

A WASTE RDI ROADMAP FOR SOUTH AFRICA

Overview of the Waste RDI Roadmap, the Roadmap funding instruments and current projects



Prof Linda Godfrey
Manager: Waste Roadmap Implementation Unit

Waste RDI Roadmap Roadshow
17-19 July 2018



science
& technology

Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA

CSIR
our future through science



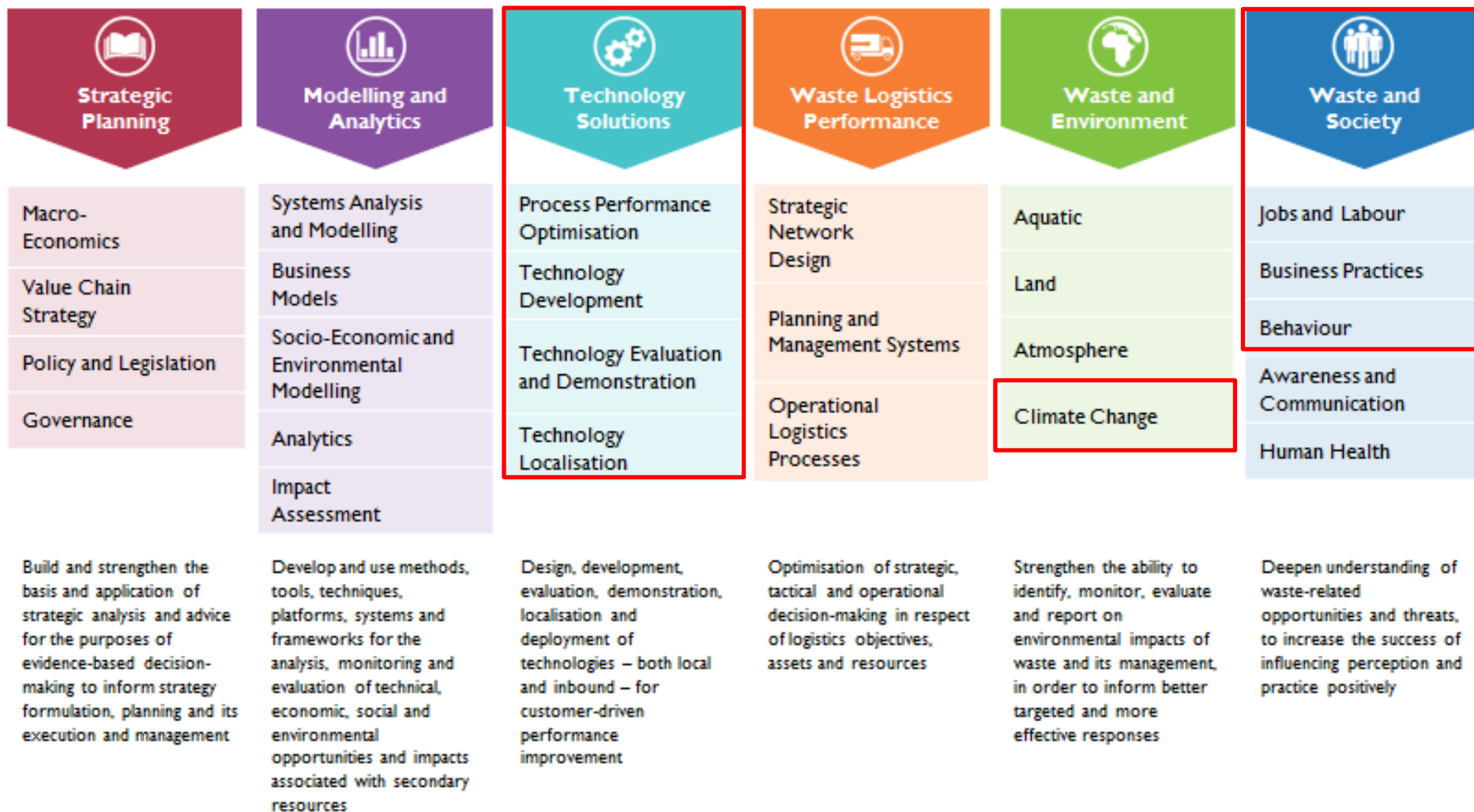
Outline of presentation

- Overview of Waste RDI Roadmap activities and funding instruments for 2016-2018
 - Human Capital Development
 - Research & Development
 - Innovation
- Planned activities 2018-2019

