pig feed (dry)	Biogas	Compost
Damage to the ozone layer				
Carcinogens				
Non-carcinogenic toxins eg heavy metals				
Ionizing radiation				
Photochemical oxidant formation				
Global Warming Potential *				
Freshwater eutrophication				
Marine eutrophication				
Terrestrial eutrophication				
Eco-toxicity				
Fossil fuel depletion *				
Depletion of other non-renewable resources				
Acidification				
Particulate matter emissions				

* The Global Warming Potential and fossil fuel depletion calculations use the current UK energy mix. If renewable energy were to be used for the processing of the feed, feed would score better on these aspects.

Circular food system, local where possible

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1918 — 2018

Smart technologies

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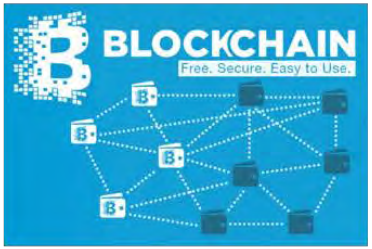
Food & Biobased
Research

New Business models



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Frameworks for action, some systemic aspects

- **Transparency** (Target, Measure, Act), Actions & Monitoring progress
- Supply chain **collaboration** (forecasting, utilisation & circular business models), value chains & **responsibility**
- **Externalities** & balance in economic, ecologic & social-economic impacts
- **Policy coherence** (prevention should come first)
- **Economic & legal frameworks** (food -> feed)
- Commitment for a collective **consumer driven** action program (building on harmonised consumer insights research)

UNITED AGAINST FOOD WASTE

Refresh Community of Experts

Knowledge and Best Practice on Food Waste Prevention

refreshcoe.eu

toine.timmermans@wur.nl

WAGENINGEN UNIVERSITY & RESEARCH

100years 1918 — 2018

FIGHT FOOD WASTE
Cooperative Research Centre
REDUCE - TRANSFORM - ENGAGE
Governance
Australian Government
Department of Industry, Innovation and Science
Business
Cooperative Research Centres Program

Audit, Risk & Compliance

Membership – Alain Pillay (Chair)
Sandra Hook
Christine Giuliano
Geoff Starr

Key Responsibilities:

- Financial Management & Reporting
- External Audit
- Risk Management
- Compliance Management

Remuneration & Nominations

Membership – Sandra Hook(Chair)
Toine Timmermans
John Webster
Kimon Taliadoros (External Member)

Key Responsibilities

- Remuneration and other personnel policy
- Board performance review and Director remuneration
- Nominations for Director election

Research & Commercialisation

Membership – Christine Giuliano(Chair)
Toine Timmermans
Robbie Davis
Alain Pillay
Prof Vincent Bulone (Uni of Adelaide nomination)

Key Responsibilities:

- All research and training activities are relevant to the objects of the Company and help achieve the KPI's agreed with the Commonwealth
- All research and training activities are of a world class standard
- All research activities include a commercialisation plan that aims to maximise benefits to industry participants
- Nominations for membership of the Company
- Nominations for new Core and Supporting Participants

CRC Industry Impact

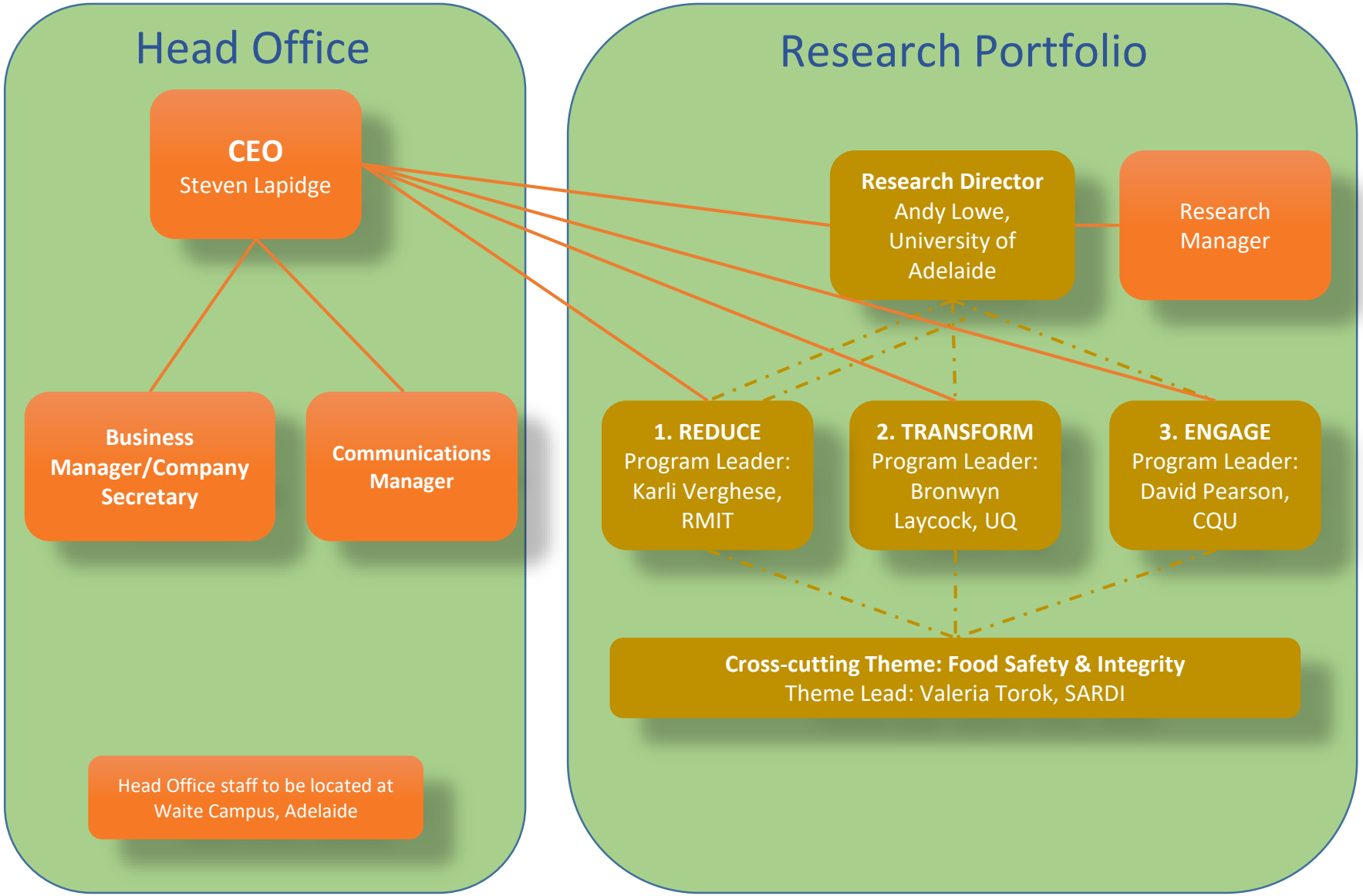
Membership – Geoff Starr(Chair)
Toine Timmermans
Robbie Davis
John Webster
Chris Deveney (Participant Representative)

