



"PROMOTING INNOVATION AND UPSCALING ENTERPRISE DEVELOPMENT"

# A 10-Year Waste Research, Development and Innovation (RDI) Roadmap for South Africa

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# Presentation outline

- The Department of Science and Technology
- The Need for the Waste RDI Roadmap
- Informing the Waste RDI Roadmap
- The Waste RDI Roadmap
- Impact of the Waste RDI Roadmap
- Way Forward

# Department of Science and Technology

- **Vision of the DST**

Increased well-being and prosperity through science, technology and innovation.

- **Mission of the DST**

To provide leadership, an enabling environment, and resources for science, technology and innovation in support of South Africa's development.

The **Waste RDI Roadmap** is therefore implemented in line with the DST's mandate *"to use **science** and **technology** to improve the country's economy, create employment and improve the quality of life of all citizens"* [Minister, 2014], as part of a suite of strategies including the Global Change Implementation and Bioeconomy strategies

# Department of Science and Technology

- Supporting South Africa's National System of Innovation (NSI)

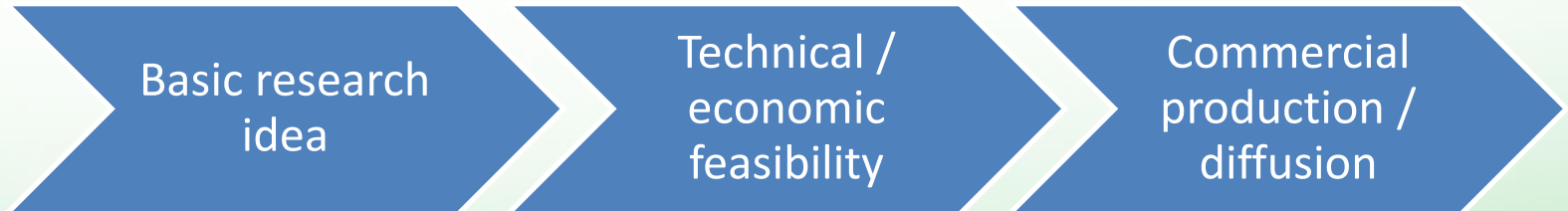


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HEIs



Industry



# The Need for Waste RDI in SA

- The correct management of waste and the diversion of waste away from landfill –
  - Creates opportunities to move resources into a **local** secondary resources **economy**
  - And in so doing, create **environmental**, **social** and **economic** opportunities for South Africa
- In this lies significant **opportunity** and **need** for research, development and innovation (RDI) to –
  - Unlock **new solutions** for utilising “waste”
  - Inform **policy** development and implementation
  - Inform **technology** uptake
  - Inform decision-making through **sound evidence**

# Informing the Roadmap



- **Current and required institutional mechanisms to support waste innovation (DST, 2012)**
  - Main constraints to waste innovation include –
    - Legislative; economic/financial; institutional; behaviour & perceptions; infrastructural; information; skills
  - Opportunities to address these constraints include –
    - Including the private sector meaningfully in the innovation system
    - Identifying sectoral priorities for innovation, with directed investment and support
    - Strengthening human capital in the waste innovation sector through formal HCD programmes
- **Skills for an Innovative Waste Sector (DST, 2012)**
  - Post-graduate specialisation to produce work-ready graduates
  - Up-skilling of existing waste management practitioners to keep them at the cutting edge of their fields
  - Training of trainers to produce waste educators at all levels



# Informing the Roadmap



- **Waste Research, Development and Innovation (RDI) Capabilities at SA Universities and Science Councils (DST, 2014)**
  - Waste RDI Community is considered “emerging”
  - Evidence of both specialisation and diversity in waste RDI
  - Funding for waste RDI remains small, with limited investment in waste RDI infrastructure (often self-funded)
  - Low numbers of post-graduates are entering the waste sector
- **The economic benefits of moving up the waste management hierarchy in South Africa (DST, 2014)**
  - Considerable value (resource value and broader economic value) is locked-up in waste and is lost to the economy through landfilling
  - Waste disposal costs (tipping fees) are particularly low, however, the value of recyclables alone should drive a more aggressive recovery of these resources than what we currently see
  - The annual resource value of waste (>R25.2b) represents  $\pm 0.86\%$  of South Africa’s GDP



