

Transitioning towards a decarbonised circular economy: Focus on Waste to Energy

IEA-Bioenergy Task 36 Roundtable at the SABIA NATIONAL BIOGAS CONFERENCE 2021 (online from South Africa)

Workshop Report

IEA Bioenergy: Task 36 - February 2023

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Preface

This report summarises the deliberations of a digital workshop that Task 36 conducted in collaboration with SABIA (the South African Biogas Industry Association) on “**Transitioning towards a decarbonised circular economy: Focus on Waste to Energy**” on 11 June 2021. This was the first of a series of workshops/webinars organised by SABIA to inform and shape their **Vision 2030 - Biogas to Energy Strategy for South Africa**, which was presented later on in 2022 at a follow up forum. The report refers to this follow up participation of the South African Task 36-member, Prof. Cristina Trois, at the SABIA National Forum on “VISION 2030 - building a sustainable Southern African Biogas Market”, held in person in Johannesburg in 2022, where the new strategy was launched.

South Africa, as many other countries in the African continent, discards over 90% of municipal solid waste and industrial biomass on land, without any effective recycling of materials or resources. In this context, any meaningful strategy to activate the circular economy needs to prioritize the optimization of existing and the development of new waste-to-resource infrastructure. In 2021, SANEDI (South African National Energy Development Institute), an R&D state entity of the Department of Minerals, Resources and Energy, reached out to the South African Research Chair in Waste and Climate Change and the other members of Task 36 of the IEA Bioenergy for the development of a Waste to Energy Roadmap for South Africa, that was subsequently launched in March 2022.

Task 36 members were invited to present their experiences and lessons learned at the first webinar and panel discussion of the SABIA (South African Biogas Industry Association) National Biogas Conference on “Transitioning towards a decarbonized circular economy: Focus on Waste to Energy”, held online on 11 June 2021. The webinar explored the main issues that are preventing the widespread insertion of waste to energy and biogas to energy projects in the South African energy mix, despite the challenging times of continued loadshedding imposed by the electricity utility ESKOM. The deliberations of the Task 36/SABIA workshop in 2021 informed the SANEDI Waste to Energy Roadmap and the SABIA VISION 2030 National Biogas to Energy Strategy that was launched in 2022.

Disclaimers

The workshop was organized by SABIA in collaboration with Task 36 (Prof. Cristina Trois) and SANEDI (South African National Energy Development Institute). Task 36 members from Sweden, USA, Australia, and South Africa were invited guest speakers, together with leadership members from SABIA and SANEDI. The views and opinions of the workshop attendees, as summarized in this document, do not necessarily reflect those of SABIA, Task 36, SANEDI or their respective employers, nor do their employees make any warranty, expressed or implied, or assume any liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represent that its use would not infringe upon privately owned rights.

The IEA Bioenergy Technology Collaboration Programme (TCP) is organised under the auspices of the International Energy Agency (IEA) but is functionally and legally autonomous. Views, findings and publications of the IEA Bioenergy TCP do not necessarily represent the views or policies of the IEA Secretariat or its individual member countries.

Abbreviations, Acronyms and Definitions

SABIA: South African Biogas Industry Association

SANEDI: South African National Energy Development Institute

GHG: Greenhouse gas

RISE: Research Institute of Sweden

UKZN: University of KwaZulu-Natal

CSIRO: Centre for Scientific and Industrial Research Organisation

FGE: Fountain Green Energy

SARCHI: South African Research Chair Initiative

DFFE: Department of Forestry Fishery and the Environment

DMRE: Department of Minerals Resources and Energy

WBA: World Biogas Association

WROSE: Waste to Resource Optimisation and Scenario Evaluation Model

Introduction

With the increased need to incorporate renewable energy resources in the energy mix, the transition towards a decarbonized circular economy has become a key topic among policy makers, governmental departments, and local authorities. However, not many countries worldwide have developed comprehensive roadmaps to navigate this transition.

South Africa, as many other countries in the African continent, discards over 90% of municipal solid waste and industrial biomass on land without any effective recycling of materials or resources. In this context, any meaningful strategy to activate the circular economy needs to prioritize the optimization of existing and the development of new waste-to-resource infrastructure.