Key Responsibilities:

- Maximise the economic, environmental & social returns from food waste for industry participants and to develop the circular food economy
- Facilitate the achievement of UN Sustainable Development Goal 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
- Reviews of stakeholder engagement

FIGHT FOOD WASTE
Cooperative Research Centre
REDUCE - TRANSFORM - ENGAGE
Research programs and projects
Australian Government
Department of Industry, Innovation and Science
Business
Cooperative Research Centres Program

Operational structure



Research Programs
- Activities
- Projects
- Outputs
- Milestones
- Impact

REDUCE
Research Program

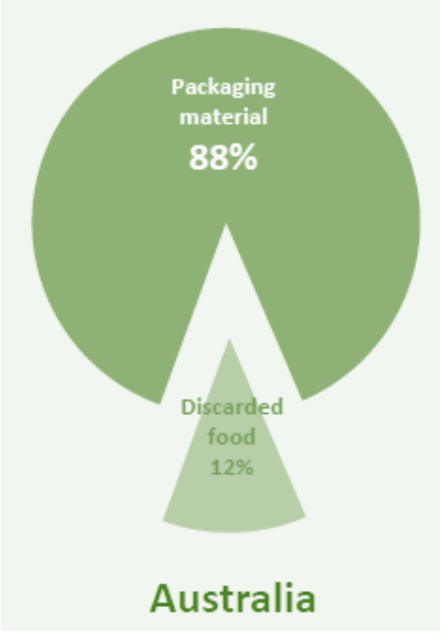
Karli Verghese

FIGHT FOOD WASTE CRC

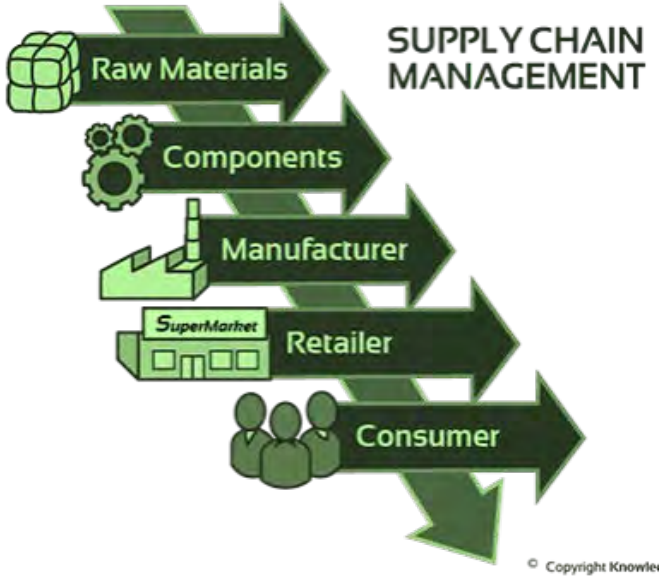
REDUCE

Key Activities

Map resource flows & root cause analysis



Packaging function & consumer perceptions

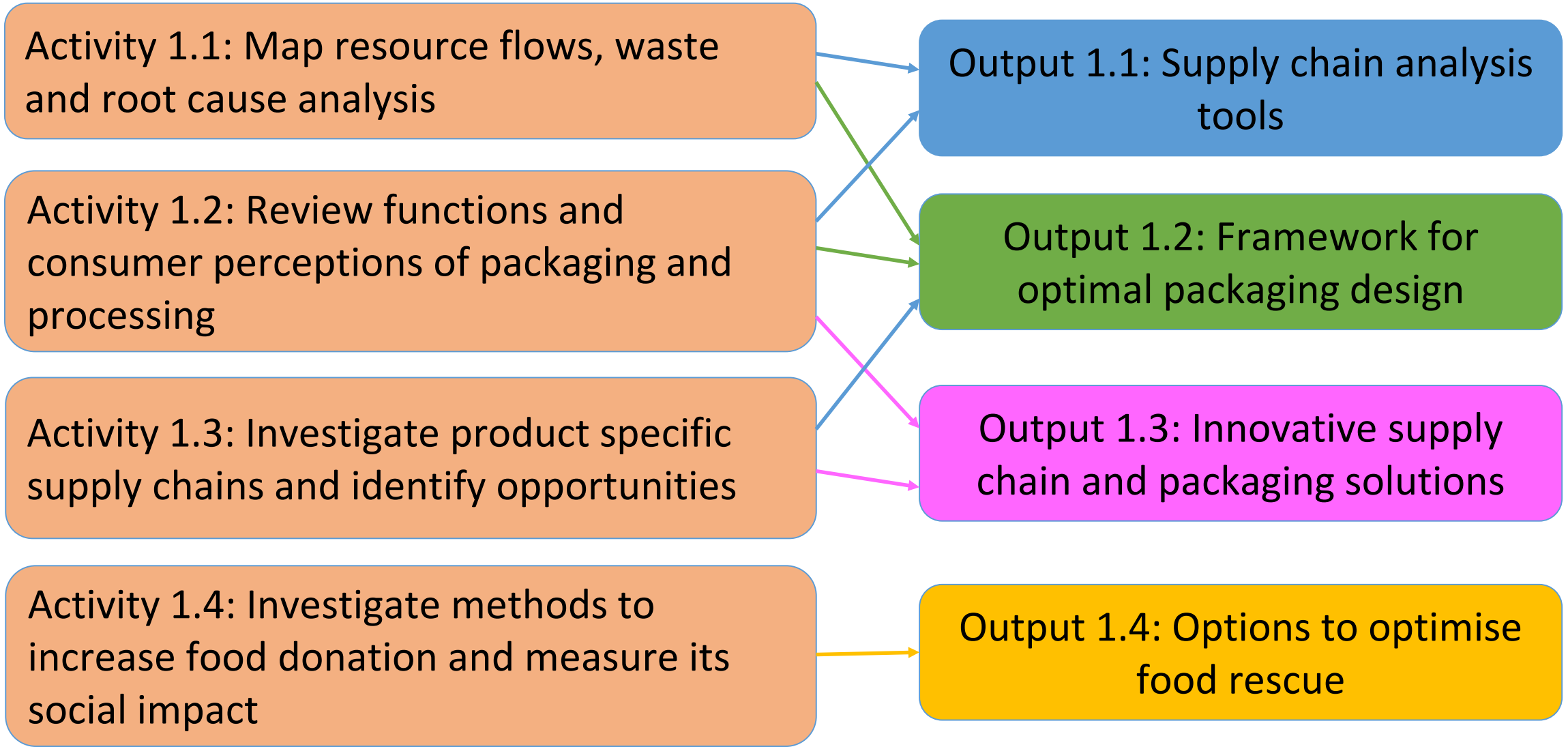


Product-packaging specific supply chains

Increase food donation

REDUCE

Key Activities and Outputs



REDUCE

Activity 1.1: Map resource flows, waste and root cause analysis

Project 1.1.1 Dynamic Industry Resource Efficiency Calculation Tool (DIRECT)

Project 1.1.2 EcodEX Life Cycle Assessment Modelling

Project 1.1.3 National food waste baseline, benchmarking and metrics

Project 1.1.4 T-Provenance Blockchain Technology

Project 1.1.5 Chameleon Asset Protection Technology

OUTPUT 1 – SUPPLY CHAIN ANALYSIS TOOLS	1	2	3	4	5	6	7	8	9	10
RP1.1 Data collection methods and business systems identified										
RP1.2 Pilot data systems and benchmark metrics										
RP1.3 Mapping of selected supply chains, data systems refined										
RP1.4 Analyse data, insights developed, benchmark metrics released										
RP1.5 Review data, pilots, metrics, benchmarks released										
RP1.6 Update models from pilot reviews, sector benchmarks										
RP1.7 Robust data collection system, benchmark metrics and models delivered										

REDUCE

Activity 1.2: Review functions and consumer perceptions of packaging & processing

Project 1.2.1 The development of packaging saves food and processing guidelines & frameworks

Project 1.2.2 Consumer behaviours and perceptions of packaging

Project 1.2.3 Cold chain integrity

Project 1.2.4 Connections to iMOVECRC foodagility

OUTPUT 2 – FRAMEWORK FOR OPTIMAL PACKAGING DESIGN	1	2	3	4	5	6	7	8	9	10
RP 1.8 Design guidelines and frameworks reviewed – packaging saves food										
RP1.9 Packaging design features, Case studies, Guidelines drafted and pilots										
RP 1.10 Consumer perceptions reviewed, study designed and conducted										
RP 1.11 Consumer insights analysed, pilot use of guidelines and implement NPD										
RP 1.12 Refine guidelines and frameworks; Insights from consumer study released										
RP 1.13 Expand case study library, guidelines into NPD processes, Consumer database										
RP 1.14 Consolidated pkg design guidelines/framework delivered; Industry Case Studies and Consumer database expanded										

AIP Australian Institute of Packaging
APPMA Australian Packaging and Processing Machinery Association Limited
FIAL Catalyst for Growth
australian institute of food science & technology
Australian Food & Grocery Council
Sustainability Victoria
AFCCC Australian food cold chain council
Woolworths Australia's fresh food people

REDUCE

Activity 1.3: Investigate product specific supply chains & identify opportunities

Project 1.3.1 Costa Group Product Category Mapping of Waste and Opportunities

Project 1.3.2 Bananas and cold chain integrity for export

Project 1.3.3 Reducing thermal processing requirements for retorted Abalone

Project 1.3.4 Prawn industry opportunities

Project 1.3.5 Truffle products – value adding and shelf life extension

Project 1.3.6 New box design for products

OUTPUT 3 – INNOVATIVE SUPPLY CHAIN & PACKAGING SOLUTIONS	1	2	3	4	5	6	7	8	9	10
RP 1.15 Supply chain mapping, issues & opportunities identified										
RP 1.16 Applicability / feasibility new & emerging processing & packaging researched										
RP 1.17 Pilot testing undertaken, monitoring options for targeted product										
RP 1.18 LCA of packaging and supply chains										
RP 1.19 Performance testing undertaken, feasibility of scale up, consumers consulted										
RP 1.20 Review pilots, assessments, testing, stakeholder engagement. Finalise and deliver product-packaging solutions for identified products										

REDUCE

Activity 1.4 Investigate methods to increase food donation and measure its social impact

Project 1.4.1 Food rescue annual survey

Project 1.4.2 Food rescue mapping and technology innovation

Project 1.4.3 Food rescue – taxation laws

Project 1.4.4 Food rescue – managing volunteers

OUTPUT 4 – OPTIONS TO OPTIMISE FOOD RESCUE	1	2	3	4	5	6	7	8	9	10
RP 1.21 Scan food rescue operations to identify opportunities for technology to improve efficiency and increase volumes										
RP 1.22 Develop prototype technologies for selected opportunities										
RP 1.23 Publication of food rescue / hunger report on annual basis										
RP 1.24 Develop policy case for change in taxation to facilitate donation of transport services for rescuing food – identify funding partners / report										
RP 1.25 Develop policy case for changes in taxation to facilitate donation of food to food rescue –identify funding partners / report										

REDUCE

CHALLENGES

Limited cash for national baseline & metrics project

Awaiting benchmark project by DoEE (2018) and NFWS Implementation Plan

Lack of packaging companies involvement

Awaiting Australian Packaging Covenant Organisation board decision to join; Briefing packaging companies; Utilising AIP and APPMA to garner members interest

Limited cash for food donation projects

Working with Foodbank to identify opportunities and opportunities to bring their partners and networks into the CRC through case studies and pilots

