

Status of organic waste management in the Western Cape

Insights from GreenCape

More Value, Less Waste

09 May 2017

Status of organic waste in the Western Cape

Current landscape

- **Western Government landfill diversion targets**
 - **50%** reduction in 5 years, **100%** in 10 years
- **More stringent regulations**
 - **banning of certain wastes** (e.g. abattoir)
 - **revised norms and standards**
- **Increased cost of disposal to landfill**
 - **Logistics** often a key factor
- **Increased interest in alternative waste management methods**
 - **Value addition** and cost **savings** opportunities
 - Variety of **technologies and methods** available

Bioeconomy Programme

Goal

To unlock the potential of the Western Cape's bio-based resources and drive the “greening” of agricultural value chains.

This is done through promoting the uptake of investment in green technology, processes & systems.

Western Cape food value chains

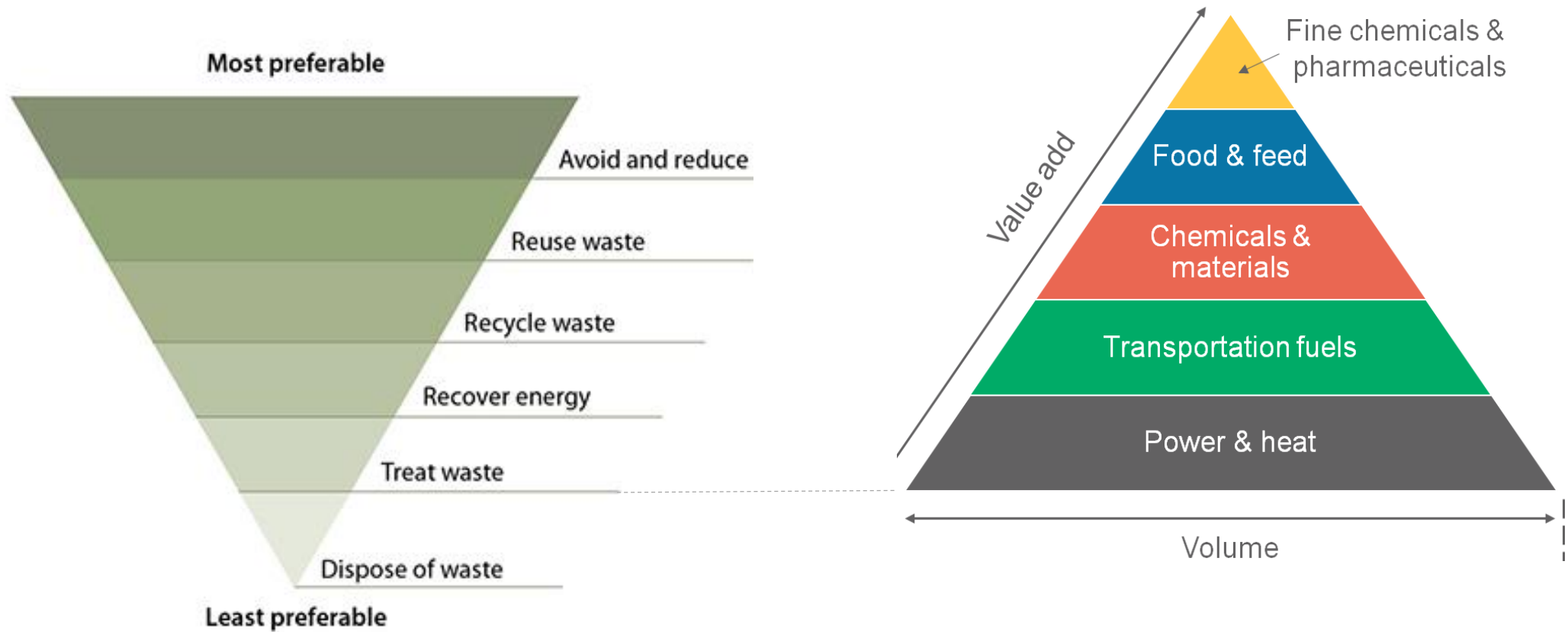
Scoping study: Value-add to organic residues

- Strategic scoping study on value-add opportunities for organic waste/residues in food value chains
 - Duration: 3 month study (Nov 2016 – Feb 2017)
 - Identify at least 2 value add opportunities for further development
 - Provide general recommendations for enabling actions by the WCG for the uptake of value-add opportunities

- Economic perspective
 - Business viability
 - Business matching / support & activities for selected value chains
 - Inform recommendations to government & direct GreenCape & partners' efforts to support business

Guiding principles

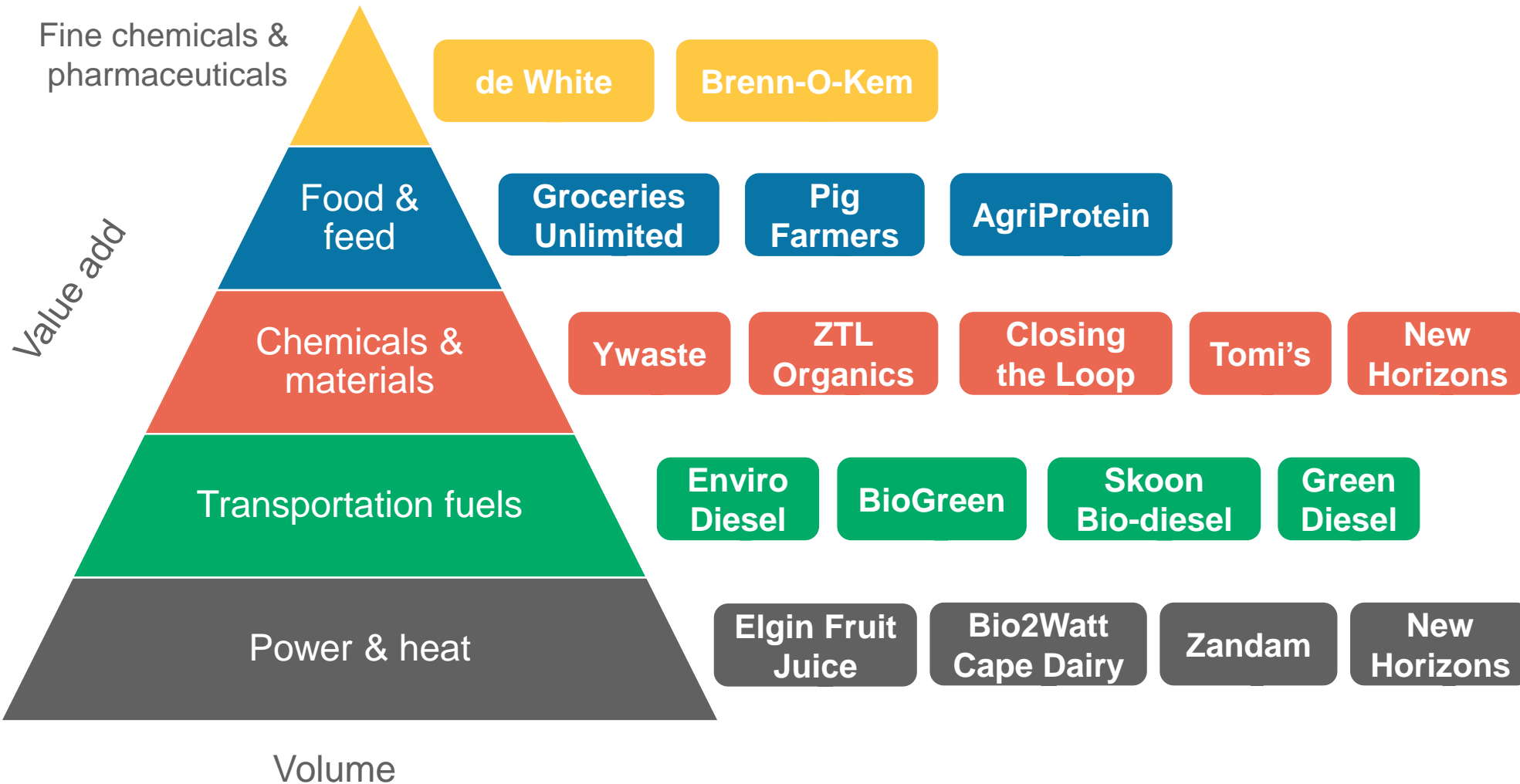
Waste and value-add hierarchy



Sources:
Waste hierarchy: <http://www.epa.nsw.gov.au/wastestrategy/waste-hierarchy.htm>
Value-add hierarchy: adapted from the Bioeconomy Study Tour, Netherlands Department of Foreign Affairs, 2015