Focus of the Roadmap for 2016-2018

RDI Clusters defined

PMU directed investment



Focus of the Roadmap for 2016-2018



- **Municipal Solid Waste**

e.g. paper and packaging, C&D waste, OFMSW, residual waste



- **Electronic Waste (WEEE)**

e.g. all fractions, metal, plastic, glass, etc.



- **Waste Plastic**

e.g. pre- and post-consumer plastics (all)



- **Organic Waste**

e.g. industrial biomass, OFMSW, food waste



- **Waste tyres**

Maximising the diversion of waste away from landfill **towards value-adding opportunities**, including **prevention** of waste and the optimised **extraction of value** from reuse, recycling and recovery, in order to create significant social, economic, and environmental **benefit** for South Africa.

Focus of the Roadmap for 2016-2018

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)

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

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



Strengthening HCD in South Africa

Human Capital Development

Strengthening HCD in South Africa

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
 - Northwest University –
 - Offered as full-time and part-time degrees
 - **BSc Honours** (Environmental Sciences with specialisation in Waste Management)
 - First class of 10 students graduated (2015)
 - **MSc** (Environmental Management)
 - First intake (8 students) in 2017
 - University of KwaZulu-Natal –
 - **MSc Eng** (Waste Management) (new)
 - Approved by the University with CHE for approval
 - Planned offering from 2019
 - Interim offered as a Summer School

Strengthening HCD in South Africa

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)

- NWU **Honours degree** not offered in 2018 due to insufficient qualified applicants

Number of prospective students applying for degree	% of applications received	Reason for being successful/unsuccessful
18	69%	No sufficient undergraduate degree/ no evidence of sufficient undergraduate degree
6	23%	2017 third year NWU students who did not pass all third year modules.
2	8%	Qualified for BSc. Hons Environmental Sciences: Waste Management ¹
Total: 26		

- The degree was established to upskill persons already employed within the sector
- Raises concern around baseline skills and the need to reevaluate the **waste diploma**

Strengthening HCD in South Africa

2

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 and 2016
 - No Call for Scholarships in 2017 (funding constraint)
 - 11 Masters/PhD scholarships funded to date
 - 7 post-graduate scholarships awarded in 2015/16
 - 4 post-graduate scholarships awarded in 2016/17
 - Strong focus of post-graduate studies on “**Technology Solutions**” (Cluster) and “**Organic waste**” (Priority waste)
 - Supporting **transformation** of the waste sector. Of the 11 students supported – female 36% and persons of colour 64%

Strengthening HCD in South Africa

3

Human Capital Development (HCD)

- Across the 16 R&D and Innovation Grants awarded (*discussed later*),
- A further 48 **post-graduate students** are supported –
 - 11 PhD
 - 24 Masters (2 completed)
 - 13 Honours (8 completed)

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)



Strengthening R&D in South Africa

Research, Development and Innovation

Strengthening R&D in South Africa



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

- **R&D and Innovation Grants**
 - 10 Projects awarded in 2015 (starting in 2016)
 - Strong focus of planned R&D on “**Technology Solutions**” (Cluster) and “**Organic waste**” (priority waste)
 - 5 Projects awarded in 2016 (starting in 2017)
 - Strong focus on “**WEEE**”
 - Project completion of grant projects ranges from 2018-2020
 - No Grant Call issued in 2017 (funding constraint)
 - Call currently out for 2018, projects starting in 2019 academic year (*discuss later*)

Grant projects funded – 2015/16



Project: Lessons from **Waste Picker** Integration Initiatives

Grant Holder: Dr M Samson

Organisation: CSIR NRE, Durban

Period: 04/2016 – 04/2019



Project: A decision-support tool for MSW **separation at source** (*completed*)