Since 2021, SANEDI (South African National Energy Development Institute), an R&D state entity of the Department of Minerals, Resources and Energy, is collaborating with the South African Research Chair in Waste and Climate Change (Prof. Cristina Trois) and the other members of Task 36 of the IEA Bioenergy for the development of a Waste to Energy Roadmap for South Africa, that was launched in March 2022. Task 36 members were invited to present their experiences and lessons learned at the first webinar and panel discussion of the SABIA (South African Biogas Industry Association) National Biogas Conference on “Transitioning towards a decarbonized circular economy: Focus on Waste to Energy”, held online on 11 June 2021. This was the first of a series of workshops/webinars organised by SABIA to inform and shape their **Vision 2030 - Biogas to Energy Strategy for South Africa**, which was presented in 2022 at a follow up forum. The report includes also inputs from this follow up participation of the South African Task 36-member, Prof. Cristina Trois, at the SABIA National Forum on “VISION 2030 - building a sustainable Southern African Biogas Market”, held in person in Johannesburg in 2022, where the new strategy was launched.

The webinar, opened by SABIA Managing Board Member, Eddie Cook, kickstarted with a welcome address by Acting CEO of SANEDI, Lethabo Manamela, who highlighted the focus that the South African Government is currently placing to develop the biogas and waste to energy sectors, through the insertion of appropriate waste to energy infrastructure and the development of institutional and economic frameworks and incentivization schemes in the country. Manamela also stressed the importance that R&D and international collaboration platforms, such as that with Task 36 and the IEA, are playing in informing and guiding the Waste to Energy Roadmap process. Her words were echoed and amplified by SABIA’ Secretary General, Alberto Borello (FGE, South Africa), who detailed strategic interventions that SABIA is putting in place to promote biogas to energy as fulcrum of a sustainable decarbonized economy in Southern Africa.

Task 36 was represented by Daniel Roberts (CSIRO, Australia) who presented the Australian experience in the development of the “Hydrogen Economy” and in the insertion of next generation Waste to Energy technologies. Beau Hoffman (Dept. of Energy, USA) detailed the lessons learned by USA’s Government in developing the USA Waste to Energy Roadmap and stressed the importance of a good stakeholder engagement in ensuring the success of the roadmap. Task 36’s Leader, Inge Johansson (RISE, Sweden) spoke about the effectiveness of incentivisation schemes for the successful insertion of bioenergy from waste in Sweden and the EU. Cristina Trois (UKZN, South Africa) presented the key elements of the Waste to Energy roadmap that developed for the South African Department of Minerals, Resources and Energy (DMRE/SANEDI).

The last presenter was the former President of the World Biogas Association, David Newman, who explored the concept of circularity in the biogas and waste to resource sector and its potential applications. The panel discussion was animated by many questions of the diverse international audience of practitioners, scientists and governmental officials who attended the webinar.

WORKSHOP OBJECTIVES

The main aim of the joint Task 36/SABIA workshop on “Transitioning towards a decarbonised circular economy: Focus on Waste to Energy” was that to present lessons learnt on the insertion of waste to energy projects from the member countries of Task 36, in order to inform SABIA in developing the Biogas-to-Energy VISION 2030 Strategy for South Africa, as well as to assist SANEDI and the

Department of Minerals Resources and Energy of South Africa (DMRE) in the development of the first Waste to Energy Roadmap for South Africa. Specific objectives include:

- Presenting SANEDI’s strategy for the insertion of waste to energy in the energy mix and explore how the strategy articulates with the South African “Just Transition Towards a Decarbonised and Circular Economy”
- Presenting SABIA’s plan to develop the biogas sector in South Africa and the key elements of the Vision 2030 - Biogas to Energy Strategy for South Africa
- Discussing experiences and lessons learnt from selected members of Task 36 (Sweden, USA, Australia and South Africa) in the development of waste to energy roadmaps and decarbonisation pathways in their respective countries
- Presenting the contribution of the World Biogas Association in developing pathways and strategies for the decarbonisation of the waste sector globally
- The panel discussion explored the following questions: what works, what doesn’t and why?

WORKSHOP AGENDA

Figure 1 details the Programme and Guest speakers of the workshop.

SABIA NATIONAL BIOGAS CONFERENCE 2021
 Transitioning towards a decarbonised circular economy
 Focus on Waste to Energy
 In collaboration with IEA Bioenergy TASK 36

10 June 2021 14h00 -16h00 (GMT+2)

EVENT 1 Program

14:00 - 14:05 OPENING SOUTHERN AFRICAN BIOGAS INDUSTRY ASSOCIATION (SABIA)	15:00 - 15:15 SWEDEN: INGE JOHANSSON, RISE The effectiveness of incentive schemes for insertion of bioenergy from waste in Sweden
14:05 - 14:15 SOUTH AFRICAN NATIONAL ENERGY DEVELOPMENT INSTITUTE (SANEDI) Welcoming address	15:15 - 15:30 SOUTH AFRICA: CRISTINA TROIS, UKZN Developing a Waste to Energy roadmap for South Africa
14:15 - 14:25 SOUTH AFRICA: ALBERTO BORELLO, SABIA Strategy towards pivoting biogas in a decarbonised economy	15:30 - 15:40 DAVID NEWMAN, WORLD BIOGAS ASSOCIATION Biogas: pathway towards a decarbonised circular economy
14:30 - 14:45 AUSTRALIA: DANIEL ROBERTS, CSIRO Hydrogen production from waste	15:40 - 16:00 PANEL DISCUSSION What works, what doesn't, and why?
14:45 - 15:00 USA: BEAU HOFFMAN, US-EPA DEPT. OF ENERGY Lessons learnt in developing Waste to Energy roadmaps for USA	