Case studies

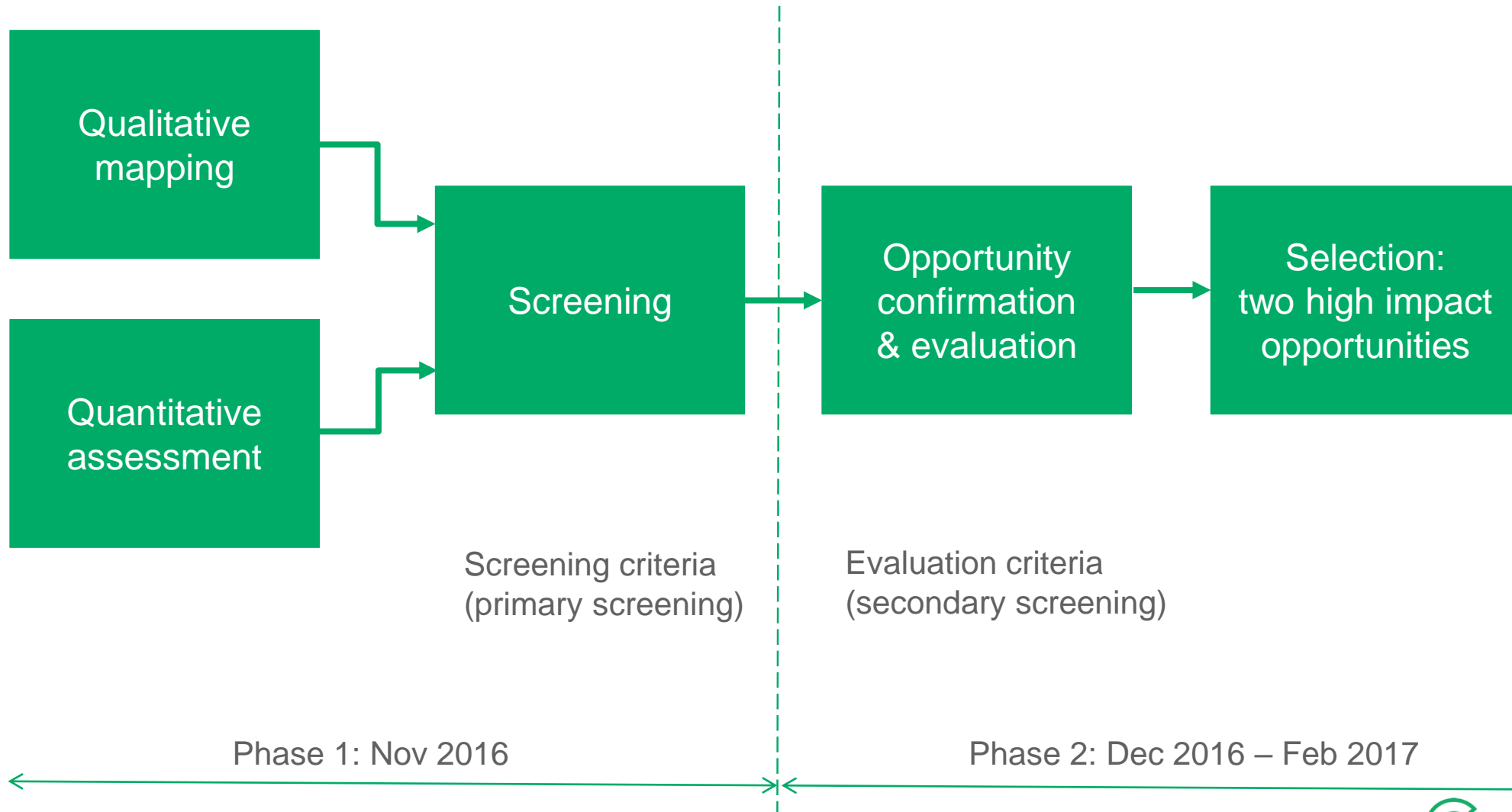
Western Cape organic waste solution providers