Grant Holder: A Nahman

Organisation: CSIR NRE, Stellenbosch

Period: 04/2016 – 03/2018



Project: Beneficiation of **forestry biomass** waste streams

Grant Holder: Prof B Sithole

Organisation: CSIR NRE, Durban

Period: 04/2016 – 03/2019



Project: Valorisation of **waste chicken feathers**

Grant Holder: Prof Bruce Sithole

Organisation: CSIR NRE, Durban

Period: 04/2016 – 03/2019

Grant projects funded – 2015/16



Project: Sustainable conversion of **agricultural waste** residues

Grant Holder: Dr M John

Organisation: CSIR MSM, Port Elizabeth

Period: 04/2016 – 03/2019



Project: Value recovery from **solid confectionary waste**

Grant Holder: Prof Sue Harrison

Organisation: UCT, Cape Town

Period: 04/2016 – 03/2019



Project: Reactor design for furfural production from **sugar cane** residues

Grant Holder: Prof J Görgens

Organisation: SUN, Stellenbosch

Period: 04/2016 – 03/2019



Project: Biogas and VFA biorefinery of **fruit juice wastes** with biomass

Grant Holder: Prof J Görgens

Organisation: SUN, Stellenbosch

Period: 04/2016 – 06/2019

Grant projects funded – 2015/16



Project: Production of novel cellulose nanocomposites from **organic waste**

Grant Holder: Dr Annie Chimphango

Organisation: SUN, Stellenbosch

Period: 04/2016 – 03/2020



Project: Amino acid leaching of metals from **printed circuit board** waste *(completed)*

Grant Holder: Prof C Dorfling

Organisation: SUN, Stellenbosch

Period: 04/2016 – 03/2018



Project: Extraction of value from solid waste by **pyrolysis conversion**

Grant Holder: Prof J Görgens

Organisation: SUN, Stellenbosch

Period: 04/2016 – 03/2019

Grant projects funded – 2016/17



Project: Recycling rare earth elements from **fluorescent lamps**

Grant Holder: Prof C Dorfling

Organisation: SUN, Stellenbosch

Period: 01/2016 – 03/2019



Project: Sequential extraction and recovery of valuable metals from **WEEE**

Grant Holder: Prof S Harrison

Organisation: UCT, Cape Town

Period: 01/2016 – 03/2020



Project: **Lithium ion battery** (LIB) recycling process

Grant Holder: Dr G Akdogan

Organisation: SUN, Stellenbosch

Period: 01/2016 – 03/2019

Grant projects funded – 2016/17



Project: Thermal treatment of **printed circuit board (PCB)** waste

Grant Holder: Prof C Dorfling

Organisation: SUN, Stellenbosch

Period: 01/2016 – 03/2020



Project: Use of **PCB leach residue** as reductant in pyrometal. operations

Grant Holder: Dr G Akdogan

Organisation: SUN, Stellenbosch

Period: 01/2016 – 03/2019

Strengthening R&D in South Africa

2

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



Mapping South Africa's Waste Electrical and Electronic Equipment Technology Landscape MINTEK, SOUTH AFRICA

PROJECT INFORMATION

Waste Roadmap Instrument: Targeted Research Call
Lead Institution: Mintek
Project Leader: Mr. M. Gerike
Research Budget: R680 398
Co-investment: R400 000
Project timeframe: May 2016-March 2017

- **Targeted research project** aimed at –
 - Mapping South Africa's **waste electrical and electronic equipment** (WEEE) dismantling, pre-processing and processing technology in South Africa
 - Research undertaken by Mintek and completed in 2017
 - To support future technology uptake in the e-waste recycling sector
- Publicly available on the Waste RDI Roadmap website
- Positive feedback from sector on the value of this research