REDUCE

INDUSTRY IMPACTS

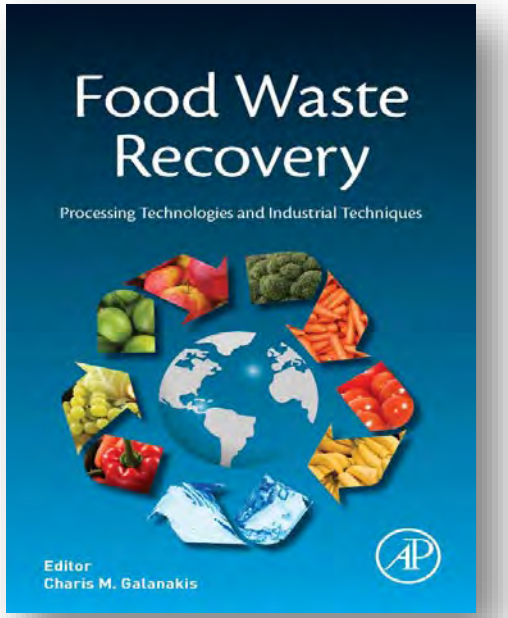
- ✓ More efficient supply chain management practice
- ✓ Better understanding by the consumer of the role of packaging in reducing food waste
- ✓ Longer shelf life for food products
- ✓ Lower volumes of food wastage
- ✓ Ability to access new markets for Australian food
- ✓ Less packaging in landfill
- ✓ Additional 20M kg pa of rescued food distributed
- ✓ 2,600 welfare agencies supported
- ✓ Reduction in number of hungry people turned away from welfare agencies
- ✓ $136M pa social return on investment
- ✓ Reduce greenhouse gas emissions and landfill costs