Organic waste
diversion potential
≈176 000 ton/year

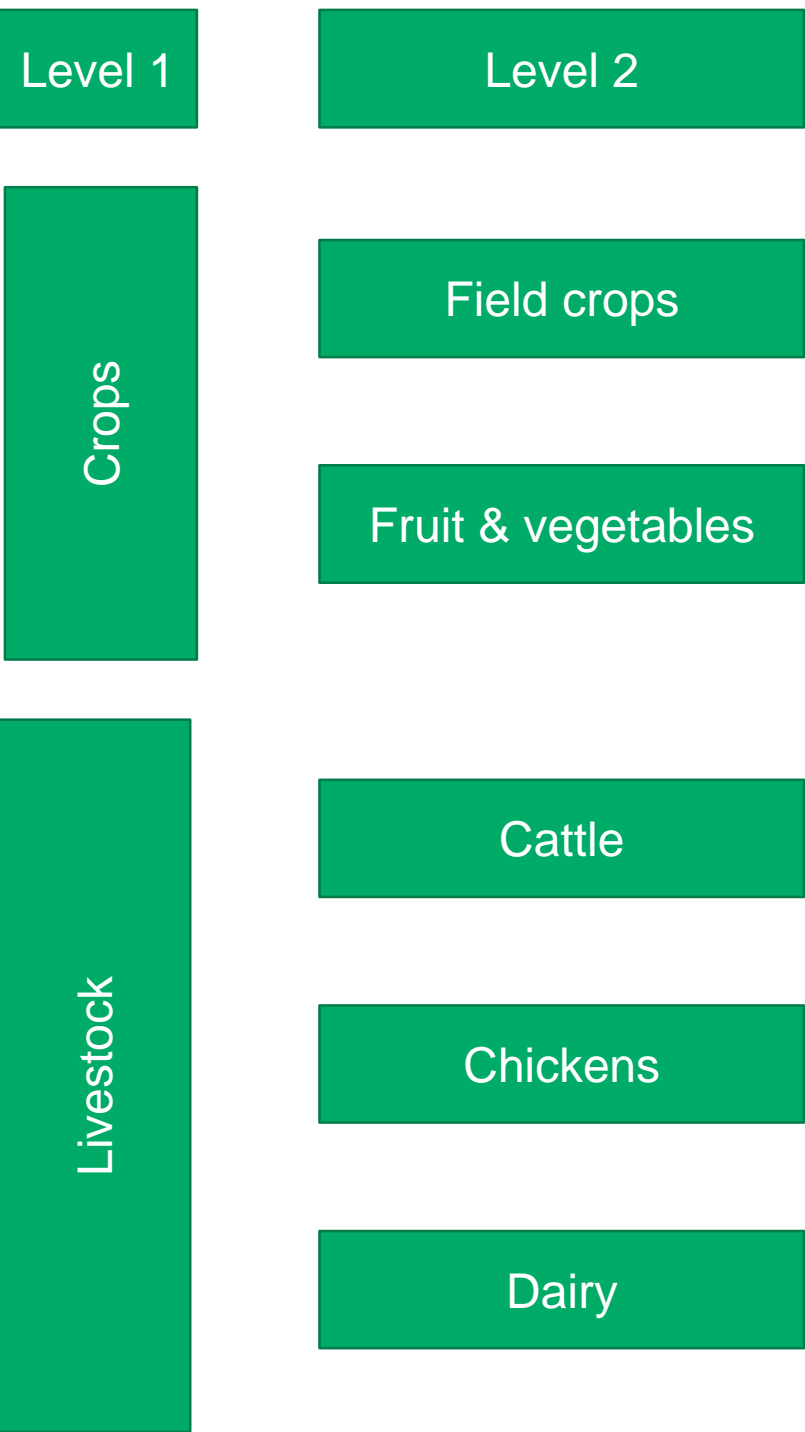
Methodology

Overall approach



Note: excludes seafood value chains due to time constraints

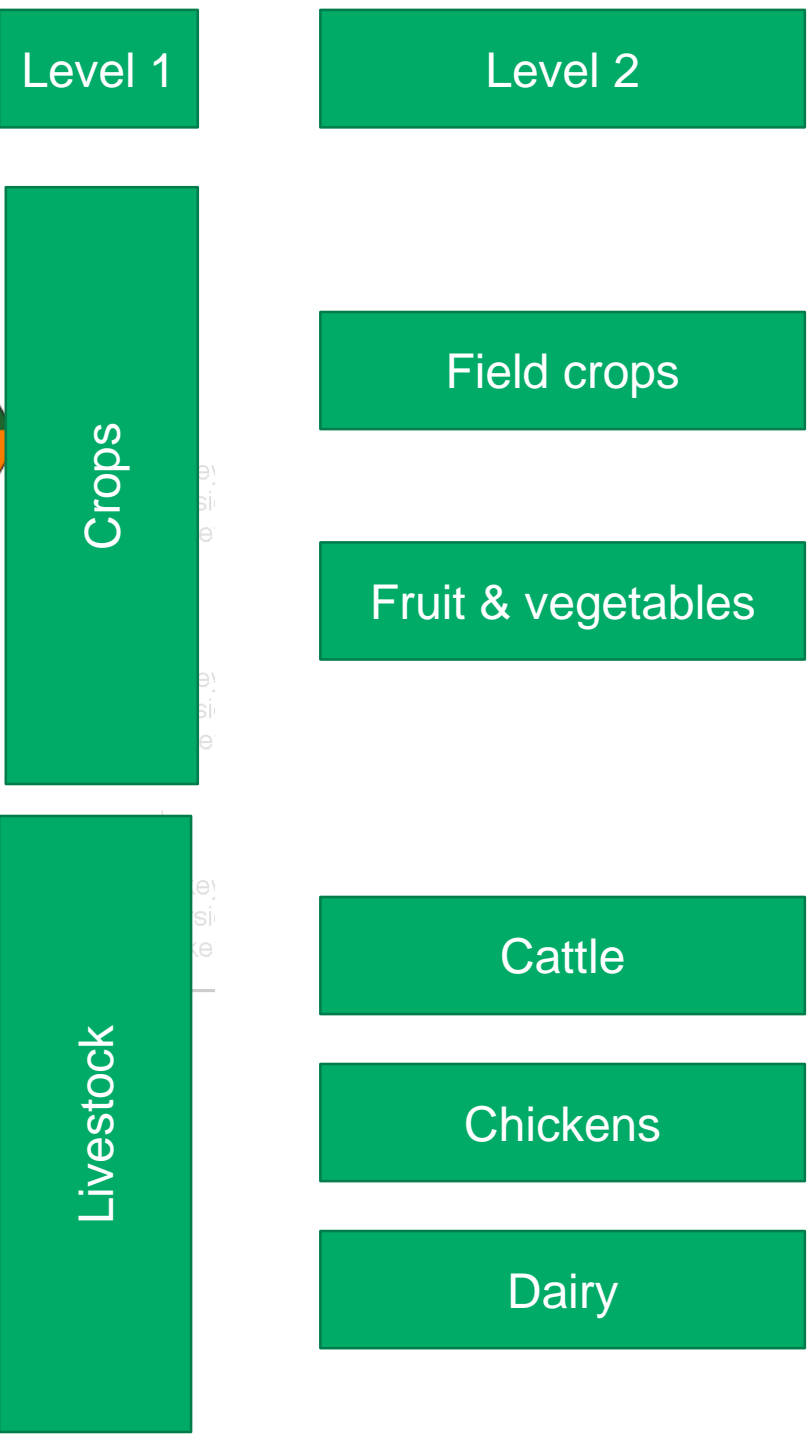
WC Overview



Legend



WC Level 1



Legend

- Mass
- Value

Full
bioeconomy

Note:
excludes
fisheries &
forestry

Back