Register: www.sabia.org.za

SABIA NATIONAL BIOGAS CONFERENCE 2021
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10 June 2021 14h00 -16h00 (GMT+2)

EVENT 1 Speakers

- ALBERTO BORELLO (South Africa)**
General Secretary - Southern African Biogas Association
- DANIEL ROBERTS (Australia)**
Hydrogen Energy Systems Future Science Platform (CSIRO Energy)
- BEAU HOFFMAN (U.S.A.)**
Technology Manager, conversion R&D, Bioenergy Technologies Office (U.S. Department of Energy)
- INGE JOHANSSON (Sweden)**
Tech. Lic. Researcher, RISE Research Institutes of Sweden, Division Built Environment - Energy and Circular economy
- CRISTINA TROIS (South Africa)**
Professor in Environmental Engineering, South African Research Chair in Waste and Climate Change (SARCHI)
- DAVID NEWMAN**
President - World Biogas Association (global trade association for biogas)

Register: www.sabia.org.za

Figure 1 (a,b): SABIA National Biogas Conference 2021-Event 1 - Programme and Speakers (Source: SABIA Marketing Manager: David Sobey)

Workshop Structure

KEYNOTE SPEAKERS

Ms Lethabo Manamela, Acting CEO of SANEDI - Welcome Address

Acting CEO of SANEDI, Lethabo Manamela, highlighted the focus that the South African Government is currently placing to develop the biogas and waste to energy sectors, through the insertion of appropriate waste to energy infrastructure and the development of institutional and economic frameworks and incentivization schemes in the country. Manamela also stressed the importance that R&D and international collaboration platforms, such as that with Task 36 and the IEA, are playing in informing and guiding the Waste to Energy Roadmap process. Manamela explained how waste to energy articulates in the current SANEDI' Strategy and how SANEDI and the DMRE will support the implementation plan of the waste to energy roadmap for South Africa in the future. SANEDI's strategy is available at the following link: <https://samedi.org.za>.

Mr Alberto Borello, Secretary General of SABIA and Technical Director at FGE, South Africa

Title: Strategy towards pivoting biogas in a decarbonised economy

SABIA' Secretary General, Alberto Borello (FGE, South Africa) detailed strategic interventions that SABIA is putting in place to promote biogas to energy as fulcrum of a sustainable decarbonized economy in Southern Africa. Alberto Borello discussed the role of biogas in the Just Energy Transition and the role of SABIA in representing and promoting the biogas sector in Southern Africa.

SABIA aims to drive the industry growth for the biogas sector, which has a theoretical potential of 10 GW (SABIA White Paper, 2020), towards the delivery of a roadmap for Southern Africa to produce over 1.25 GW in 5 years. The implementation of this roadmap in the first 5 years would create over 30,000 permanent and 140,000 temporary jobs, while preventing CO₂ emissions for almost 10 million tons per year (2 % of the South African carbon footprint). However, challenges to the growth of the biogas industry have been identified in institutional (lack of clarity on Government policy and direction relating to Biogas), financial (access to funding, project development costs, regulations and feed-in tariffs, developing the market), technical (need for more research and development into new technologies, focus on skills and capacity development across the industry value chain) and institutional (lack of clarity on Government policy and direction relating to Biogas) factors that need to be addressed.

The role of biogas in contributing towards the Just Energy Transition is detailed in Figure 2 below.