TRANSFORM
Research Program

Bronwyn Laycock

TRANSFORM

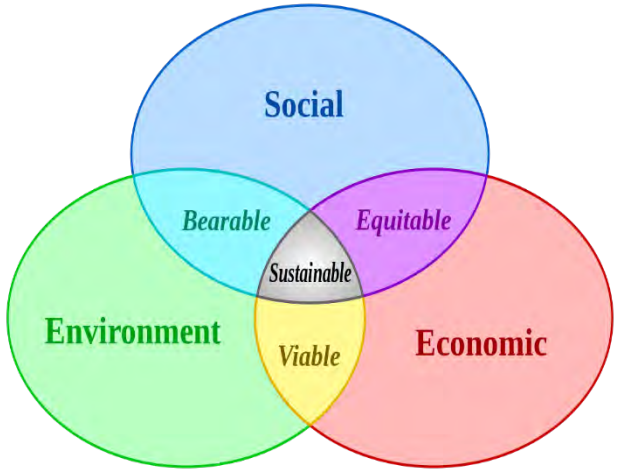
Key Activities



Valuable products from waste

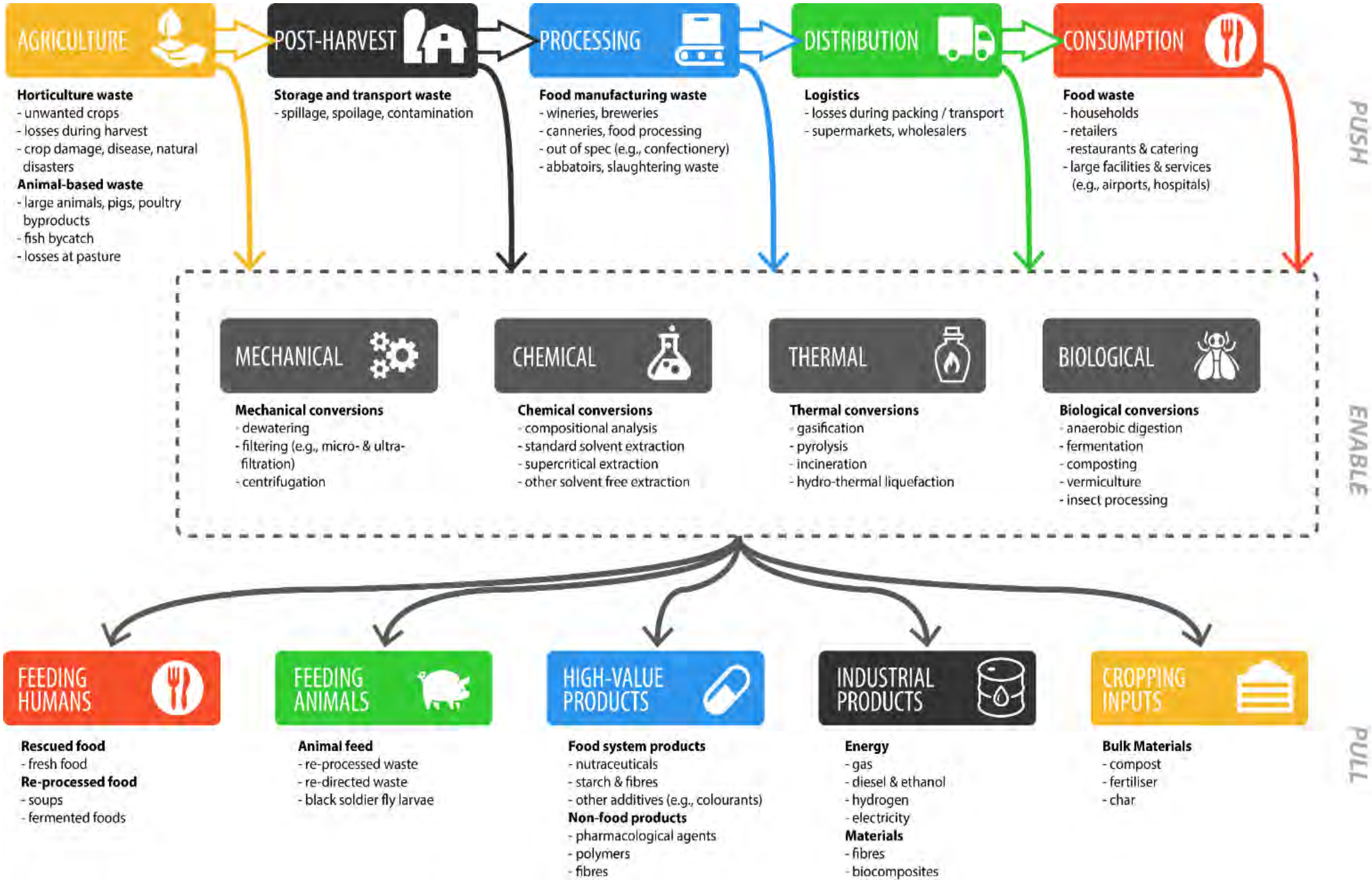
Technology gaps & processes

Decision Support Tools



Socio-economic & policy evaluation

TRANSFORM


AGRICULTURE
POST-HARVEST
PROCESSING
DISTRIBUTION
CONSUMPTION
Horticulture waste
- unwanted crops
- losses during harvest
- crop damage, disease, natural disasters
Animal-based waste
- large animals, pigs, poultry byproducts
- fish bycatch
- losses at pasture
Storage and transport waste
- spillage, spoilage, contamination
Food manufacturing waste
- wineries, breweries
- canneries, food processing
- out of spec (e.g., confectionery)
- abbatoirs, slaughtering waste
Logistics
- losses during packing / transport
- supermarkets, wholesalers
Food waste
- households
- retailers
-restaurants & catering
- large facilities & services (e.g., airports, hospitals)
PUSH
MECHANICAL
CHEMICAL
THERMAL
BIOLOGICAL
Mechanical conversions
- dewatering
- filtering (e.g., micro- & ultra-filtration)
- centrifugation
Chemical conversions
- compositional analysis
- standard solvent extraction
- supercritical extraction
- other solvent free extraction
Thermal conversions
- gasification
- pyrolysis
- incineration
- hydro-thermal liquefaction
Biological conversions
- anaerobic digestion
- fermentation
- composting
- vermiculture
- insect processing
ENABLE
FEEDING HUMANS
FEEDING ANIMALS
HIGH-VALUE PRODUCTS
INDUSTRIAL PRODUCTS
CROPPING INPUTS
Rescued food
- fresh food
Re-processed food
- soups
- fermented foods
Animal feed
- re-processed waste
- re-directed waste
- black soldier fly larvae
Food system products
- nutraceuticals
- starch & fibres
- other additives (e.g., colourants)
Non-food products
- pharmacological agents
- polymers
- fibres
Energy
- gas
- diesel & ethanol
- hydrogen
- electricity
Materials
- fibres
- biocomposites
Bulk Materials
- compost
- fertiliser
- char
PULL

TRANSFORM

Key Activities & Outputs

Activity 2.1: Identify and prioritise products from waste streams	Output 2.1: Commercially valuable products from waste
Activity 2.2: Identify technology gaps and process limitations in waste transformation	Output 2.2: Commercial prototype technologies for waste transformation
Activity 2.3: Deliver toolkit for optimizing technology and feedstock combination choice	Output 2.3: Framework to optimise viability of technology and waste input combinations
Activity 2.4: Conduct socio-economic assessment of alternative policy settings	Output 2.4: Regulatory options to promote investment in Waste Transformation

TRANSFORM

Activity 2.1: Identify and prioritize products from waste

Project 2.1.1 Unlocking value from waste and surplus horticultural produce

Project 2.1.2 Victorian horticulture project

Project 2.1.3 Northern Australia CRC project

Project 2.1.4 Sandalwood nut/ truffles/other waste transformation

Project 2.1.5 Making ACC circular

Project 2.1.6 Pre-biotics from potato waste

Project 2.1.7 Mushroom chogs and compost

Project 2.1.8 Valorization of seafood processing waste

TRANSFORM

Activity 2.1: Identify and prioritize products from waste

Milestone	1	2	3	4	5	6	7	8	9	10
RP2.1 Existing relevant waste streams surveyed, near market opportunities identified										
RP2.2 Initial proof of concept testing completed, IP registered										
RP2.3 Further waste streams surveyed, further market opportunities identified, IP registered										
RP2.4 Rapid screening protocols developed, Further waste streams surveyed, further market opportunities identified, IP registered										
RP2.5 Proof of concept testing established for new business cases, IP for new product solutions registered										
RP2.6 Future product roadmap developed										

TRANSFORM

Activity 2.2: Identify process gaps and technology limitations in waste transformation

Project 2.2.1 Valorizing compost

Project 2.2.2 Soil CRC

Project 2.2.3 Diesel or electricity from waste

