

# Waste economics - understanding the economics of waste and the financial value of waste as resource



**Dr Linda Godfrey**

**Council for Scientific and  
Industrial Research (CSIR),  
South Africa**



**science  
& technology**

Department:  
Science and Technology  
**REPUBLIC OF SOUTH AFRICA**

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# Waste RDI Roadmap: The Goal

The **Goal** of the Waste RDI Roadmap, is -

Acknowledging the goals of the NWMS, *“the South African waste sector can achieve a 20% reduction (by weight) in industrial waste and a 60% reduction (by weight) in domestic waste, to landfill by 2024”* –

Through the investment in science and technology and the establishment of a national waste R&D and innovation roadmap

# Alternatives to landfilling

- Why should SA do anything else other than landfill?
  - South Africa landfills **~90%** of all waste generated and **~75%** of all MSW
- We have –
  - Plenty of available space
  - Cheap landfilling (relative to alternatives)
    - General waste ~ R100-R200/T
    - WtE ~ 3-4 times more expensive
    - Composting more expensive

# Alternatives to landfilling

- But we have –
  - Legislation that requires a move away from landfilling
    - Principles of the waste hierarchy
    - Regulations that ban certain waste to landfill (in time)
    - New ‘Norms & Standards for Disposal of Waste to Landfill’ may correct ‘low’ disposal costs
  - An unemployment rate of 25.5%
    - Youth unemployment rate of 36.1% (aged 15 to 34)
    - ~60% of those who are unemployed have < Grade 12

# Alternatives to landfilling

- Waste creates opportunities to address –
  - Unemployment and
  - Economic development
- Through waste as **secondary resource**, and
- Through **labour-intensive** approaches
- Acknowledging that this must only be after all steps have been taken to first prevent waste
- So what is the value lost to the SA economy through landfilling?

