

# A WASTE RESEARCH, DEVELOPMENT AND INNOVATION (RDI) ROADMAP FOR SOUTH AFRICA (2015-2025)

## RDI OPPORTUNITIES IN ORGANIC WASTE



Presented by: Dr Linda Godfrey  
Occasion: Industry-meets-Science  
Date: 26 November 2014



science  
& technology

Department:  
Science and Technology  
REPUBLIC OF SOUTH AFRICA

# Purpose of this workshop

- Bring industry and research community together to -
  - Further identify the **key issues** facing industry wrt biomass and organic waste (*ensure RDI is relevant to industry*)
  - Jointly shape **research priorities**
  - Strengthen RDI **collaboration** between industry and R&D community
  - Support **uptake** of RDI outputs by industry

Relevant RDI

Innovative RDI

Partnerships

# Prioritized RDI waste streams

- Stakeholders prioritised **organic waste** as one of five priority waste streams for the National Waste RDI Roadmap
- Goal Statement (*beyond 2024*)
  - “Zero organic waste to landfill with maximum value extraction (materials and energy)”
- Benefits
- Obstacles
- Key enabling institutions

Organic waste

Municipal waste

Waste tyres

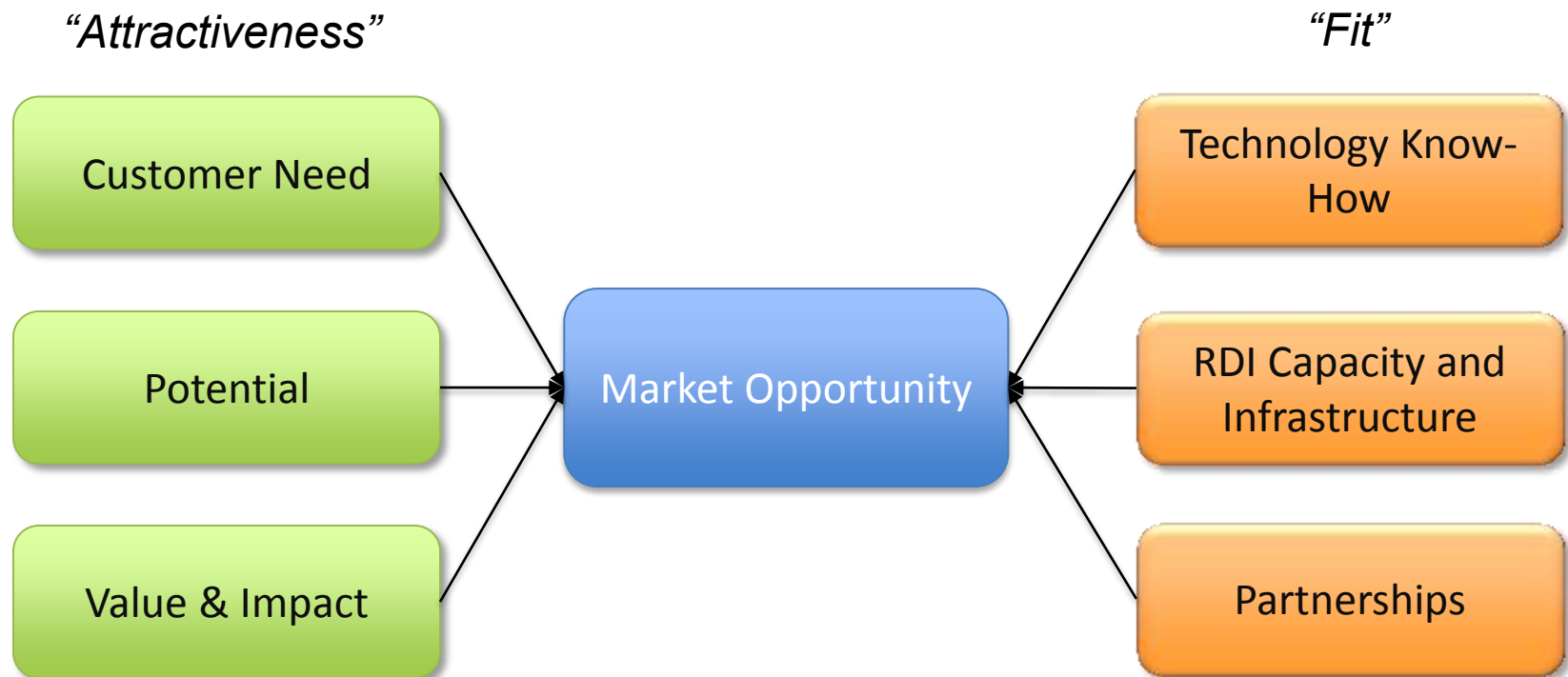
Plastic waste

Electronic waste

- As defined by stakeholders –
  - Municipal and commercial organic waste (e.g. food waste, garden waste, retail)
  - Industrial and agricultural biomass (e.g. food processing, pulp & paper processing)
  - Animal waste (e.g. manure, abattoir waste)
  - Sewage sludge