Project 2.2.4 Karma^3 nutrient recycling system

Project 2.2.5 Food Waste to Animal Feed

Milestone	1	2	3	4	5	6	7	8	9	10
RP2.7 Technology needs reviewed, existing technologies surveyed, market opportunities identified										
RP2.8 Initial proof of concept testing of modular technologies completed, IP registered										
RP2.9 Further full scale review technology needs and gaps, new modular technologies developed, IP registered										
RP2.10 Establishment of demonstration facilities										
RP2.11 Iterative proof of concept testing for new technologies, IP registered										
RP2.12 Future technology roadmap developed										

TRANSFORM

Activity 2.3: Deliver toolkit for optimizing technology and feedstock combination choice

Project 2.3.1 Waste to Energy – Fuelling sustainable wastewater treatment with food waste

Project 2.3.2 Food Waste Solutions Centre

Milestone	1	2	3	4	5	6	7	8	9	10
RP2.13 Initial data set collated; review of available technologies; protocol circulated										
RP2.14 Process models delivered and validated for known technologies										
RP2.15 Techno-economics for process regions conducted										
RP2.16 Updated models developed with state-of-the art technologies										
RP2.17 Regional models delivered using consistent framework and most robust data										
RP2.18 Updated, large scale, sector-focussed integrated model for regions developed										
RP 2.19 Methodology toolkit delivered										

TRANSFORM – Enterprise Solutions Centre

FIAL

Growing the share of Australian food in the global marketplace

Value from Waste ESCP

As part of our support to the National Food Waste Strategy, FIAL is pleased to announce a call for projects that are specifically focused on creating value-added products from food waste. This is in addition to the current call for projects to the FIAL **Enterprise Solutions Centre Program.**

TRANSFORM

Activity 2.4: Conduct socio-economic assessment of alternative policy settings

Project 2.4.1 Transforming waste into a regional economic benefit

Milestone	1	2	3	4	5	6	7	8	9	10
RP2.20 Stakeholder survey; initial review of existing policy/legislation										
RP2.21 Review of regulatory barriers for markets										
RP2.22 Socio-economic assessment of alternative policy settings completed; Report to stakeholders and Government										
RP2.23 Updated stakeholder surveys										
RP2.24 Updated review of regulatory barriers for markets										
RP2.25 Further socio-economic assessment of alternative policy settings completed; Report to stakeholders and Government										
RP 2.26 Final review – perceived future risks and barriers										

TRANSFORM

CHALLENGES

Lack of partners delivering modular and other relevant transformation technology (e.g. dewatering, extractives)

Will address in the interim by running pilots at available facilities

Development of appropriate desktop models in Activity 2.3

Will address this through PhD projects initially, supported by Program Manager role

Lack of project/s specifically funded to deliver on assessment of policy settings

Will address through FIAL and probable National Food Waste Strategy partnerships, supplemented with targeted PhD research

TRANSFORM

INDUSTRY IMPACTS

- ✓ Innovative new food products and value chains from surplus food.
- ✓ Reduce waste to landfill
- ✓ Contribute to the UN SDG 12.3 (50% by 2030)
- ✓ New and optimised technologies to deliver cost-effective processing
- ✓ Health benefits from bioactives and functional foods
- ✓ Decision Support Tools for industry
- ✓ Policy support for sustainable waste transformation industries
- ✓ At least 87 GL of water savings through recovery and reuse
- ✓ At least 30M tonnes in reduced food waste.
- ✓ 5,200 jobs (direct and indirect), most in rural areas.
- ✓ $600M reduction of waste produce and waste handling costs.
- ✓ A saving of at least 44M tonnes of greenhouse gases emitted over 10 years.