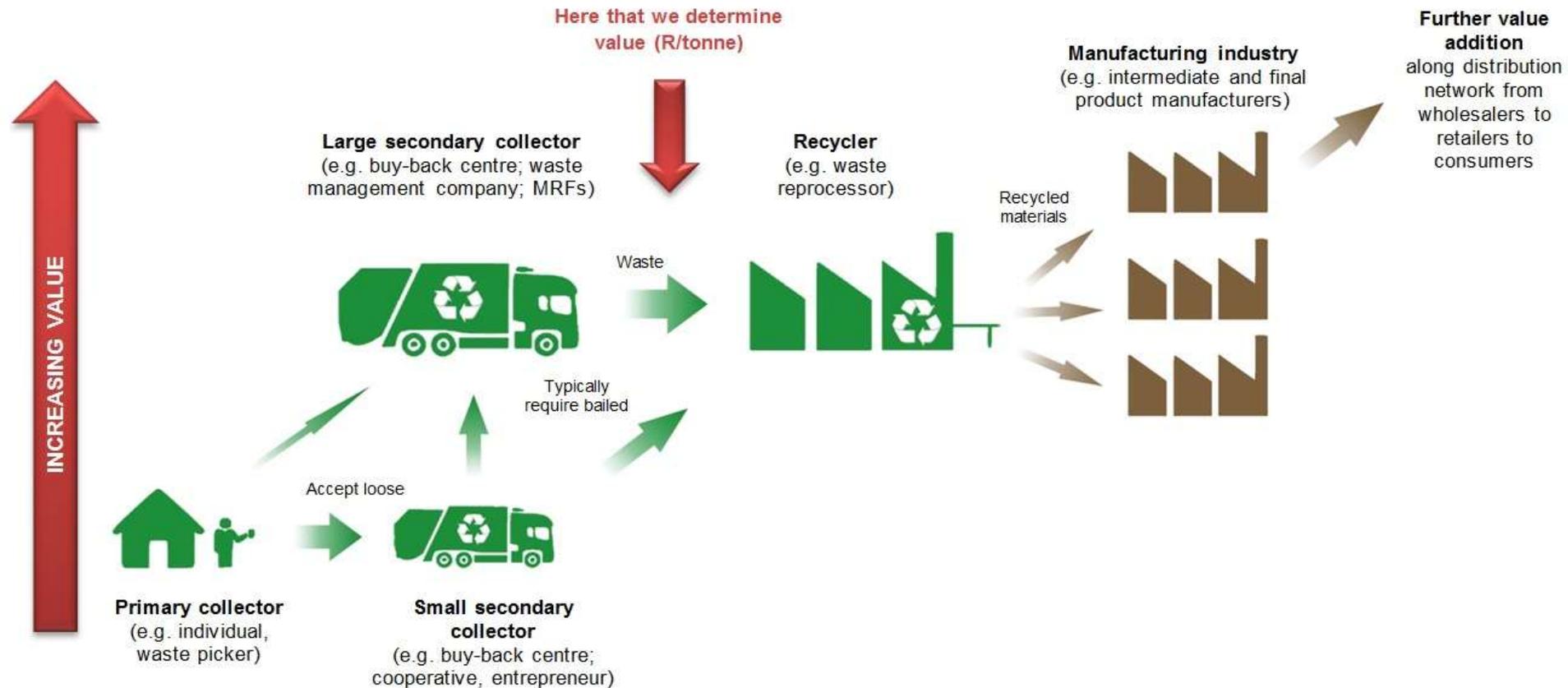
# Valuing South Africa's waste

- Methodology for modelling economic benefit –

$$\text{Resource value}_n = (Q_1 \times UV_1) + (Q_2 \times UV_2) + \dots (Q_n \times UV_n)$$

- Quantity (Q) of waste stream
  - **Selected 13 waste streams** to value, based on –
    - Perceived mod-high potential for recycling/recovery (global trends)
    - Magnitude of waste generated (high tonnage waste streams)
    - Availability and accuracy of data
  - Tonnages of waste generated from DEA **baseline study** (2011)
- Unit value (UV) of stream
  - Various methods of determining unit value
  - Adopted the **price paid by the recycler** for the waste

# Determining unit value



# Valuing South Africa's waste

- Calculations of resource value modelled for 4 scenarios
  - Current – Baseline (status quo) as at 2011
  - Medium-term – IndWMP and midpoint
  - Long-term – DST Roadmap Goal (20% reduction in industrial waste and a 60% reduction in domestic waste, to landfill by 2024)
  - Vision – 100% diversion from landfill towards recycling and recovery

# Unit value of selected wastes

Stream	Range in values (R/t)	Unit value (R/t)
Municipal waste (non-recyclable portion)	N/A (own calculations)	367.38
Organic component of municipal waste	N/A (own calculations)	188.63
Biomass waste from industry	N/A (own calculations)	188.63
Construction and demolition waste	85 - 90	87.50
Paper	200 - 1800	744.47
Plastic	1900 - 3960	3119.54
Glass	450 - 500	490.00
Metals	1000 - 7000	2270.00
Tyres	N/A (own calculations)	367.00
WEEE	1000	1000.00
Slag	170 - 180	175.00
Ash	0 - 5	3.00
Waste oils	2777.78	2777.78

## Disclaimer:

All prices quoted in the report are average prices based on data from multiple sources, multiple geographic regions, and for a period of time (2013), and as such should not be seen as the current (January 2014) market price that could be obtained for a waste.

# Value of selected wastes

	Value (Rand/year)			
Stream	Scenario 1 (Baseline)	Scenario 2	Scenario 3 (DST Goal)	Scenario 4 (100%)
Municipal waste (non-recyclable portion)	0	740 547 527	1 481 095 054	2 962 190 108
Organic component of municipal waste	199 624 053	299 436 079	399 248 106	570 354 437
Biomass waste from industry	0	2 046 933 732	4 093 867 465	6 823 112 441
Construction and demolition waste	66 157 613	136 450 038	206 742 463	413 484 925
Paper	735 995 662	809 595 449	1 032 976 649	1 291 220 811
Plastic	734 824 361	1 677 846 536	2 449 411 002	4 082 351 670
Glass	150 499 090	204 584 780	282 185 904	470 309 840
Metals	5 668 103 740	6 022 360 735	6 376 617 729	7 085 130 810
Tyres	3 620 455	38 015 658	72 410 862	90 513 577
WEEE	6 884 000	19 453 250	32 022 500	64 045 000
Slag	469 959 700	587 449 625	704 939 550	939 919 400
Ash	6 867 312	14 299 656	21 732 000	108 660 000
Waste oils	146 666 667	193 333 333	240 000 000	333 333 333
<b>Total</b>	<b>8 189 202 652</b>	<b>12 790 306 399</b>	<b>17 393 249 283</b>	<b>25 234 626 353</b>