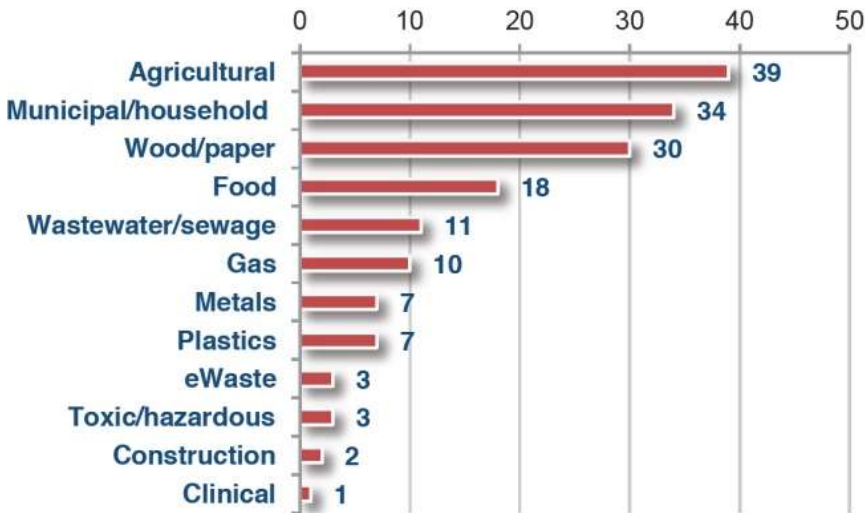
# Evaluating Market Opportunities

- Market opportunities for each prioritised waste stream assessed through expert work sessions

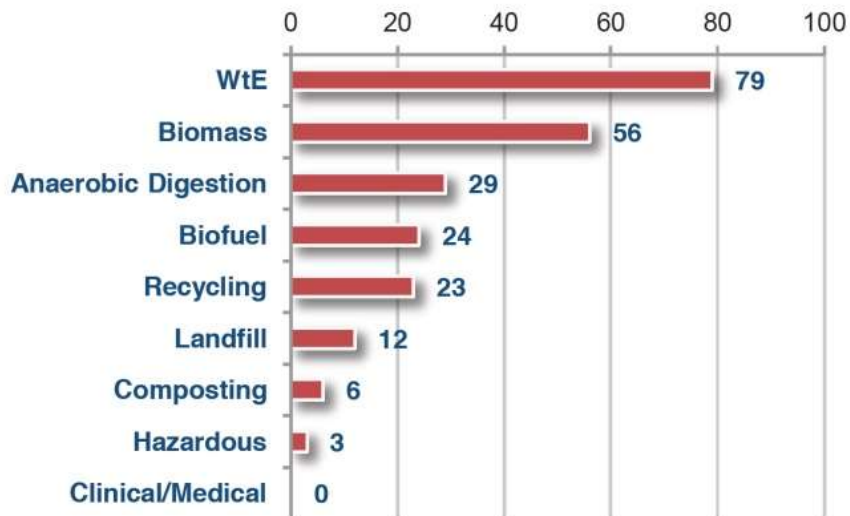


# Local and global trends

Projects by Waste Type, Dec-13



Projects by Facility Type, Dec-13



New project business in the first 9 months of 2013 globally reached US\$20.9 billion and was expected to exceed US\$27 billion by the year end (AcuComm).

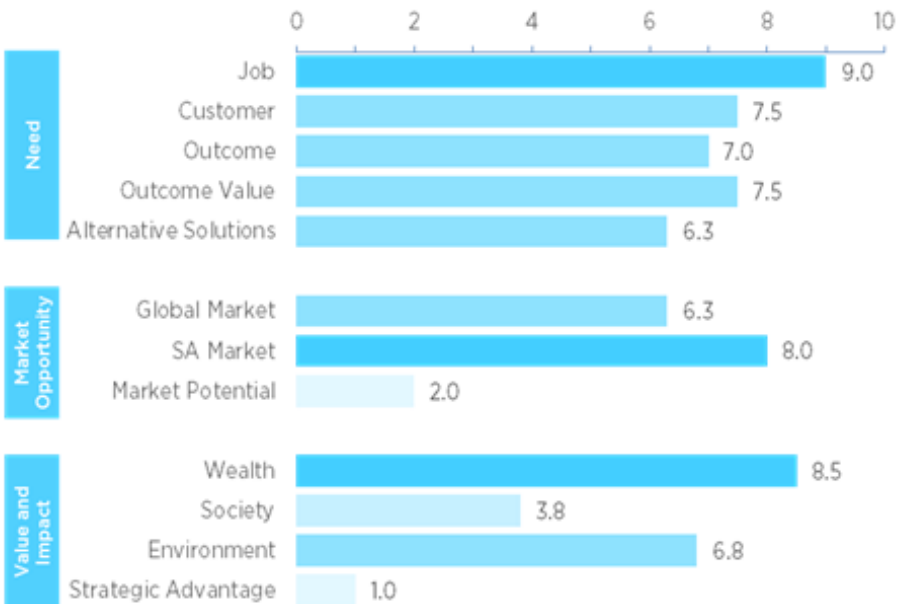
All sectors of the market performed well, with **Waste-to-Energy (WtE), Biomass and Anaerobic Digestion** being strong performers.