<http://wasteroadmap.co.za/documents/index.php>

Strengthening R&D in South Africa



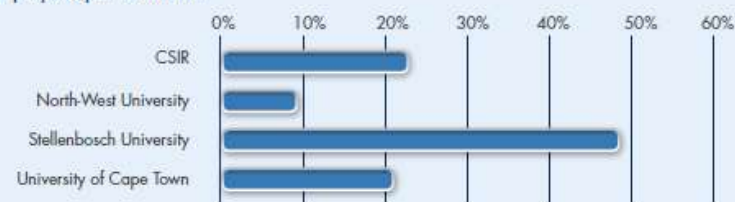
- **Platforms** for sharing and showcasing RDI with e.g. industry
- Facilitating targeted research

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

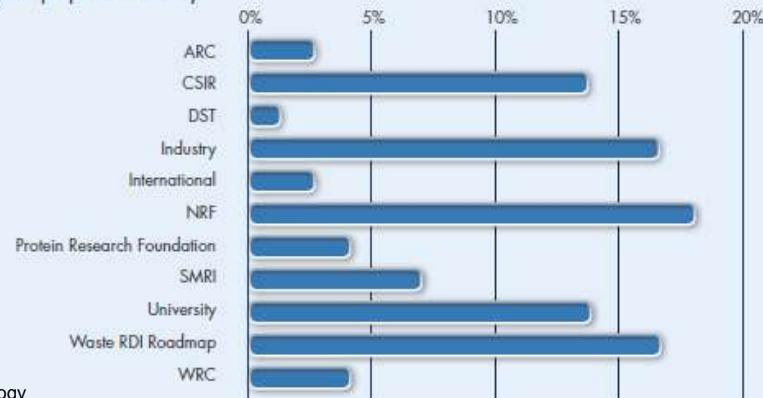
Percentage of projects by waste streams



Percentage of projects per institution



Percentage of projects funded by



Strengthening R&D in South Africa

4

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



- Facilitating the establishment of instruments within the NSI to strengthen waste RDI
- NRF/DST/CSIR Call for **SARChI Chairs** issued in 2017
- First **solid waste** management SARChI Chairs in South Africa
- Awarded by NRF in March 2018
 - Waste & **Society** – UWC (Prof R Schenck)
 - Waste & **Climate** – UKZN (Prof C Trois)

Strengthening Innovation in SA

1

**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 Grant Call** for upscaling technologies in 2015
 - 5 Grant Applications received
 - 1 Project awarded starting in 2016
- No call issued in 2016 or 2017
- But in discussion organisations such as TIA, The Innovation Hub, GreenCape, NCPC, etc. to drive waste innovation in South Africa



Waste RDI Roadmap

Strategic partnerships

Strategic Partnerships

- Local and international **partnerships** are key to the implementation of the Roadmap
 - Government
 - Business / Industry
 - Academia
- Both as “implementing **partner**” and as “**funder**”

The WRIU staff have engaged with, and provided specialist advisory support to, among others –



South Africa –

- Department of Environmental Affairs
- Department of Trade and Industry
- State owned enterprises
- Development Bank of Southern Africa (DBSA), Green Fund
- Plastics and packaging sector (including PETCO, Packaging | SA, Plastics | SA, Sustainability Council)
- Various International beverage companies (with footprints in South Africa), and their associated packers/fillers
- WEEE sector (including eWASA, HP, SAEWA)
- Various Eastern and Western Cape green economy, innovation and green skills forums



International –

- European Commission
- EU Horizon 2020 EWIT project team
- EU Horizon 2020 WASTECOSMART project team
- German Academy of Sciences Leopoldina
- Global Network of Science Academies
- Global Young Academy (GYA)
- United Nations International Labour Organization (ILO)
- United Nations Environment Programme (UNEP)

Strategic Partnerships (PMU)