# Informing the Roadmap



- **South African Waste Sector Survey (2012)** (DST, 2013)
  - Waste sector (public & private) employed  $\pm 29,833$  people
  - Minimum financial value of the formal waste sector (public and private) was R15.3 billion or 0.51% of GDP
  - Minimum spend on waste RDI was R50.2m (0.33% the value of the sector)
  - Positive transformation of sector with average BBEEE level 4



- **Trends in Waste Management and Priority Waste Streams for the Waste RDI Roadmap** (DST, 2014)
  - Economic opportunities in waste exist (opportunity waste streams & opportunity regions)
  - Globalization of waste (increasing flows between countries)
  - Increasing partnership between public and private sectors, globally, to achieve waste diversion targets
  - Improved feedstock management (quality and quantity)
  - Different paths to achieving IWM (technology portfolios)



# Waste RDI Roadmap for South Africa

Problem — Means — How — Opportunities

## Problem Statement:

- 90% of South Africa's waste goes to landfill
- Resulting in **loss of resources** to the economy
- Resulting in social (human health) and environmental **impacts**
- Municipalities face **challenges** in delivering services and diverting waste from landfill
- Alternative waste treatment typically more **expensive** than landfilling

## Human Capital Development (HCD)

(Skills)

## Research and Development (R&D)

(Evidence)

## Innovation (technological and non-technological)

(Technology)



**Strategic Planning**



**Modelling and Analytics**



**Technology Solutions**



**Waste Logistics Performance**



**Waste and Environment**



**Waste and Society**

Strengthen **skills** and generate **evidence** to **inform** decision-making, planning and policy development by government and industry

Strengthen **skills** in methods, tools, models and techniques and apply these to generate **evidence** to **inform** the management of waste

Develop, evaluate, demonstrate, localise and deploy **technologies** to **support** municipalities and industry in diverting waste away from landfill towards value-add

Strengthen **skills** and generate **evidence** to optimise decision-making around the movement of waste across the country (logistics, assets, resources)

Strengthen **skills**, generate **evidence**, **deploy technologies** to reduce the impacts of waste on receiving environments

**Deepen understanding** of the socio-economic opportunities provided by waste, but also the threats that waste poses to human health

## Opportunities:

- Preventing waste creates opportunities for industry to increase **value-addition and competitiveness**
- Diverting waste from landfill creates opportunities for new direct and indirect **jobs and enterprises**
- Improved management of waste **reduces risks** to human health and environment

# Reflecting on 2015/16 – The 1<sup>st</sup> Year

## Human Capital Development (HCD)

Providing a pipeline of skilled post-graduates into the waste and secondary resources sector with the skills to drive alternative waste treatment and to unlock opportunities

Increasing the supervisory capacity to mentor post-graduate (Honours, Masters, Doctoral and Post-Doc students)

- Post-graduate **degrees** in **waste management**
  - **BSc Honours** (Environmental Sciences with specialisation in Waste Management) (NWU)
    - First class of 10 students graduated (2015)
    - Offered as a full-time (and now part-time) degree
  - **MSc** (Environmental Management with specialisation in Waste Management) (NWU)
    - Planned offering from 2017
  - **MSc Eng** (Waste Management) (new degree) (UKZN)
    - Approved by University and submitted to CHE for approval in 2015
    - Planned offering from 2017

# Reflecting on 2015/16 – The 1<sup>st</sup> Year

## Human Capital Development (HCD)

Providing a pipeline of skilled post-graduates into the waste and secondary resources sector with the skills to drive alternative waste treatment and to unlock opportunities

Increasing the supervisory capacity to mentor post-graduate (Honours, Masters, Doctoral and Post-Doc students)

- Post-graduate **scholarships** in **waste management**
  - Open and Targeted Calls for Scholarships in 2015
    - Partnered with Plastics|SA on the targeted call
  - 36 applications were received (28 Masters and 8 Doctoral Scholarship applications)
  - 9 Post-graduate Scholarships awarded for 2016
    - Number limited only by the funding available
  - Strong focus of planned post-graduate studies on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
  - Supporting **transformation** of the waste sector (black 56% of awarded scholarships) and (female 67% of awarded scholarships)

# Reflecting on 2015/16 – The 1<sup>st</sup> Year

## Waste Research & Development (R&D)

Supporting the generation of new scientific evidence, relevant to South Africa, that will inform policy, planning, decision-making

Supporting the development of new technology and of adapting technology to South Africa conditions through R&D