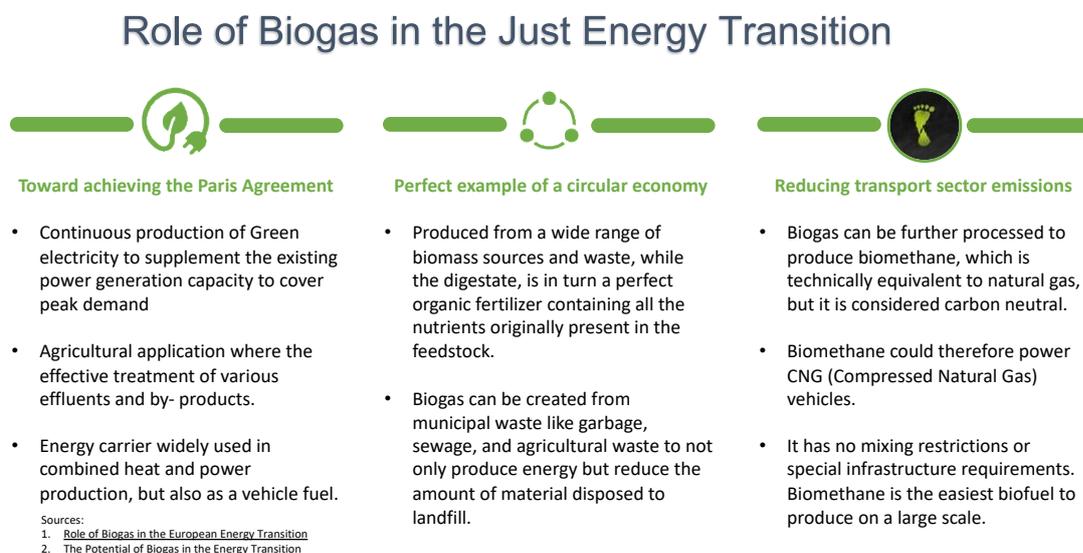


Figure 2: The role of biogas in the SA Just Energy Transition.

The potential for the biogas industry sector in South Africa was estimated to be around 10GW.

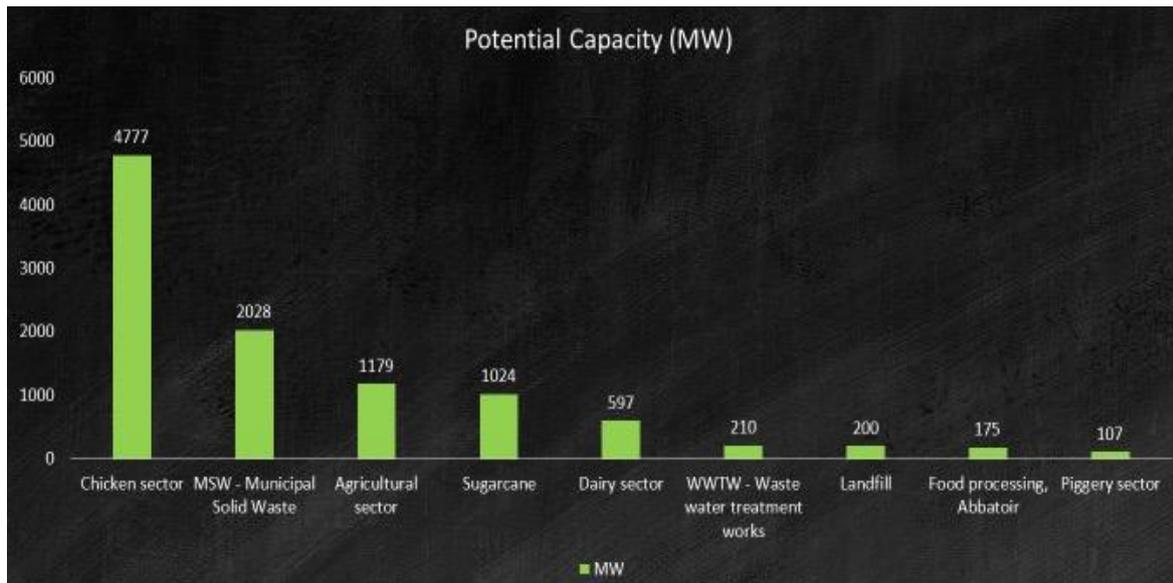


Figure 3: Calculated contributions by sector.

Figure 4 details the predicted impact on the South African economy of the biogas sector if developed accordingly.

Job creation	Theoretical	Feasible within 5 years
Direct permanent job creation	247 122	30 177
Development/Construction jobs in the sector	1 153 234	141 455

Carbon reduction to be separated	Theoretical	Feasible within 5 years
CO ₂ e avoided [t/y]	81 189 768	9 889 650
% on total country emission in 2019	15%	2%

Comparison to other renewable technologies	Theoretical	Feasible within 5 years
Energy delivered to or displaced from the national grid [MWh/y]	85 462 913	10 410 158
Equivalent Wind installed capacity [MW]	35 610	4 338
Equivalent PV installed capacity [MW]	58 536	7 130
Installed peaking capacity in SA 2019 [MW]	3 570	

Figure 4: Predicted impact on the South African economy of the biogas sector.

The presentation concluded with the role of SABIA in South Africa and the key elements of the VISION 2030 - Biogas Strategy being developed by SABIA in 2021 (Launched in November 2022) (Figure 5).