ENGAGE
Research Program

David Pearson

ENGAGE

ENGAGE

Education

Training

Australia-wide consumer interventions

ENGAGE

ENGAGE

Activity 3.1: Educate future industry professionals	Output 3.1: Educate future industry professionals
Activity 3.2: Disseminate industry and skills training	Output 3.2: Industry dissemination and skills training
Activity 3.3: Develop household and business behaviour change instruments	Output 3.3: Household and business behaviour change

ENGAGE

Activity 3.1: Educate future industry professionals

Project 3.1.1 Training for Higher Degree Research students (PhD and MSc)

30 PhD students, duration four years

12 MSc students, duration two years

Four cohorts commencing in years 1,2,3,4

Support from FFWCRC $25,000/student/year

Students complete:

- Graduate Certificate in Business (with host University)
- Future Leaders Program (Project 3.1.2 with Honey & Fox)
- Career Mentoring Program (Project 3.1.3 with KPMG)

Project 3.1.4 Affiliates program for non-FFWCRC students

Milestone	1	2	3	4	5	6	7	8	9	10
RP3.1 Commencement of 30 PhD students										
RP3.2 Completion of 25 PhD students										

ENGAGE

Activity 3.2: Disseminate industry and skills training

Project 3.2.1 Industry Extension Hub

Project 3.2.2 Annual FFWCRC Conference

Project 3.2.3 Annual FFWCRC Awards

australian institute of food science & technology

AUSTRALIAN FOOD & GROCERY COUNCIL

Woolworths

East Gippsland Food Cluster Inc

FOOD SOUTH AUSTRALIA FEEDING CONNECTIONS

APPMA Australian Packaging and Processing Machinery Association Limited

Industry Association

AIP Australian Institute of Packaging

Retailer

Regional Association

REFRIGERANTS AUSTRALIA

Regional Development Australia MURRAYLANDS & RIVERLAND SOUTH AUSTRALIA

CCIC CENTRAL COAST INDUSTRY CONNECT

Industry Extension Hub

FOOD BANK

Charity

FIAL

Sustainability Victoria

Honey & Fox

Service Provider

Government

OZHARVEST

PiperAlderman

KPMG

NSW EPA

Government of South Australia Green Industries SA

Milestone	1	2	3	4	5	6	7	8	9	10
RP3.3 Industry dissemination and skills training – Needs analysis										
RP3.4 Industry dissemination and skills training – Update of needs analysis										

ENGAGE

Activity 3.3: Develop household and business behaviour change instruments

Project 3.3.1 Consumers saving food: Australia-wide measurement of food waste caused by consumers and identification of impactful behaviour change interventions

Milestone	1	2	3	4	5	6	7	8	9	10
RP3.5 Behaviour change for household members: Undertake survey of food buyers and present findings in report that will be made available to Project participants										
RP3.6 Behaviour change for household members: Develop interventions										

ENGAGE

CHALLENGES

Inability to recruit appropriately qualified and motivated Higher Degree Research students

Being addressed through provision of financial contribution, management training and industry mentoring for students

Only modest funding for industry training

Will address through leveraging training already being undertaken by CRC industry participants

Lack of funding to deliver Australia-wide consumer behaviour change interventions

Will align with partners who are able to deliver interventions, particular emphasis on opportunities emerging from National Food Waste Strategy

ENGAGE

INDUSTRY IMPACTS

- ✓ Future industry professionals, including at least 30 PhD and 12 Masters graduates in a rapidly growing field.
- ✓ New industry training packages and tools.
- ✓ Up-skill industry through an extensive extension network involving many peak industry associations and institutes.
- ✓ Unite existing household and business food waste behaviour change activities in Australia while learning from the best WRAP (UK) who have saved UK consumers at least £13 billion.

FOOD SAFETY & INTEGRITY
Research Theme

Valeria Torok

FOOD SAFETY & INTEGRITY

FOOD SAFETY AND INTEGRITY

Cross cutting theme - REDUCE, TRANSFORM and ENGAGE

- Ensure the food safety of waste streams and end products utilised in human food, animal feed & nutraceutical production
- Consider food safety and integrity implications of new packaging materials & formats

FOOD SAFETY & INTEGRITY

FOOD SAFETY & INTEGRITY

Activity 1.2: Map resource flows, waste and root cause analysis

Activity 1.3: Investigate product specific supply chains and identify opportunities

Activity 2.1: Identify and prioritize products from waste

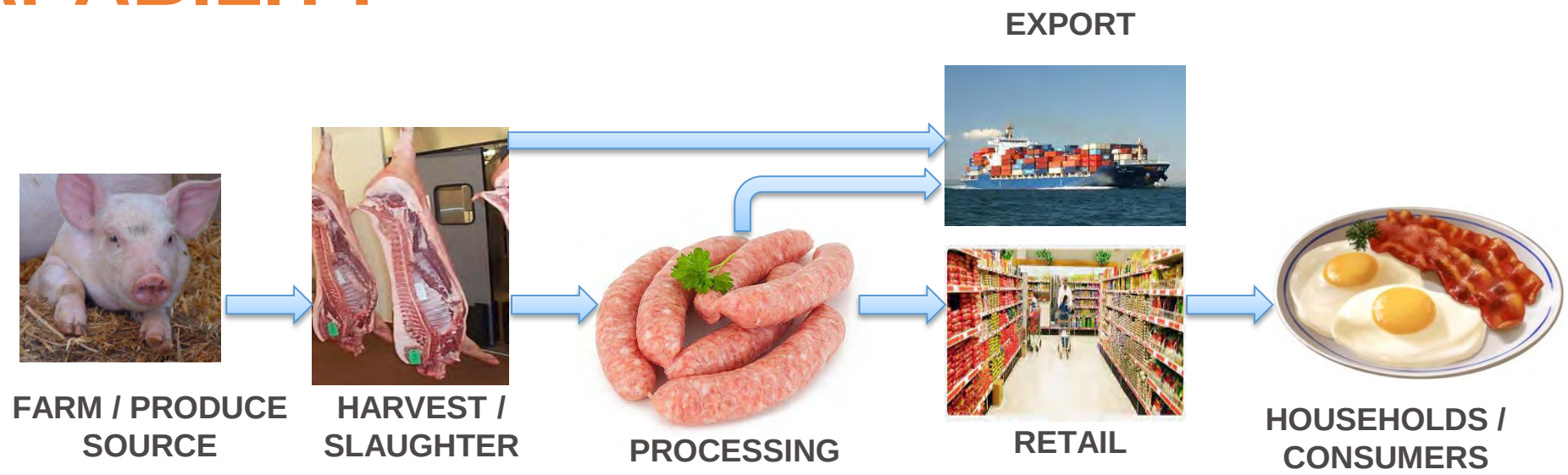
Output 1.1: Framework for optimal packaging design