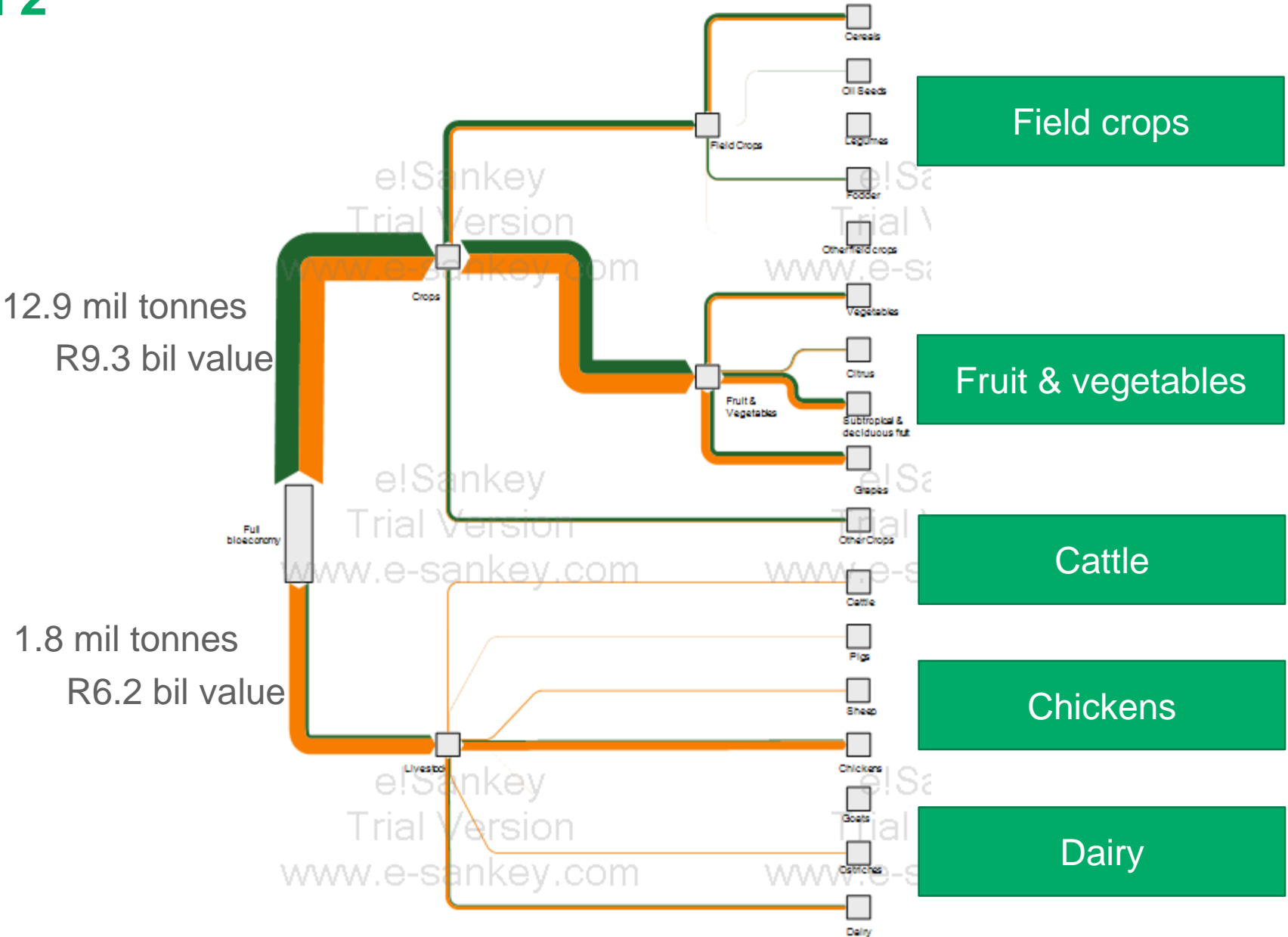
WC Level 2

Level 1

Level 2

Legend

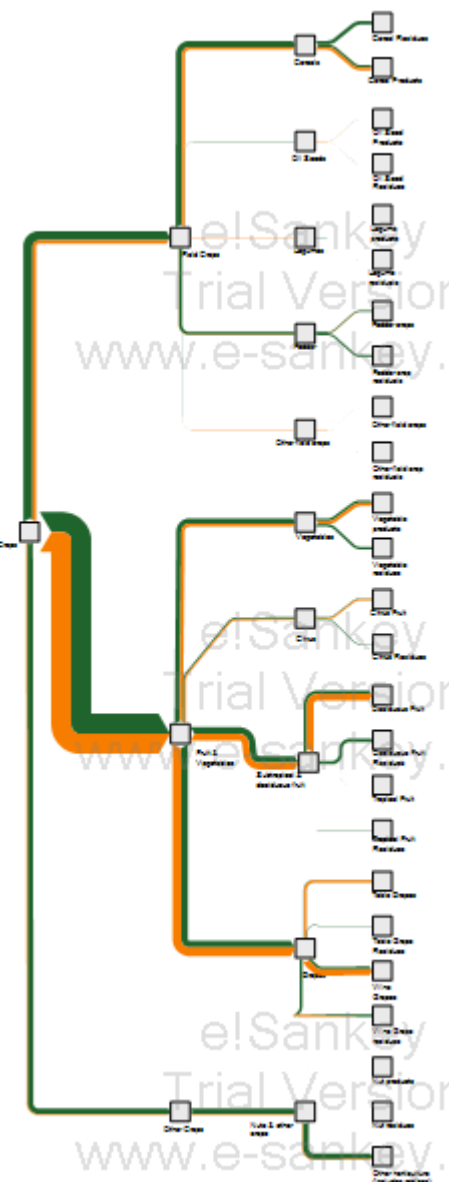
- Mass
- Value



Back

Crops

Crops
12.9 mil tonnes
R9.4 bil value



Level 2

Field crops

Field Crops
3.5 mil tonnes
R1.3 bil value

Vegetables

Vegetables
1.8 mil tonnes
R1.2 bil value

Fruit

Fruit
5.6 mil tonnes
R6.5 bil value

Other crops
(includes rooibos)

