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

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31 May 2016
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)
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 ±0.86% of South Africa’s GDP
Informing the Roadmap

  - Waste sector (public & private) employed ± 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

  - 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 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

Means:
- Human Capital Development (HCD)
  - (Skills)
- Research and Development (R&D)
  - (Evidence)
- Innovation (technological and non-technological)
  - (Technology)
- Waste Logistics Performance
- Strategic Planning
- Modelling and Analytics
- Technology Solutions
- Waste and Environment
- Waste and Society

How:
- 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 1st Year

- 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

**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)
Reflecting on 2015/16 – The 1st Year

• 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)

Human Capital Development (HCD)

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Reflecting on 2015/16 – The 1st Year

- 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 1st Year

- 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 1st Year

- Summary of scholarships and grants awarded for 2016

**By institution**
- SUN 40%
- CSIR 20%
- UCT 10%
- UKZN 10%
- NWU 5%
- CPUT 10%
- Wits 5%

**Financial investment by funding instrument**
- Scholarship 11%
- Upscaling 11%
- R&D 78%

**By waste stream**
- Organic 55%
- Plastic 15%
- MSW 15%
- WEEE 15%
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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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