CSIR, DST, ILO Green Economy Training, Turin, 2017



UN IETC, Global Dialogue on Technology for Resilient Cities, Japan, 2017



Coordinating Lead Author, African Waste Management Outlook, Nairobi, 2017-2018



University of Leeds, Circular South Cities Workshop, UK, 2018

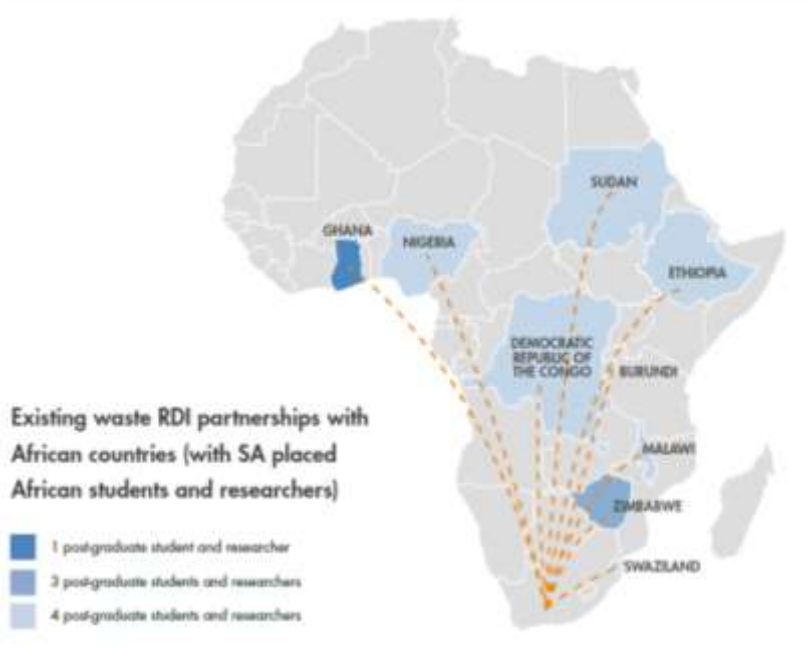


ILO, Page, DEA, UNEP National Green Economy Academy, Jhb, 2018

- **Showcasing South Africa's waste RDI** locally and internationally
- Building local and international **capacity** based on SA learning
- Strengthening local and international **partnerships**

Strategic Partnerships (NSI)

- Regional and international **research partnerships** remain limited (2017)
- An **opportunity** to establish and strengthen local, regional and international partnerships in solid waste R&D





Waste RDI Roadmap

Communication

COMMUNICATION IMPACT

POPULAR ARTICLES

2 radio interviews
15 print articles
highlighting
the Waste RDI
Roadmap



TOP DOWNLOADED PUBLICATIONS

2 447 Trends in waste management
1 148 South African Waste Sector Survey
1 083 The economic benefits of moving
up the waste hierarchy
925 Current and required institutional
mechanisms to support waste innovation
870 Waste management red meat abattoirs

2015/16

WEBSITE



2 857 UNIQUE VISITORS
4 062 NUMBER OF VISITS
13 593 PAGES VISITED
17 737 DOCUMENT
DOWNLOADS

TOP 5 COUNTRIES ACCESSING THE WASTE RDI ROADMAP WEBSITE



COMMUNICATION IMPACT

POPULAR ARTICLES

3 radio interviews
3 TV interviews
14 print articles
highlighting the
Waste RDI Roadmap



TOP DOWNLOADED PUBLICATIONS

- The economic benefits of moving up the waste hierarchy
- South African Waste Sector Survey
- Trends in waste management
- Waste RDI Roadmap Summary
- BSc Hon Brochure (Northwest University)

WEBSITE



19 683 UNIQUE VISITORS
17 208 NUMBER OF VISITS
30 569 PAGES VISITED

TOP 5 COUNTRIES ACCESSING THE WASTE RDI ROADMAP WEBSITE



2016/17



www.wasteroadmap.co.za

Waste Research, Development and Innovation Roadmap

A waste R&D and innovation programme for South Africa

Innovation, and the development and deployment of new technologies, will improve waste management



Home

Waste RDI Roadmap

Funding calls

- Overview
- Funding streams
- Focus areas
- Open calls
- Current projects

Tenders

Skills development

Industry-meets-Science

Publications and media

Contact us

The Department of Science and Technology's (DST) "Ten-Year Innovation Plan: Towards a knowledge-based economy" recognises the importance of science and technology in improving the country's competitiveness and economic growth. The waste sector is recognised by Government as one that provides opportunities for value recovery, job creation and economic development.