SABIA has adopted a global strategy for the development of a local biogas industry and is working with the South African Government to:



Figure 5: Key elements of the Biogas Strategy Vision 2030 being developed by SABIA.

Dr Daniel Roberts, Director of the CSIRO's Hydrogen Energy Future Science Platform, Australia

Title: Hydrogen Production from Waste

Dr Roberts detailed the current available technologies for hydrogen production in Australia and presented a detailed description of the barriers and drivers for the acceptance of new innovative bio-hydrogen from waste technologies in the country. Green hydrogen enables cross-sector decarbonisation and a new export industry. It is estimated that, in Australia, by 2050 we could have a global hydrogen demand of 80 EJ (Figure 6). Since 2050, Australia has experienced a 10-fold increase in carbon-free hydrogen demand.

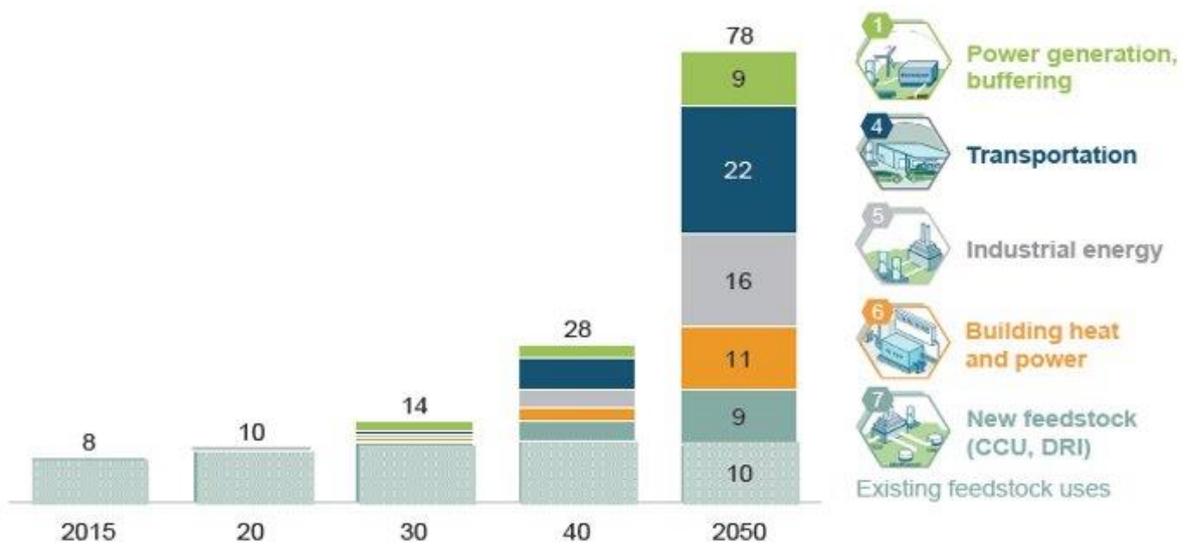
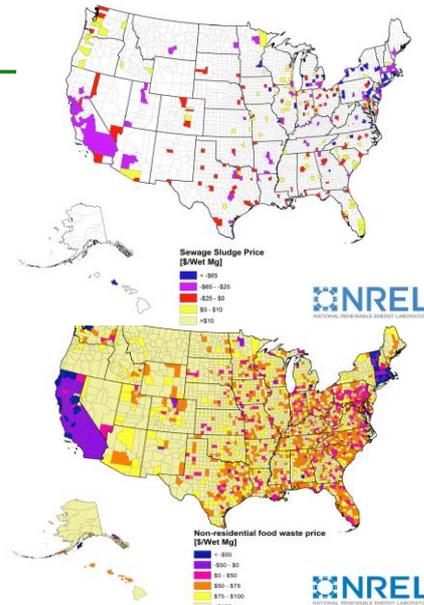


Figure 6: Predicted distribution of green-hydrogen supply in Australia by 2050, by sector. (Source: <https://hydrogencouncil.com/wp-content/uploads/2017/11/Hydrogen-scaling-up-Hydrogen-Council.pdf>)

Economic Assessment

- Price maps developed for each feedstock, except FOG
- If a resource has been commoditized (e.g., FOG), its price is determined by market demand
- If a resource is regarded as waste, its price is driven by the cost of its disposal
- Negative prices occur in areas with:
 - Organic waste disposal bans
 - High disposal costs (e.g., landfill tipping fees)
- Formal or informal local markets can drive prices in a given area



Badgett, A., Newes, E., Milbrandt, A. "Economic Analysis of Wet Waste-to-Energy Resources in the United States". *Energy*. Vol. 176, June 2019.