Other Crops
2.1 mil tonnes
R0.3 bil value

Legend

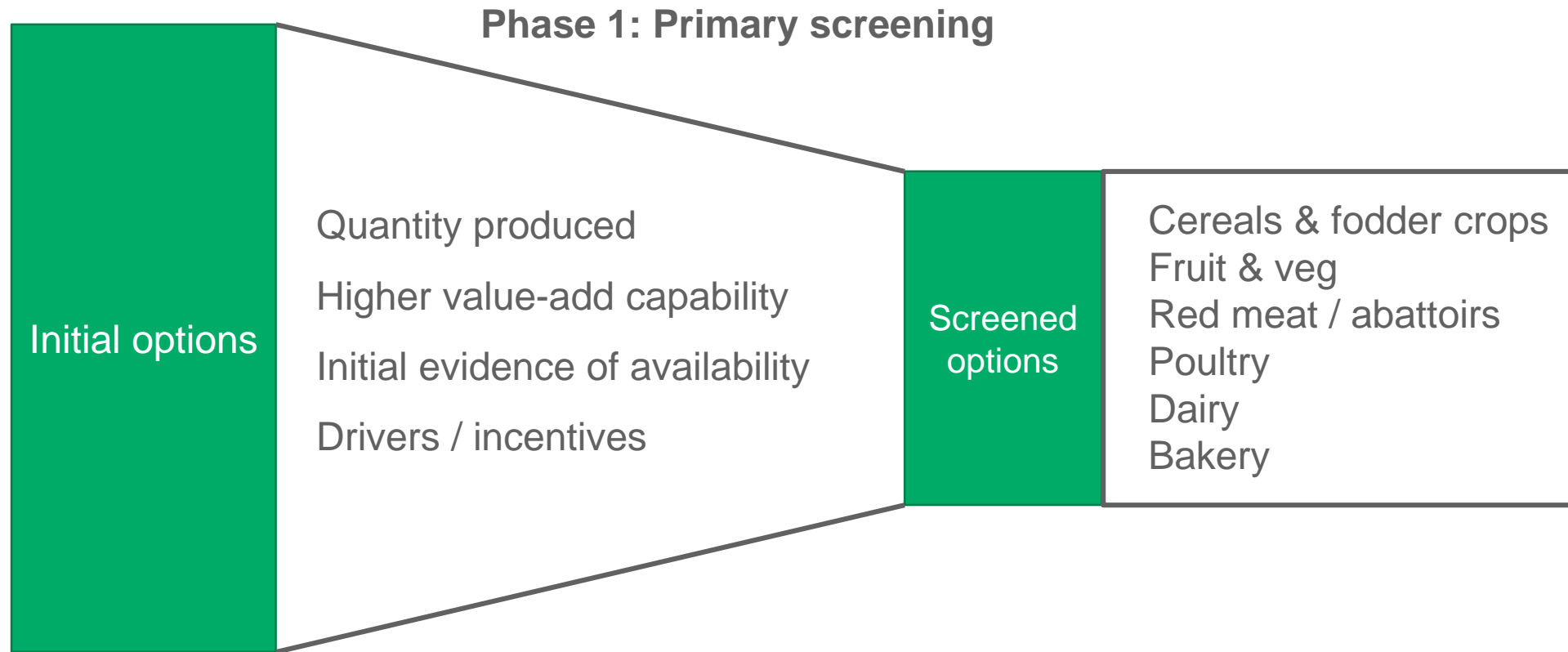


Fruit & Vegetables
7.4 mil tonnes
R7.7 bil value

Back

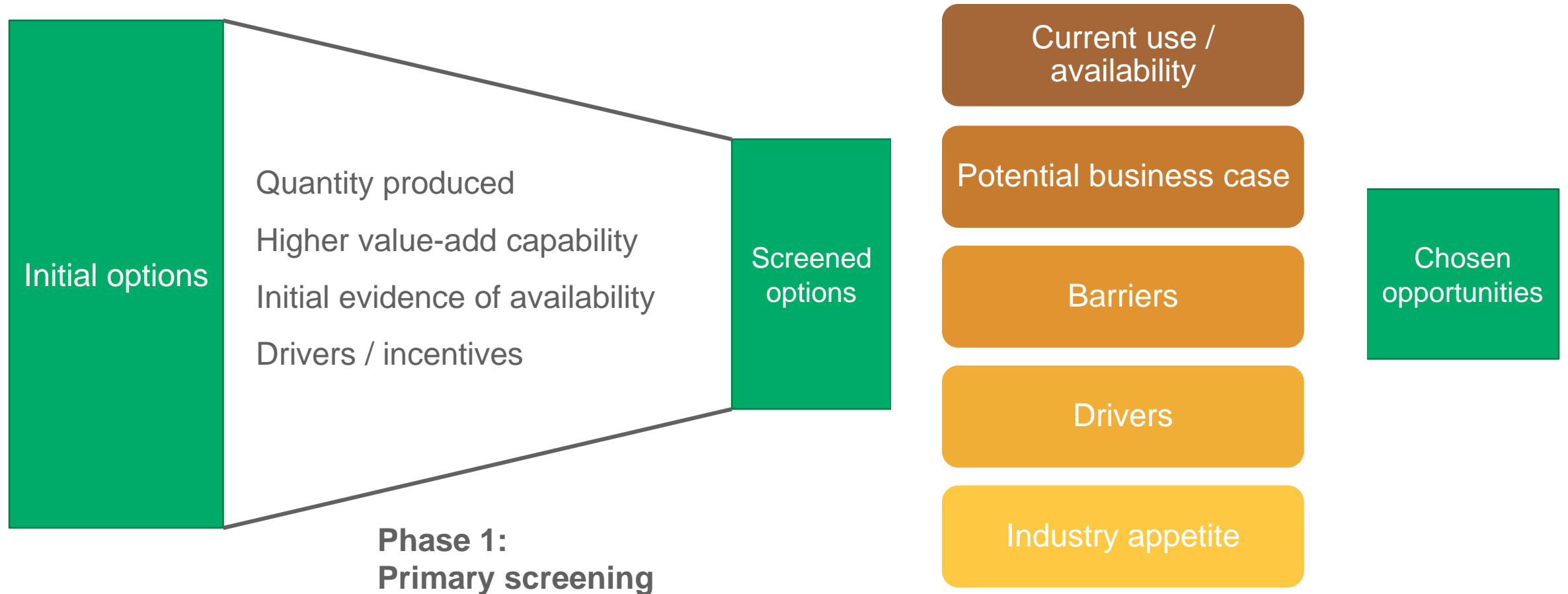
Methodology for selection

Screening criteria



Methodology for selection

Screening criteria



Value chain	Quantities (t / yr)	Current use / availability	Drivers	Barriers	Business case / appetite for alternatives
Abattoir	<p>Sample: 52000 ton</p> <p>Est total: 0.2m ton</p>	<p>Availability expected to increase</p> <p>Used for food & animal feed, compost, rendering products, power & heat</p>	<p>Stricter waste regulations</p> <p>WCG aims to reduce organic waste to landfill by 50% over next five year</p> <p>Increased cost of disposal to landfill</p>	<p>Rendering: Prohibitive cost, stakeholder acceptance</p> <p>Biogas: long payback period, technical expertise, nascent industry, markets for byproducts</p> <p>Composting is dominant</p>	<p>Business case strong for composting</p> <p>cost savings for heating/electricity</p> <p>service model common</p> <p>increase in investor interest in rendering</p>
Dairy	<p>Sample: 64 400 tonnes</p> <p>Whey 10 500 tonnes</p> <p>Liquid effluent: ~ 60 000 m³</p>	<p>Expired milk products, off-cut cheese, whey solids not available, used as animal feed</p> <p>Milk solids & off –spec milk available</p>	<p>Value add must have benefits of water use, carbon intensity, profitability</p> <p>Sustainability & market demand</p>	<p>water consumption and carbon emissions prioritised over waste management</p>	<p>Industry thinks value-add opportunities largely realised, primarily byproducts</p>

Key insights

General

- Residues & wastes are generated but the majority is used
 - South Africa has very good “layering” or cascading of organic materials (products and residues) between different end-uses
 - <2.5% of wastes (by volume) did not already have a use
- Rapid change driven by legislative pressures and, in part, GreenCape’s assistance
 - 3 months ago approximately 30% of abattoir wastes were unused
 - Currently used for value-add, primarily composted

Key insights

General

- The dominant alternative use appears to be animal feed
 - Potentially a high level end use but this is quality-dependant
 - In many cases can be considered “cheap disposal” & thus a lower value-add
 - 20% diverted to animal feed
- Economies of scale remain a key constraint, especially for the uptake of biogas
 - Agricultural residues have strong seasonal attributes
 - Typically spatially dispersed
 - Some of these opportunities may be unlocked by collating smaller waste streams, however transport costs remain a key barrier

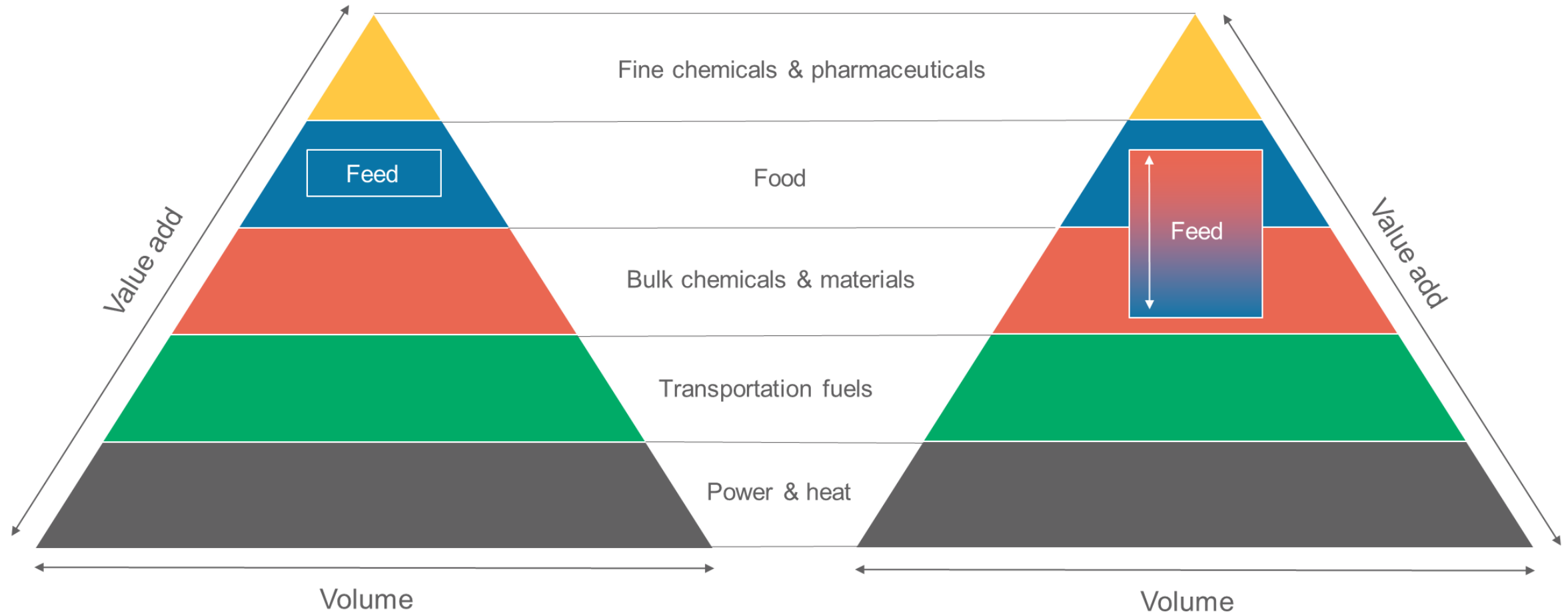
Key insights

General

- The basics of the value add hierarchy seem to hold in the Western Cape
 - Greatest revenue being generated by application to insects production for animal feed, followed by animal feed, composting & then electricity from biogas
 - If biogas' heat & digestate values is also included, biogas should be great than composting
- The greater seasonality of fruit means that vegetables may have larger opportunities or technology should be adapted to deal with large batches of wastes rather than continuous streams

Bio-based value-add hierarchy

Heuristic used for value-addition assessment



(a) General bio-based hierarchy

(b) Suggested bio-based hierarchy

Recommendations

Key value chains with potential for value-add

- Value chains selected based on:
 - Potential economic benefits (i.e. investment, sales & job creation)
 - Industry drivers (e.g. landfill diversion)