The DST has developed the Waste Research, Development and Innovation (RDI) Roadmap for South Africa to provide strategic direction and to coordinate and manage South Africa's portfolio investment for the next 10 years in six identified clusters of waste research, development and innovation activity –

New degree

[BSc. Honours in Waste Management launched](#)

Recent documents

Report

[Waste RDI Roadmap for South Africa \(2015-2025\)](#)

Presentations

[Industry-meets-Science Workshop Series](#)

Waste RDI Roadmap

- Annual **Progress Reports** published for 2015/16 and 2016/17

A 10-Year Waste Research Development and
Innovation Roadmap for South Africa
2015-2025

2015/16 Annual Progress Report

REFLECTING ON THE FIRST YEAR OF IMPLEMENTATION



A 10-Year Waste Research Development and
Innovation Roadmap for South Africa
2015-2025

2016/17 Annual Progress Report

REFLECTING ON THE SECOND YEAR OF IMPLEMENTATION



<http://www.wasteroadmap.co.za/documents/index.php>



Waste RDI Roadmap

Planned activities for 2018

Waste Capability Mapping



- In the process of finalising the **Waste RDI Capability Mapping** report (update to 2014 report)
- Survey responses (questionnaires) received from CSIR, Limpopo, Mintek, NMU, NWU, Stellenbosch, TUT, UJ, UKZN, UNISA, UP, UWC, Wits

<http://wasteroadmap.co.za/skillsdevelopment/capabilities.php>

SA Innovation Bridge Portal



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Department:
Science and Technology
REPUBLIC OF SOUTH AFRICA



Innovation
Bridge

South Africa's Technology Showcase and Matchmaking Portal

NAVIGATION

PROJECTS

TECHNOLOGY

FUNDING

CALLS FOR INFORMATION

SUPPORTIVE INFO

LOGIN/REGISTER



Olive Pomace for Cosmetic Formulations

Share / Save   

OVERVIEW:

A short description of the available technology.

Olive pomace is a waste product from the process of developing olive related foodstuffs. However olive pomace can offer significant benefits when included in cosmetic formulations. By processing the olive pomace waste then incorporating it into oil or water emulsion creams for topical application. By using a product that would otherwise go to waste into a beneficial cosmetic, we can produce an affordable product and reduce waste.

KEYWORDS:

INTELLECTUAL PROPERTY PROTECTION:

OPPORTUNITY TYPE:

CONTACT

Please use this contact form for enquiries regarding this page.

Your name *

Your e-mail address *

Subject *

Funding Calls for 2018/2019



- No scholarship call in 2018 as all funding will be directed to the new Grant Call –
 - Encourage students to make use of existing instruments (e.g. NRF, business)
- Targeted **Grant Call** for research projects starting in 2019 academic year is open and will focus on **MSW**
 - Research Topic 1: City cleanliness
 - Research Topic 2: Diversion of organic and construction & demolition waste
 - Research Topic 3: Incentive models
 - Research Topic 4: Phasing out uncontrolled dumping

<http://wasteroadmap.co.za/funding/opencalls.php>

10-year Waste RDI Roadmap for SA

- Highlighted the activities that the Waste RDI Roadmap Portfolio Management Unit (PMU) is driving
- But encourage Universities and Science Councils to also **pursue alternate sources of funding** to drive Roadmap-aligned RDI (e.g. NRF, TIA, EU)
- To **build R&D portfolios** around Roadmap clusters or sub-clusters
- To **strengthen partnerships** and networks with other institutions
- The PMU, hosted by the CSIR, is a **resource** that the NSI can draw upon



www.wasteroadmap.co.za

Contact details

- **Prof Linda Godfrey**
Manager: Waste Roadmap IU
Principal Scientist
E-mail: LGodfrey@csir.co.za
- **Dr Henry Roman**
Director: Environmental Services
and Technologies
E-mail: henry.roman@dst.gov.za
- **Ms Magamase Mange**
Deputy Director: Environmental
Technologies
E-mail: magamase.mange@dst.gov.za

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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