Output 1.3: Innovative supply chain and packaging

Output 2.1: Commercially valuable products from waste

FOOD SAFETY & INTEGRITY

FOOD SAFETY IN THE SUPPLY CHAIN CAPABILITY



Risk Analysis

Lab Diagnostics

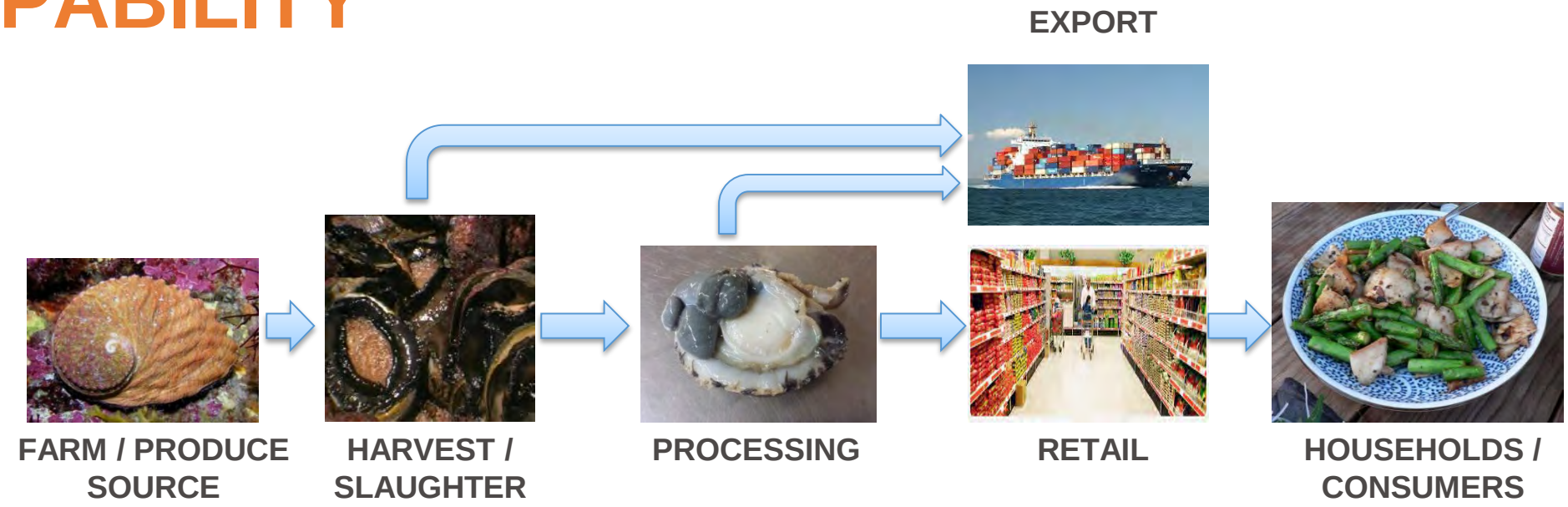
Process Control & Development

Risk Communication

Food Statistics

FOOD SAFETY & INTEGRITY

FOOD INNOVATION IN THE SUPPLY CHAIN CAPABILITY



FOOD SAFETY & INTEGRITY

REDUCE

Activity 1.2: Map resource flows, waste and root cause analysis

Milestone	1	2	3	4	5	6	7	8	9	10
RP1.8 Design guidelines & frameworks reviewed to consider role of packaging (saving food, food safety & quality, date labelling & shelf life)										

Activity 1.3: Investigate product specific supply chains and identify opportunities

Milestone	1	2	3	4	5	6	7	8	9	10
RP1.16 Applicability/feasibility of new and emerging processing and packaging (including cost, performance, food safety, consumer acceptance) researched.										

FOOD SAFETY & INTEGRITY

TRANSFORM

Activity 2.1: Identify and prioritize products from waste

Milestone	1	2	3	4	5	6	7	8	9	10
RP2.1 Existing waste streams surveyed. Market opportunities & food safety hazards identified. Near-market opportunities reviewed.										
RP2.3 Further waste streams surveyed for known and novel products. Further market opportunities & food safety hazards identified and reviewed. IP for new product solutions registered.										
RP2.4 Rapid screening protocols developed. Additional waste streams identified and surveyed for known and novel products. Market opportunities and food safety hazards identified and reviewed. IP registered.										

FOOD SAFETY & INTEGRITY

Project 2.1.8
Valorisation of seafood processing waste

Key Activities:

- Investigate alternatives to sulphur dioxide and use of sulphur dioxide
- Investigate abalone waste valorisation opportunities
- Investigate market driven opportunities for new products and preservation techniques

Abalone Council Australia Ltd

FRDC
FISHERIES RESEARCH & DEVELOPMENT CORPORATION

FOOD SAFETY & INTEGRITY

CHALLENGES

No separate funding for food safety and integrity research

Work will be embedded into projects and post graduate research and need evaluated during project formulation

INDUSTRY IMPACTS

- ✓ Demonstration that industry is proactive in evaluating and managing risks
- ✓ Food safety incidents have significant social, economical and reputational impact
- ✓ Reduced waste due to improved quality and shelf-life

FIGHT FOOD WASTE
Cooperative Research Centre
REDUCE - TRANSFORM - ENGAGE
Project Approval &
Future Research Calls
Australian Government
Department of Industry,
Innovation and Science
Business
Cooperative Research
Centres Program

PROJECT APPROVAL PROCESS

1. Program/Theme Leaders to work with Project Leaders throughout August to October to draft project proposals using the Project Agreement template.
2. Research Director + Business Manager to establish electronic project submission process in Zume in October-November.
3. Completed and endorsed (by Program Leader) project applications to be lodged in November once the agreement process is near completed.
4. All project applications will be reviewed by the Research & Commercialisation (RCC) Board sub-committee and potentially independent experts.
5. The RCC will make recommendations to the Board regarding project establishment/funding priority based on alignment to milestones in the Grant Agreement.
6. Once projects have been approved they will be established in Zume by the Research Office before they commence.
7. Key projects from the initial research portfolio will commence in January on once Board approved.