- Two key focus areas:
 - Fruit and vegetable value chains
 - With a particular focus on:
 - Packhouses, distribution centres & retail
 - Specific commodities (e.g. potatoes)
 - Livestock value chains
 - With a particular focus on abattoir wastes



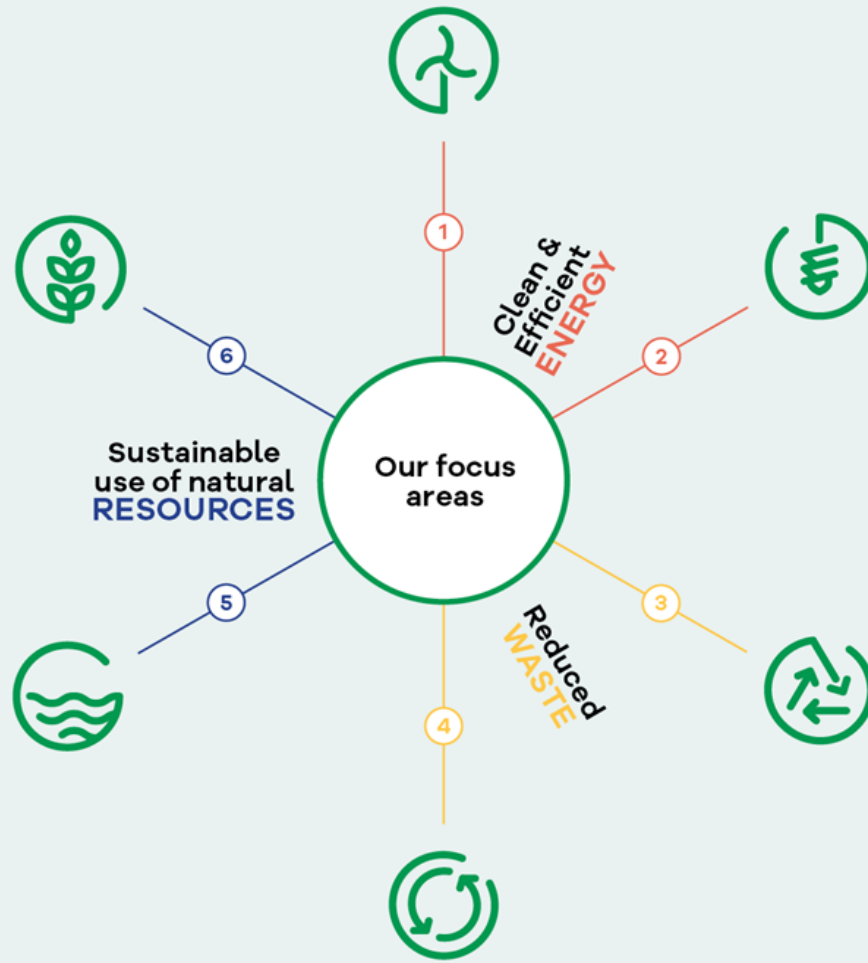
Thank You

Cathy Pineo, Pieter Janse van Vuuren, Usisipho Gogela

Background slides



GreenCape focus areas



— ① Renewable Energy

Utility-scale projects, small-scale embedded generation, and localisation of component manufacture.

— ② Energy Efficiency

Energy efficient buildings and equipment, demand side management and financing contracting models.

— ③ Alternative Waste Treatment

Municipal decision-making and policy and legislative tools on alternative waste treatment options; small-scale biogas, recycling and reuse (dry recyclables, construction and demolition waste).

— ④ Western Cape Industrial Symbiosis Programme (WISP)

Free facilitation service that networks companies to exchange under-utilised resources (materials, energy, assets, logistics and expertise).

— ⑤ Water

Water provision and economic development; greentech opportunities for water use efficiency, treatment and reuse.

— ⑥ Agriculture and Bio-Based Value Chains

Sustainable agriculture, valorisation of wastes to high value bio-products, including bio-energy.

Western Cape food value chains

GreenCape's Bioeconomy Programme

- Goal:
 - Unlock the potential of the Western Cape's bio-based resources & drive the “greening” of agricultural value chains
 - Done through promoting the uptake of investment in green technology, processes & systems
- Structure:
 - Builds on insights from the resource efficiency analysis done in 2013-15 for the Western Cape economy
 - Comprises of:
 - Agriculture sector desk
 - Bioenergy and resource productivity projects

Methodology: qualitative mapping

- Desktop research (academic and grey literature)
- Western Cape Industrial Symbiosis Programme (WISP) database

[illegible]

Methods

Phase one

- Quantitative analysis
 - Partial material flow analysis (MFA) – focus on outputs
 - Value & volume of organics (thicker line, larger relationship)

Methodology: quantitative assessment

- Desktop research
 - Production (tons/year) & gross farming income (GFI)(ZAR): Agricultural Census (StatsSA 2007)
 - Residue-to-product ratios: academic and grey literature

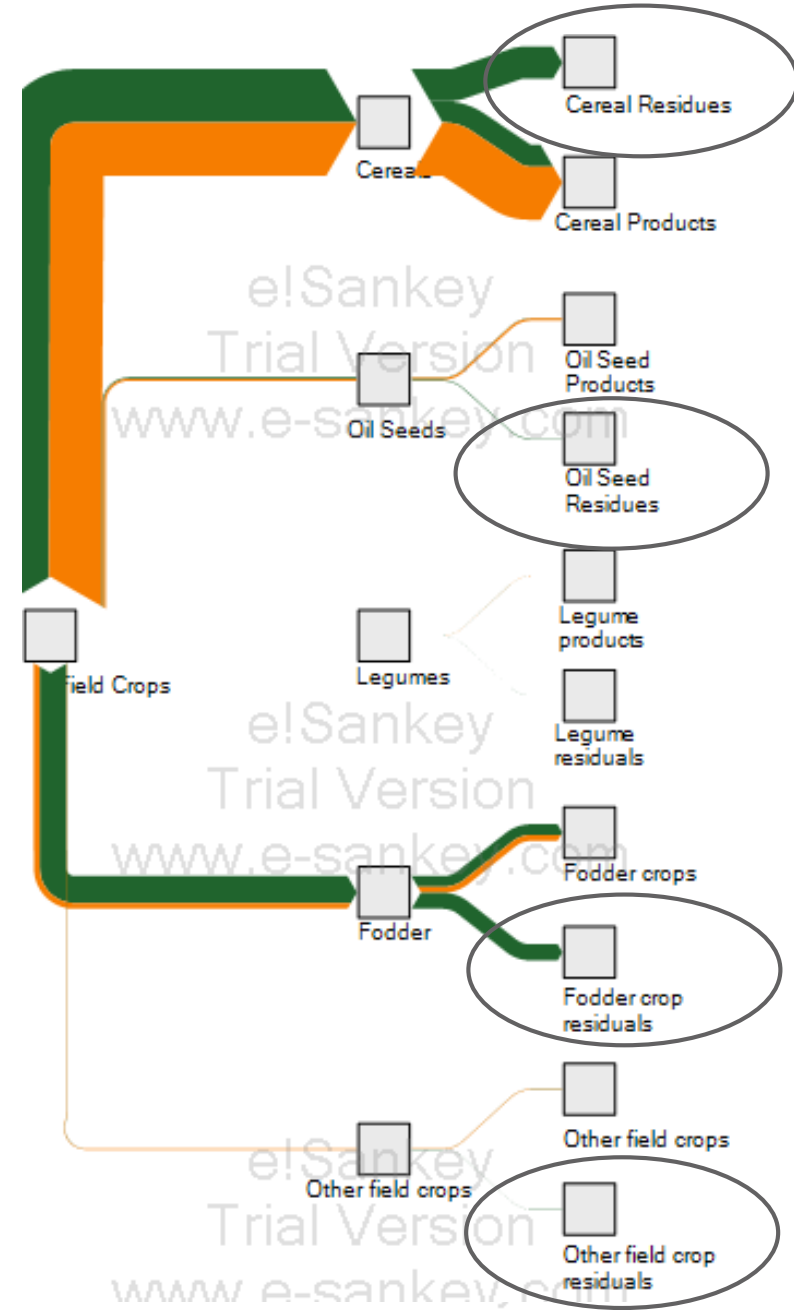
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Field Crops