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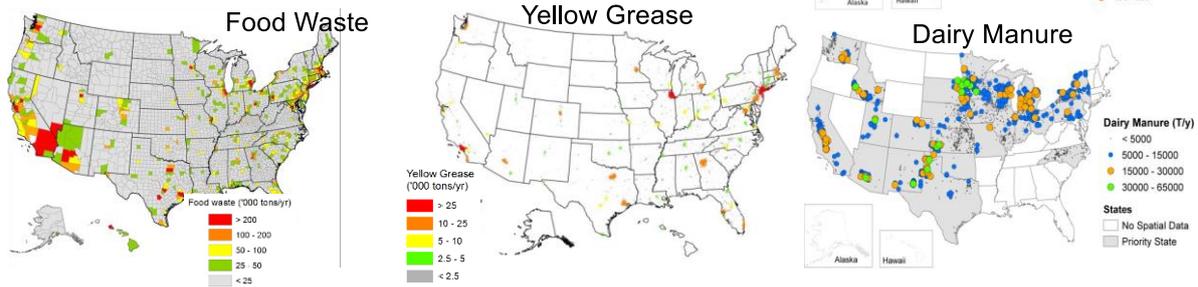
Figure 8: Economic assessment conducted during the development of the WtoE Roadmap by the US dept. of Energy.

Resource Assessment

Wet Resources	Annual Beneficial Utilization (Current)			Annual Potential Excess ¹		
	Estimated Resource Availability (MM Dry Tons)	Inherent Energy Content (Trillion Btu)	Fuel Equivalent (MM GGE) ²	Estimated Resource Availability (MM Dry Tons)	Inherent Energy Content (Trillion Btu)	Fuel Equivalent (MM GGE) ²
Wastewater Residuals	7.12	107.6	927.0	7.70	130.0	1,119.6
Animal Waste	15.00	200.2	1,724.3	26.00	346.9	2,988.7
Food Waste	1.30	6.8	58.2	14.00	72.8	627.1
Fats, Oils, and Greases	4.10	147.4	1,269.3	1.95	66.9	576.6
Total	27.52	462.0	3,978.8	49.65	616.6	5,312.0

¹ Unused excess in this definition includes landfilled biosolids and other wet resources.

² 116,090 Btu/gal. This does not account for conversion efficiency.



Milbrandt, A., Seiple, T., Heimiller, D., Skaggs, R., Coleman, A. "Wet waste-to-energy resources in the United States". *Resources, Conservation and Recycling*. Volume 137, October 2018, Pages 32-47.

Seiple, T. et al. "Municipal wastewater sludge as a sustainable bioresource in the United States". *Journal of Environmental Management*. Volume 197, July 2017, Pages 673-680.

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Figure 9: Resource assessment conducted during the development of the WtoE Roadmap by the US dept. of Energy.

Realistic Supply Modeling

Building a business case for any transformational conversion technology requires an understanding of realistic feedstock travel costs and total price

FY2021 Objective: Use real-world waste and infrastructure data to identify the likely location, cost, scale and composition of blended waste hot-spots

Approach: Develop and apply a geo-economic supply model to simulate competition among candidate "bio-hubs" for a finite set of waste resources to maximize scale at or below a fixed feedstock price

- **Data-driven:** simply change the price or re-configure underlying resource data and instantly get new results
- **Metric:** Mass-weighted avg. cost per dry metric ton

Hot-spot: ≥ 1000 dry t/d cost-effective feedstock

Challenges: True feedstock prices are unknown; computationally intensive problem; requires optimization

Current Model Capability	By End-of-FY2021
Fixed truck size, load time, % solids	Waste and scale dependent pump rate, % solids, truck size, frequency, ownership
Trucking only with map distances	National Freight Analysis Framework v.4 multi-modal network with linear optimization
Wet Organic Resources	Add industrial HSW (high-strength waste) sources to our National Wet Waste Inventory
Feedstock price = delivery cost	Total feedstock price (add formatting, storage, fees, credits; could be negative)

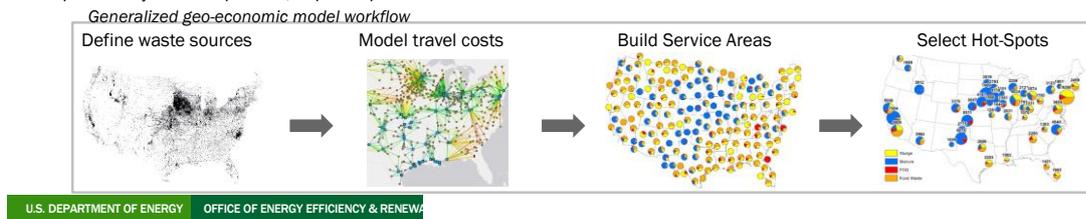


Figure 10: Supply Modelling conducted during the development of the WtoE Roadmap by the US dept. of Energy.