# Unlocking barriers

Stream	Unit value (R/t)	Value (100% scenario) (Rand/year)	Current recycling rate (%)
Plastic	3119.54	4 082 351 670	18
Waste oils	2777.78	333 333 333	44
Metals	2270.00	7 085 130 810	80
WEEE	1000.00	64 045 000	11
Paper	744.47	1 291 220 811	57
Glass	490.00	470 309 840	32
Tyres	367.00	90 513 577	4
Municipal waste (non-recyclable portion)	367.38	2 962 190 108	0
Organic component of municipal waste	188.63	570 354 437	35
Biomass waste from industry	188.63	6 823 112 441	0

# Unlocking barriers

- Recycling at 10% unlocked ~R8.2 billion/year worth of resources into the SA economy
- Achieving DST target (Scenario 3) would unlock R17.4 billion/year worth of resources
- Achieving 100% diversion from landfill (Scenario 4) would unlock R25.2 billion/year worth of resources
- In terms of **resource value**, the benefits of additional recycling/recovery (over and above the value of resources currently being recycled) = R17.0 billion/year
- In terms of **avoided financial and external costs** associated with landfill disposal, the benefits increase to R36.0 billion/year.

# The sector “values” in context

Downstream economic benefits (e.g. manufacturing sector)  
*(Unquantified ??)*



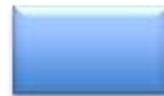
Possible size of waste sector (**1.0-1.5% GDP**)  
(R30b – R45b)



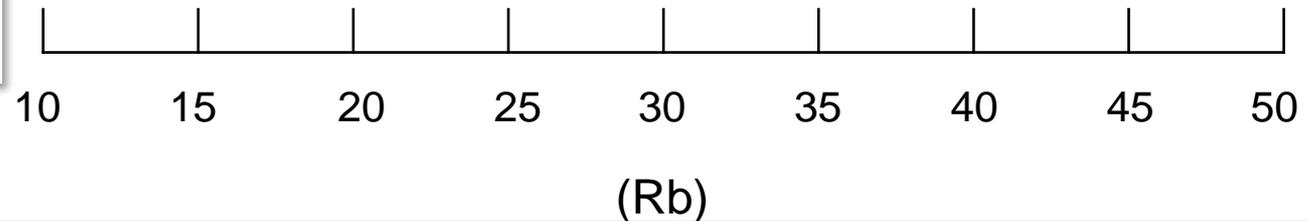
Minimum resource value (waste) R25.2b  
(R8.2b currently extracted)



Minimum financial size of sector (**0.51% GDP**)  
R10b – R15.3b  
(2009 – 2012)