PROJECT APPROVAL PROCESS

Project Proposal Evaluation Form

Proposal Title: <Insert Here>
Program: <Insert Here>

Criteria	Score	Reviewers' Comments	Weighting
Impact on Industry	0	*Scale of 1 - 5 - Table below*	5
Innovativeness	0	*Scale of 1 for a repeat of previous R&D to 5 for an original/novel approach*	2
Proportion of Industry affected by outcomes	0	*1 - Local, 2 - Regional, 3 - State, 4 - National, 5 - International*	1
Return on Investment justifies project budget	0	*Based on a scale of 1 to 5, is the Cost of the project justified in terms of the proposed outcomes?*	5
Quality of the science and experimental approach- Technical Risk assessment	0	*Scale of 1 - 5 - Poor to Excellent*	2
Ease of adoption by the industry - Commercial risk assessment	0	*Based on a scale of 1 for complex and logistically challenging technologies to 5 for simple readily implemented technologies.*	3
Steps to Commercial Application of Proposed Outcomes - Commercial risk assessment	0	*Allows an understanding of how applicable and rapidly [or directly] a successful Project can be applied at the End User level - Scale 1-5* *1 - Two or More Projects expected to be required for End User application/impact* *2- A major Project expected to be required* *3- Field trial required* *4- A minor project required before application* *5 - Directly Applicable at End User Level*	2
Total Score	0	Max Score = 35	100

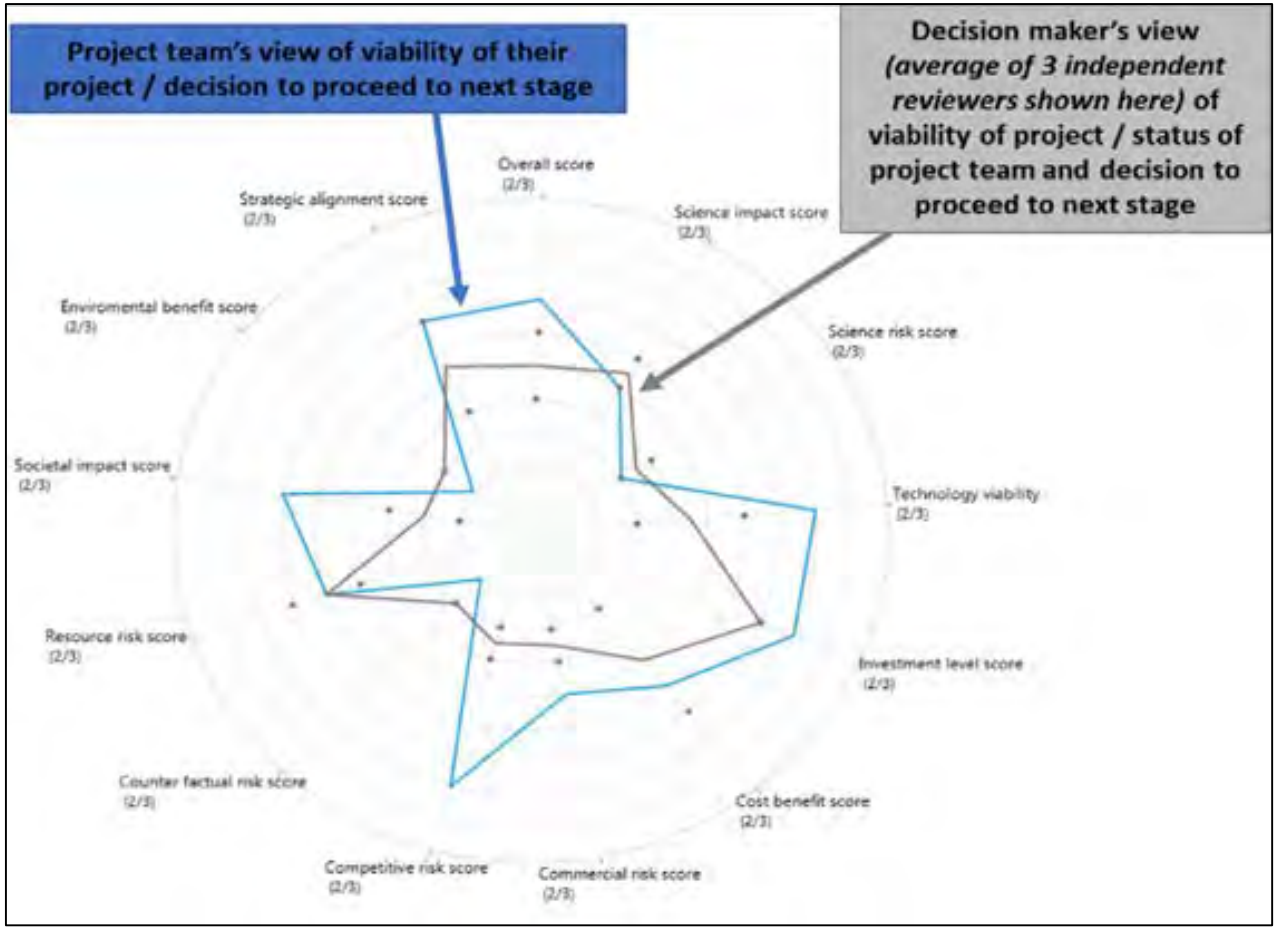
PROJECT APPROVAL PROCESS

Proposal Quality Assessment Factors		Reviewers' Comments	
Does the proposal address the priorities of the Program, and the strategic milestones of FFW CRC?	*Yes/ No*		
Is it collaborative?	*Yes/ No*		
Does the proposal address staff and other in-kind budgets for the Program?	*Yes/ No*		
Includes students and international collaboration.	*Yes/ No*		
Includes stop/go project milestones	*Yes/ No*		
Includes detail on potential IP and commercialisation opportunities likely to arise from the project	*Yes/ No*		
Reviewer's Recommendation		*Should the project the project be funded?* *1- Recommended* *2- Recommended, with minor revisions* *3- Recommended with major revisions* *4- Funding not recommended*	
Reviewer's Comments			

Impact Assessment Table

Impact on Industry	High	5	4	3
	Med	4	3	2
	Low	3	2	1
		High	Med	Low
		Probability of Success		

PROJECT APPROVAL PROCESS



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