Cereals
2.2 mil tonnes
R1.1 bil value

Fodder
1.1 mil tonnes
R0.1 bil value

Other Field
0.12 mil tonnes
R0.01 bil value



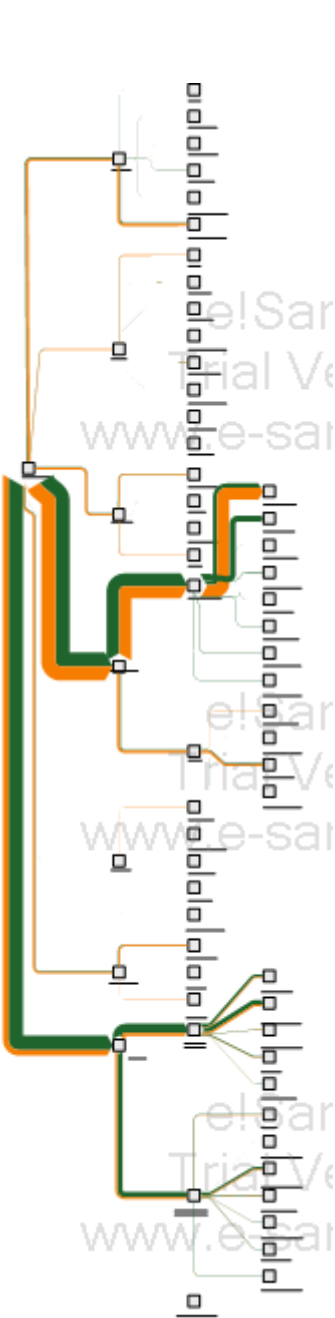
Legend

- Mass
- Value

Back

Livestock

Livestock
1.8 mil tonnes
R6.2 bil value



Cattle
0.07 mil tonnes
R0.5 bil value

Chickens
0.8 mill tonnes
R3.3 bil value

Dairy
0.8 mil tonnes
R1.3 bil value

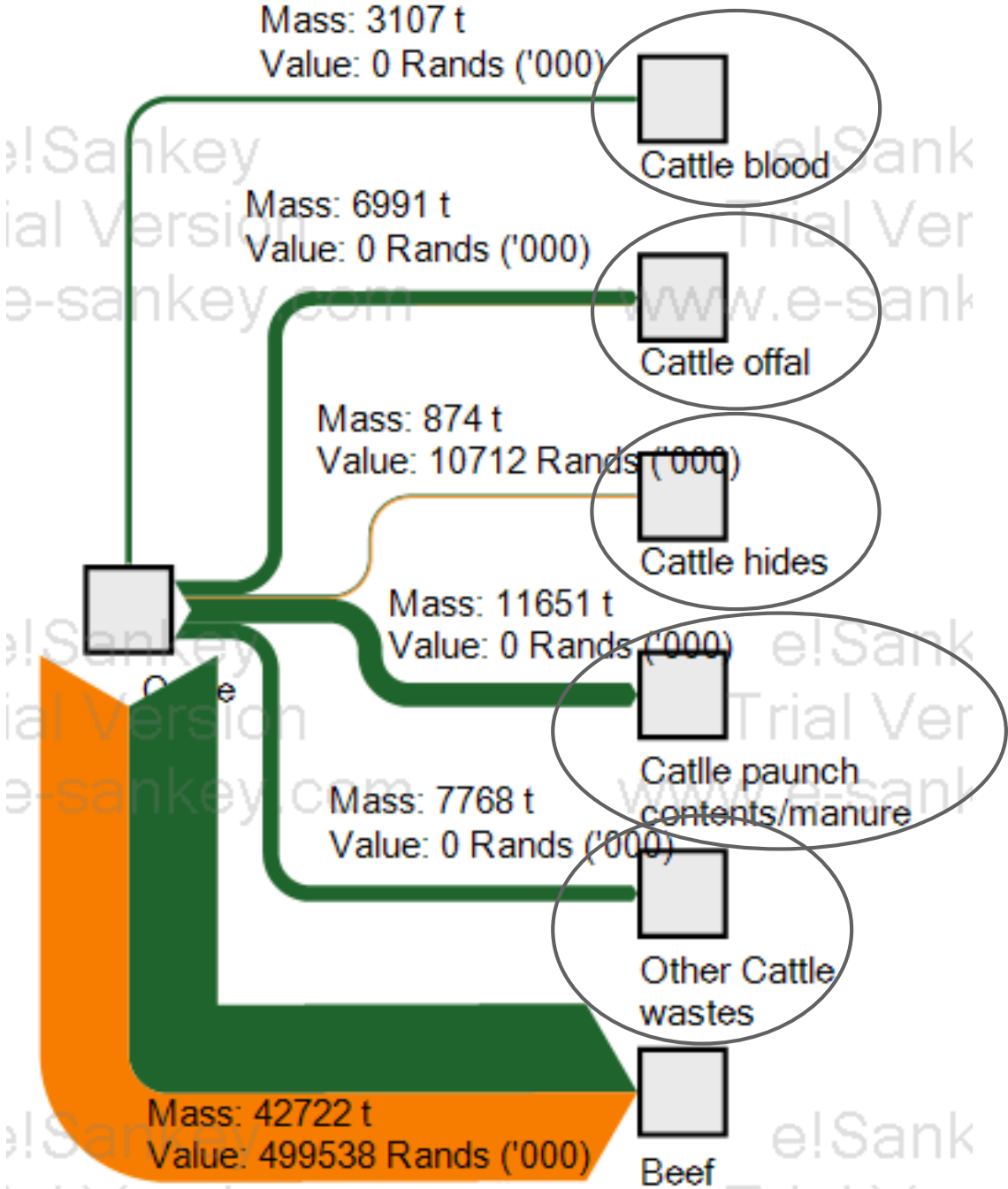
Legend



Back

Cattle

Cattle
0.07 mil tonnes
R0.5 bil value



Legend

- Mass
- Value

Back

Chickens

Chickens
0.8 mill tonnes
R3.3 bil value

Meat
0.7 mil tonnes
R2.8 bil value

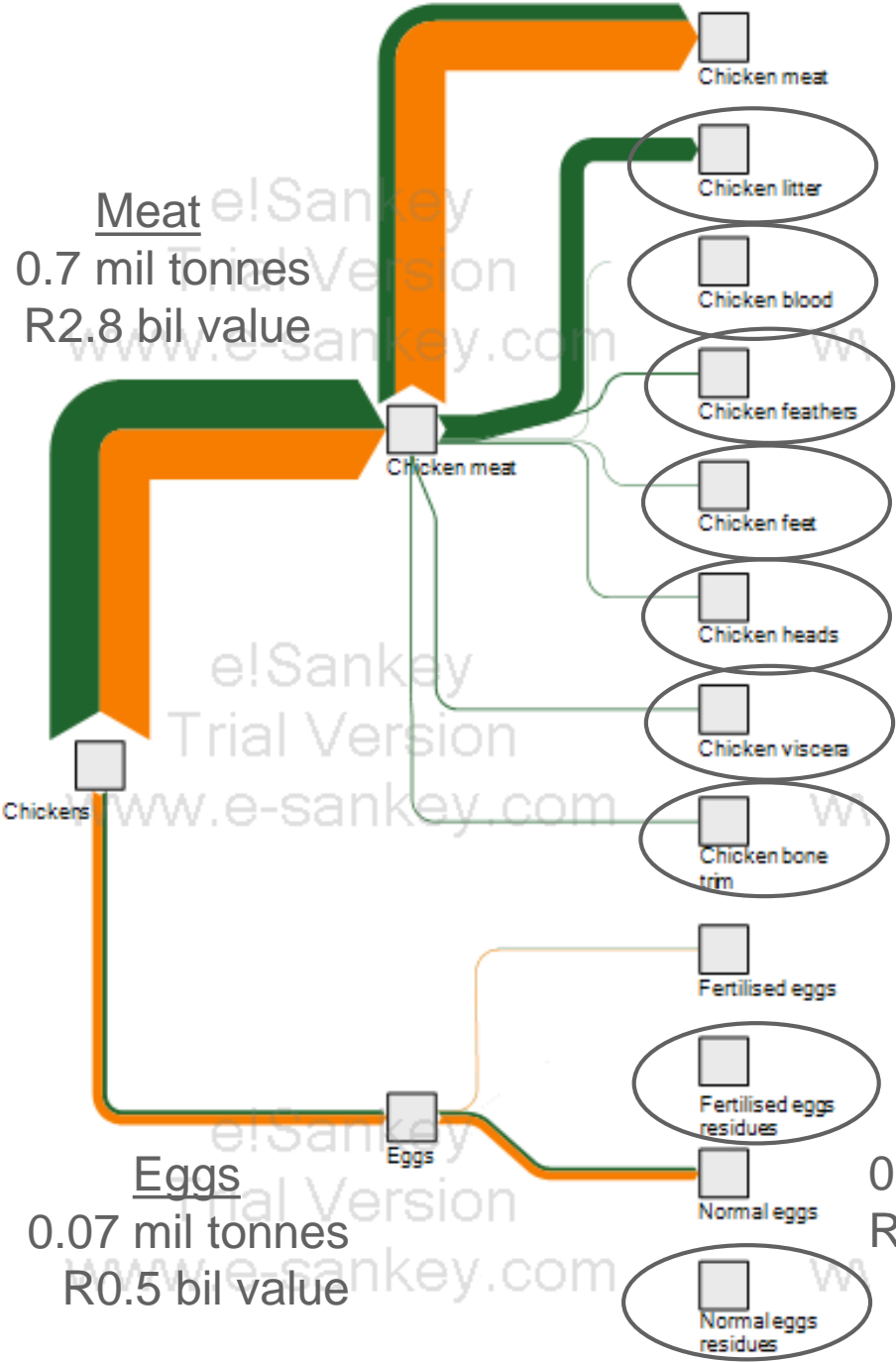
Eggs
0.07 mil tonnes
R0.5 bil value

Meat
0.25 mil tonnes
Litter
0.35 mil tonnes

Normal
0.06 mil tonnes
R0.49 bil Rands

Legend