← Unlocked potential of waste →



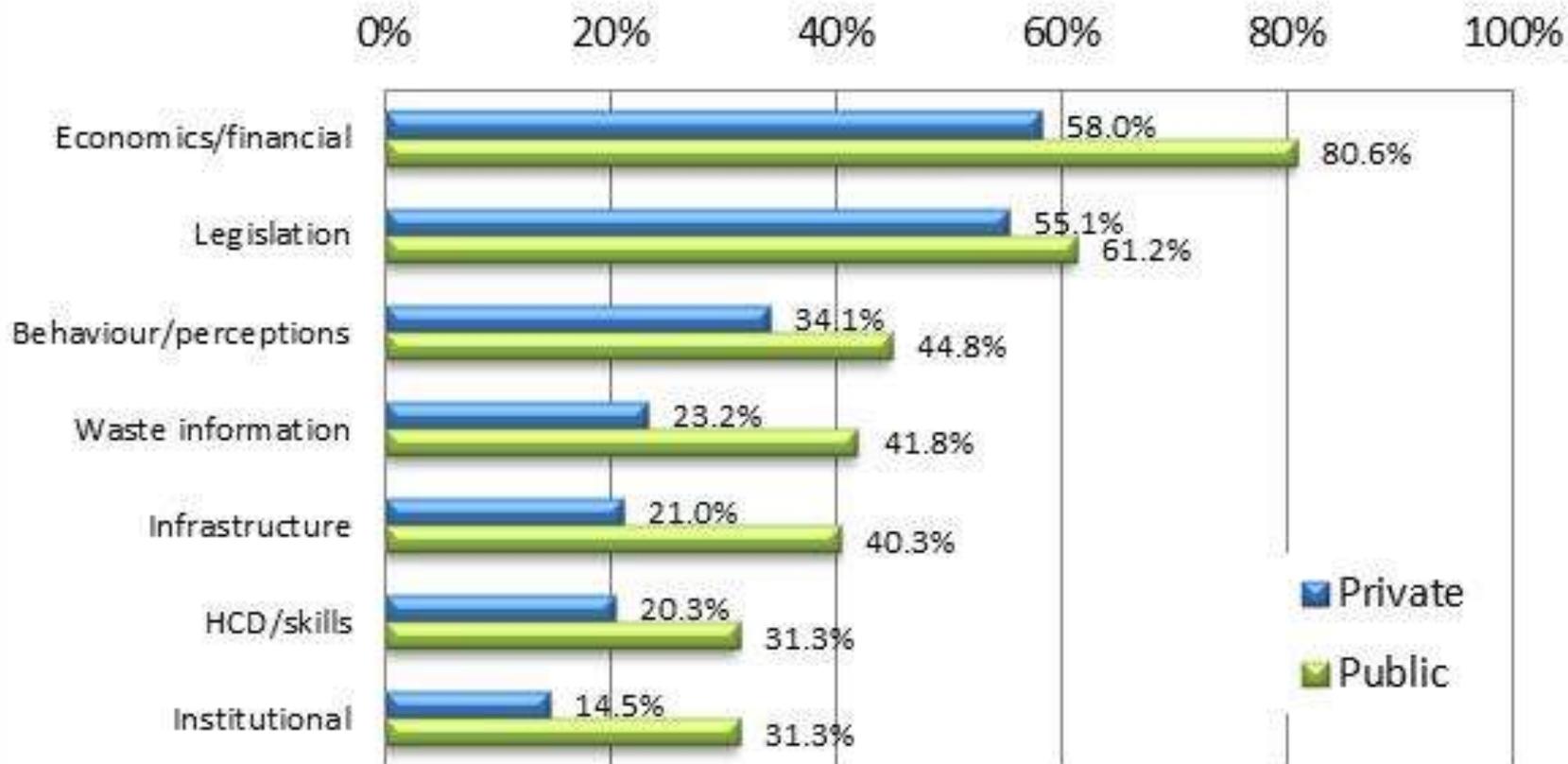


# Unlocking barriers

- So...
  - If there is ‘value’ (minimum **R25b**) available as secondary resources
  - If the value for most streams is greater than the cost of landfilling (R100-R200/T)
  - Why are we only recycling **~25%** of MSW generated?
- What are the barriers that need to be unlocked to recover **“maximum value”** from our waste?

# Unlocking barriers

## Constraints to Innovation



# Alternative policy instruments

- To address market failures, overcome barriers and unlock opportunities of waste as resource
- Department of Science & Technology (DST)
  - Waste RDI Roadmap
- Department of Environmental Affairs (DEA) will implement alternative policy instruments –
  - Economic instruments (NPS-WMC)
  - Extended Producer Responsibility
- Department of Trade and Industry
  - Industrial policy to grow the recycling industry



# National Pricing Strategy

- Aim:
  - Provide a framework for the implementation of economic instruments in the SA waste sector
- Objectives:
  - Mainstream the Polluter Pays Principle
  - Reduce the generation of waste
  - Increase the diversion of waste away from landfill towards reuse, recycling and recovery
  - Support the growth of a southern African (regional) secondary resources economy from waste

# Alternative policy instruments



# The Waste RDI Roadmap





# Contact details

- Dr Henry Roman  
Director: Environmental Services and Technologies  
E-mail: [henry.roman@dst.gov.za](mailto:henry.roman@dst.gov.za)
- Ms Magamase Mange  
Deputy Director: Environmental Technologies  
E-mail: [magamase.mange@dst.gov.za](mailto:magamase.mange@dst.gov.za)
- Dr Linda Godfrey  
Principal Scientist: Waste for Development  
Email: [LGodfrey@csir.co.za](mailto:LGodfrey@csir.co.za)

<http://www.wasteroadmap.co.za>