Mr Inge Johansson, Tec. Lic. Researcher, RISE Research Institute of Sweden, Division Built Environment-Energy and Circular Economy, Sweden

Title: The effectiveness of incentive schemes for insertion of bioenergy from waste in Sweden

Mr Johansson's presentation details the pathways followed by Sweden since the introduction of the Landfill Tax in 2000 to 2020 when an Incineration Tax of 7.5-12.5 Euros/tonne of waste was reintroduced in the country. The development of the legal framework was supported and informed by a 70 % reduction in GHG emissions as a result of the introduction of improved waste management and wastewater treatment technology during the period 1990 to 2019. The main drivers and barriers for the biogas sector in Sweden were:

1. Policy driven resulting in the introduction of policy targets on the collection and treatment of organic waste and not only compost;
2. Climate change driven resulting in more emphasis in reaching net carbon neutrality towards a progressive decarbonisation of the transport sector;
3. Circular economy driven resulting in more emphasis given to the circular use of nutrients as by-products of the treatment of waste and/or wastewater.

The incentive schemes adopted by the Swedish Government have traditionally been aimed at creating a market for the use of biogas. The incentive scheme is underpinned by the following elements:

- Tax exemption for energy tax on biogas for transport
- Investment supporting gas vehicles
- Investment support to build gas taps
- Investment for industries to change to biogas
- Investment support for biogas plants-but only for manure

- Sustainability criteria are in place

However, the barriers identified are as follows:

- The socio-economic benefits have been shown for the society, however it has been challenging to get positive balance sheets
- Logistics, Sweden do not have a national grid in which you can inject the gas
- Technological-the business has traditionally been too small so equipment used has often been developed for other industries
- Low will to pay for the biofertilizer
- Competition with other renewables (biodiesel and now electricity) for heavy transports (including buses and garbage trucks)
- Different incentivisation in neighbouring countries

In conclusion, the introduction of new policy and different incentives had a major effect on the development of decarbonisation pathways for the waste sector in Sweden. Therefore, incentives or policies need to be predictable and not ever changing in the short term to give the industry the courage to develop. The presentation highlights the importance to consider which effects the legislation framework, policy and incentives have in the long period, not only in the national context but also in relation to surrounding markets.

Prof. Cristina Trois, SARCHI Chair Waste and Climate Change, University of KwaZulu-Natal, South Africa

Title: Developing a Waste to Energy Roadmap for South Africa

The waste sector in South Africa contributes to over 4.3 % of GHG emissions in atmosphere of which 37.2 % are methane emissions (NIR, 2017). Over 100 million tonnes of municipal solid waste are produced in South Africa every year, with 30% being organic. However, despite the many opportunities for recycling and recovery of these organic fractions, over 80% of the waste streams are landfilled. In the past 20 years, methane emissions from the waste sector have increased by 11.3 % and GHG emissions of almost 60 %. In the same time frame, the GHG emissions from waste management in the European Union have halved, because of the progressive insertion of mitigation strategies. Effective barriers to the implementation of mitigation strategies in South African municipalities have been identified in the lack of resources, knowhow, reliable waste data and absence of GHG emission indicators, as well as poor social acceptance of waste to energy technology. In this backdrop, the SARCHI Chair Waste and Climate Change has been mandated by SANEDI to develop a waste-to-energy roadmap for South Africa. The main elements of the roadmap are presented in Figure 11 below.

The WROSE model (Trois and Jagath, 2010) was used to conduct the technology assessment as well as the forecasting of GHG emissions for the next 50 years. The roadmap is due to be completed in March 2022. An implementation plan will follow afterwards.