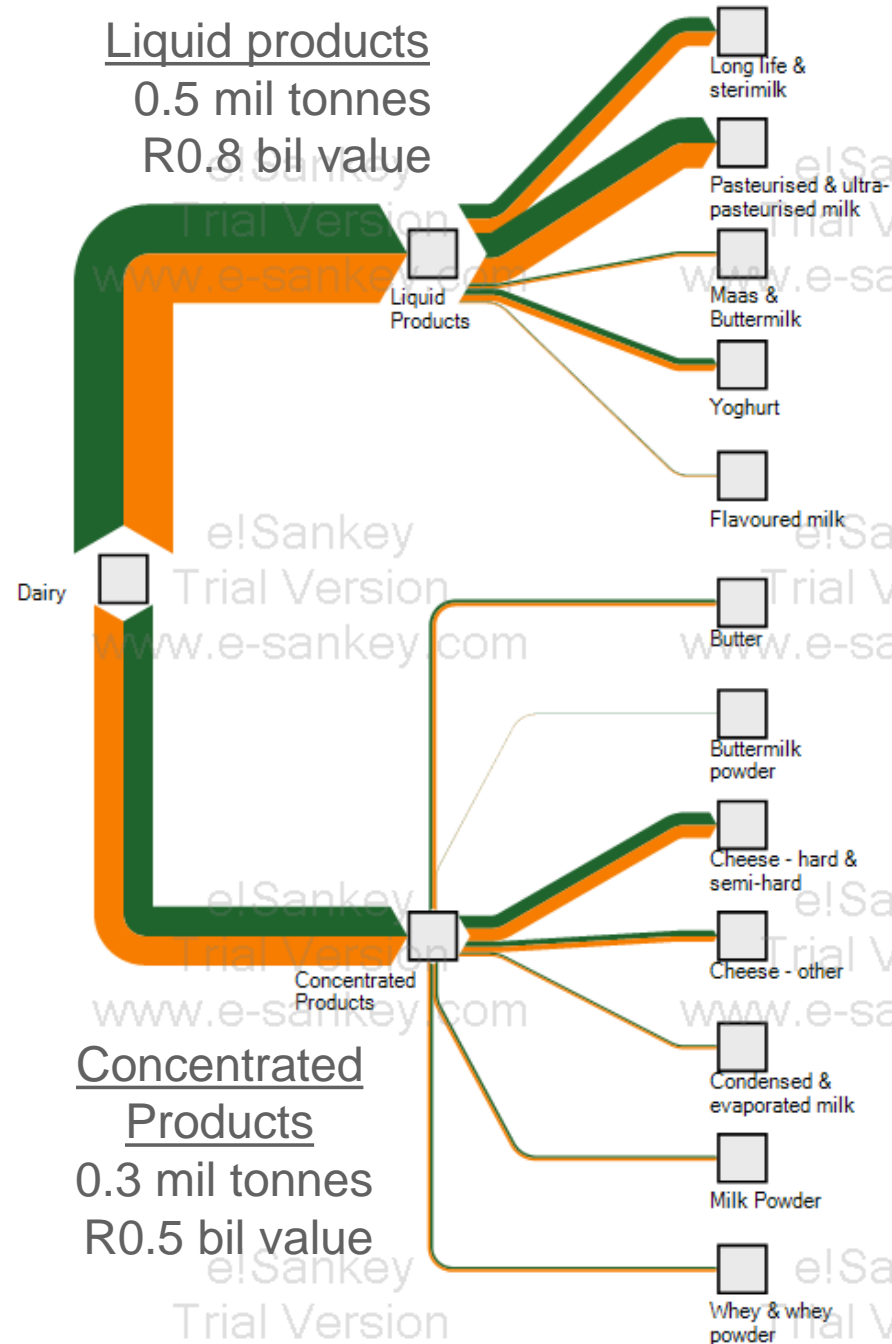
- Mass
- Value



Back

Dairy

Dairy
0.8 mill tonnes
R3.3 bil value



Legend



Back

Phase 1: Primary screening results: selection matrix				
Sector	Criteria			
	Quantity (per annum) (residues : total mass)	High value-add capability	Evidence of availability	Drivers / incentives
Cereals & fodder crops	✓✓ (1.8 : 3.4 mil tonnes)	✓✓ ^{1,2,3,4}		X
Vegetables	✓ (0.9 : 1.9 mil tonnes)	✓✓✓ ¹⁻⁵	✓✓	
Fruit (grapes & other)	✓✓ (1.2 : 2.4 mil tonnes)	✓✓✓ ¹⁻⁵	✓✓	
Citrus fruit	✓ (0.3 : 0.6 mil tonnes)	✓✓✓ ¹⁻⁵		
Abattoir	(0.05 : 0.2 mil tonnes red meat)	✓✓ ^{1,2,4,5}	✓	✓✓
Poultry	✓ (0.5 : 0.8 mil tonnes)	✓✓ ^{1,2,4,5}	✓	
Dairy	(? : 0.8 mil tonnes)	✓✓ ^{1,2,4,5}	✓	
Bakery	?	✓✓✓ ¹⁻⁵	✓	
Other crops (includes residues)	X (0.001 : 2.0)	✓ ^{1,2,4}		