- Issued **Open R&D Calls** to Public Research Institutions in 2015
  - 22 Grant Applications received
  - 10 Projects awarded starting in 2016
    - Number limited only by the funding available
  - Strong focus of planned R&D on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
- Consolidating existing R&D in South Africa
  - Planned DST Academic book series
  - First book in process on the beneficiation of **biomass and organic waste** in South Africa

# Reflecting on 2015/16 – The 1<sup>st</sup> Year

**Waste  
Innovation**  
(technological  
and non-technological)

Driving technological and non-technological innovation to improve the management of waste in South Africa and to unlock the social, environmental and economic opportunities in resource recovery

Developing technological solutions unique to South African conditions

- Issued **Open Innovation Calls** for upscaling technologies from TRL 3
  - 5 Grant Applications received
  - 1 Project awarded starting in 2016
    - Number limited only by the funding available
- Targeted projects through **RFPs**
  - RFP issued on e-waste (WEEE technologies)
- Industry-meets-Science Workshop series
  - Aimed at strengthening RDI collaboration between industry and academia
    - **Biomass and organic waste** (2014)
    - **Bioplastics** (2016)
    - **Waste electrical and electronic equipment** (2016)

# Reflecting on 2015/16 – The 1<sup>st</sup> Year

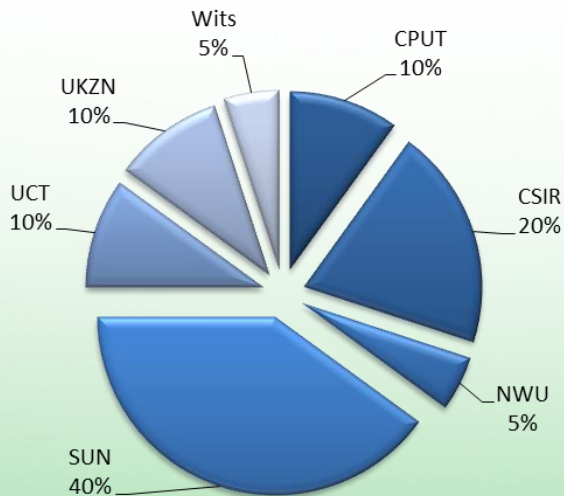
Human Capital  
Development (HCD)

Waste Research  
& Development (R&D)

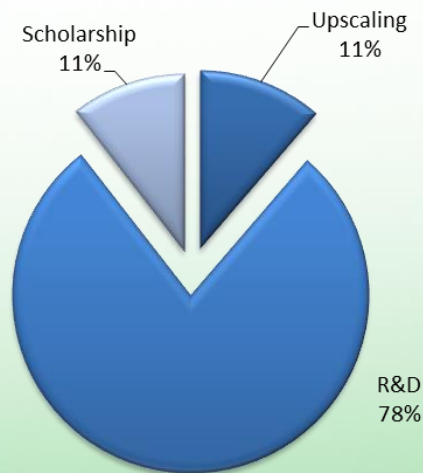
Waste  
**Innovation**  
(technological  
and non-technological)

- Summary of scholarships and grants awarded for 2016

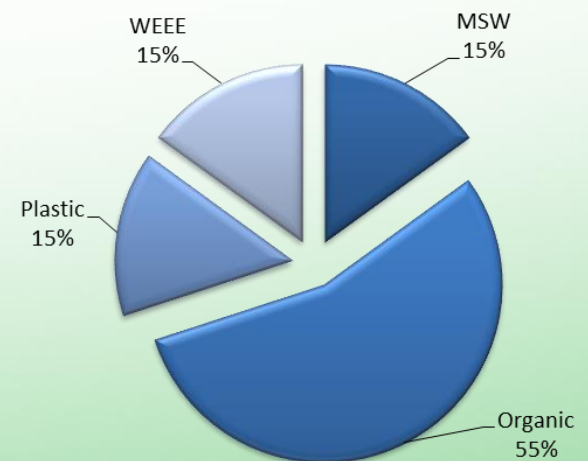
**By institution**



**Financial investment by  
funding instrument**



**By waste stream**





# Highlights for 2016/17



- WEEE Technology Landscape Mapping  
*(aimed at providing support to government and industry)*
- Waste RDI collaborative initiatives with specific municipalities *(aimed at providing support to local government)*
- Waste Technology and Innovation Centre  
*(aimed at providing support to local government on alternative waste treatment technologies)*

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