**Power generation** from waste is increasingly becoming the favoured option for waste disposal. **Biogas/biofuel plants** have seen strong growth, while the benefits of **anaerobic digestion** technology in handling food/agricultural waste have led to an advance in this sector.

# Opportunities in organic waste

## Organic Waste

### Attractiveness



## Interpretation

*“Zero organic waste to landfill, with optimum extraction of materials and energy in order to maximise economic value”*

- ▶ Very clear appreciation of the Need to divert organic waste from landfill, the resultant benefits, and the alternative solutions with potential to create local value and impact
- ▶ The value of achieving waste stream objectives and the associated urgency of diverting organic waste from landfill underpins higher scores
- ▶ Large volumes creates opportunities for local markets. However, dispersed sources, high transport costs, and constraints on alternatives (e.g. electricity into the grid) has negatively influenced scores for market potential and strategic advantage
- ▶ High potential is perceived for job creation and benefits are envisaged in reduction of environment impacts (leachate, GHGs)



# Capability (market readiness)

Table 7. Waste Types

	Waste Types																																				
	General and unclassified waste streams													Hazardous waste streams																							
	Municipal waste	Commercial and industrial waste	Brine	Fly ash and dust	Bottom ash	Slag	Mineral waste	Waste of Electric and Electronic Equipment	Organic waste	Sewage sludge	Construction and demolition waste	Paper	Plastic	Glass	Metals	Tyres	Other	Gaseous waste	Mercury containing waste	Batteries	POP Waste	Inorganic waste	Asbestos containing waste	Waste Oils	Organic halogenated and /or sulphur containing solvents	Organic halogenated and/or sulphur containing waste	Organic solvents without halogens and sulphur	Other organic waste without halogen or sulphur	Tarry and Bituminous waste	Health Care Risk Waste	Miscellaneous	Radioactive/Nuclear waste					
Cape Peninsula University of Technology	■			■											■																						
University of Cape Town	■	■	■	■		■	■		■			■	■		■		■					■															
Central University of Technology	■	■		■					■		■	■	■	■		■						■										■	■				
Durban Institute of Technology																																					
University of Fort Hare																																					
University of the Free State																																					
University of Johannesburg	■														■																						
University of KwaZulu-Natal	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
University of Limpopo	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	
Mangosuthu University of Technology																																					
Nelson Mandela Metropolitan University																																					
North-West University									■							■																					■
University of Pretoria																																					
Rhodes University																																					
University of South Africa																																					
University of Stellenbosch	■	■		■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Tshwane University of Technology	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Vaal University of Technology																																					
University of Venda																																					
Walter Sisulu University																																					
University of the Western Cape		■	■	■				■				■	■	■	■							■	■														
University of the Witwatersrand																																					
University of Zululand																																					
CSIR	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
HSRC																																					
Mintek		■		■		■	■	■							■	■					■		■														

Research activity level	8	8	5	8	4	5	5	5	9	5	4	6	6	6	6	6	3	4	3	5	3	4	3	2	2	3	2	2	3	3	3	3	3	2
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# Capability (market readiness)

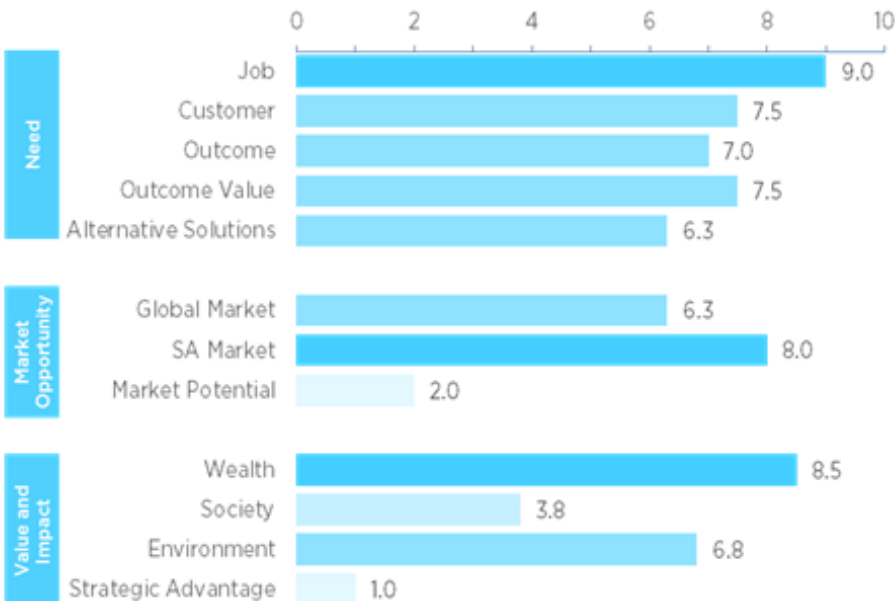
Table 8. Waste Technologies

LEGEND: <span style="color: orange;">■</span> Subcritical <span style="color: red;">■</span> Emerging <span style="color: green;">■</span> Building <span style="color: darkgreen;">■</span> Mature	Waste Technologies																												
	Thermal					Biological/chemical												Mechanical/Physical					Landfill						
	Advanced Thermal Recycling	Plasma/Arc Gasification	Pyrolysis	Pyrolysis/Gasification	Pyrolysis/Steam Reforming	Acid leaching	Advanced oxidation	Aerobic Digestion/Composting	Anaerobic Digestion	Arthropods	Bio-conversion to biocomposites	Biodiesel	Bioleaching/Chemical leaching	Biorefinery	Catalytic Cracking	Compressed biogenic gas	Enzymatic protein hydrolysis	Ethanol Fermentation	Syngas-to-Ethanol	Thermal Depolymerization	Alternative construction materials	Densification/pelletization	Encapsulation of nuclear waste	Recycling of nuclear fuel	Refuse-derived fuel (RDF)	Sorting/Classification	Landfill engineering	Landfill gas recovery	Landfill mining (sludge)
Cape Peninsula University of Technology			■	■							■													■			■		
University of Cape Town							■	■			■			■							■								
Central University of Technology							■	■												■				■		■			
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University of Johannesburg																													
University of KwaZulu-Natal							■	■			■							■	■	■		■		■		■	■	■	
University of Limpopo	■	■	■	■	■		■	■			■			■				■	■	■		■		■		■	■	■	
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University of Stellenbosch			■	■		■	■		■							■	■		■					■					
Tshwane University of Technology	■						■	■																		■			
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CSIR	■		■	■			■	■		■	■		■								■								■
HSRC		■	■	■								■																	
Mintek	■	■	■	■																									
Research activity level	5	3	6	7	3	1	1	6	6	1	1	5	1	1	3	1	1	3	3	3	2	3	1	1	6	1	4	3	1

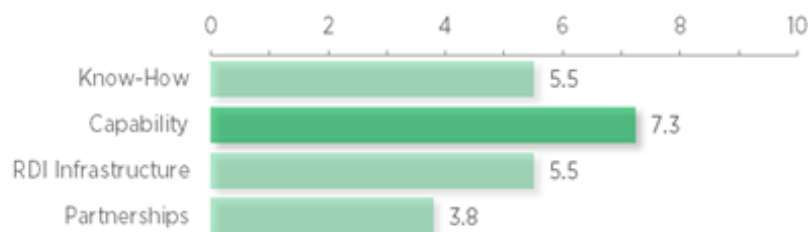
# Opportunities in organic waste

## Organic Waste

### Attractiveness



### Fit



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- 
- ▶ Universities and Science Councils have strengthened RDI capabilities in organic waste, with a focus on alternative technologies. High level of RDI activity across the NSI.
  - ▶ However, uptake of local RDI is slow, with limited partnerships between research and industry on alternatives. Industry mostly dealing with organic waste internally (management and RDI)

# Industry-meets-Science

**INDUSTRY** meets  
**SCIENCE** Waste Sector

Relevant RDI

Innovative RDI

Partnerships

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## Waste RDI Roadmap

Outlines the proposed interventions, progression paths and the related instruments, and the required RDI investment over time



## Trends

Describes the local and global trends in waste management and approach adopted in arriving at the priority waste streams for the Roadmap



## Capabilities

Maps the nature, availability and maturity of waste RDI capability and capacity in South Africa



## Opportunities

Provides an overview of the Market Opportunities we see, how attractive they are and what is required to realise them