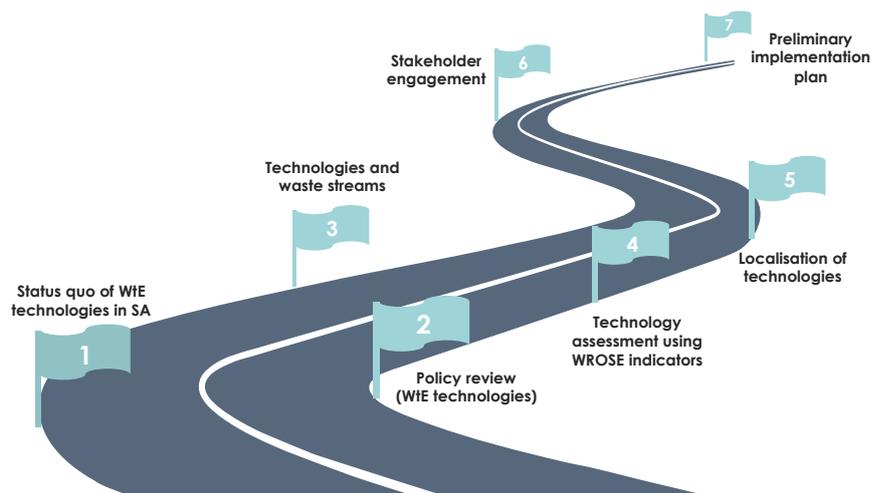


Figure 11: Elements of the waste to energy roadmap developed for SANEDI.

Dr David Newman, Former President of the World Biogas Association

Title: Biogas: Pathways to 2030

Over 105 billion tonnes of organic wastes produced from human activity each year, however, 1/3 of all food produced is wasted contributing towards methane emissions which equate to 5% of the global GHG emissions. The pathways to decarbonisation in 2030 developed by the WBA include the fundamental steps of reducing organic waste production and recycling the remaining unavoidable and unpreventable organic wastes. We are unlocking just 2 % of these bioresources full potential. The presentation details the activities of the WBA in the past 10 years and presents the main elements of the Pathways to 2030 strategy towards the reduction of global emissions by 10% by 2030. Dr Newman continued highlighting the benefits and potential for Anaerobic digestion of organic waste and biogas production in reducing GHG emissions as well as in providing basic optimised waste management services, also in developing countries. The presentation concludes with a call to action, emphasising the need to reduce organic waste production and recycle the unavoidable wastes (cutting GHG emissions by 3% and 10% respectively while providing 33% of the global gas demand by adopting AD technology for organic waste. Moreover, the digestate from AD plants can be used as fertiliser encouraging nutrient replacement and soil restoration. Insertion of AD technology in the waste management sector can create around 10-15 million jobs, stimulating investments of *\$100 trillion*.

Concluding Remarks

This workshop successfully brought together a wide diversity of experiences and useful lessons learnt on barriers and drivers influencing the development of waste to energy roadmaps in South Africa, Australia, Sweden, United States and globally with the perspective from the World Biogas Association.

Political will (or the lack thereof) to implement mitigation strategies seem to be the key barrier and/or driver in the accomplishment of set targets, which are often replicated in developing countries without taking in consideration the context in which municipalities operate, the presence of obsolete or inefficient waste management systems, the lack of know-how and the scarce availability of reliable waste data. Social acceptance of waste to energy projects remains one of the major barriers in the insertion of WtoE technology, coupled complex regulatory and legislative frameworks that dominate especially in Africa and developing, despite the lack of control and indiscriminate illegal dumping.

The World Biogas Association as well as SABIA, in their shared Vision 2030 strategy have set very clear targets for the development of the biogas sector and the abatement of global GHG emissions to 10 %

by 2030, through the promotion of AD technology. Finally, the importance that R&D and international collaboration platforms, such as that with Task 36 and the IEA, are playing in informing and guiding the Waste to Energy Roadmap process was stressed. The workshop ended with SANEDI and the DMRE pledging their support towards the implementation plan of the waste to energy roadmap for South Africa in the future.

Appendix A: Related Links

Presentations are available at the IEA Task 36 website: [WEBINAR: TRANSITIONING TOWARDS A DECARBONISED CIRCULAR ECONOMY: FOCUS ON WASTE TO ENERGY | TASK 36 \(IEABIOENERGY.COM\)](https://www.ieabioenergy.com/webinar-transitioning-towards-a-decarbonised-circular-economy-focus-on-waste-to-energy-task-36)

Appendix A: Presenters' Short Biography



DANIEL ROBERTS (Australia)
Hydrogen Energy Systems Future Science Platform (CSIRO Energy)

Daniel is the Director of CSIRO's Hydrogen Energy Future Science Platform, an initiative driving new science and technology development in support of the emerging Australian hydrogen industry.

Prior to this role, Daniel led CSIRO's thermal and electrochemical research programs, and he continues to play a senior role in CSIRO's gasification RD&D activities.

He has a background in environmental and industrial chemistry and has worked on projects ranging from lab-scale to industrial-scale in Australia and internationally.



Beau Hoffman is a Technology Manager with the United States Department of Energy, Bioenergy Technologies Office (BETO). Beau oversees much of BETO's portfolio that seeks to recover energy and nutrients from waste streams. Beau started his career working in the start-up sector working on biotechnology and anaerobic digestion.

Since joining DOE, he has helped create the organic waste portfolio including leading resource assessment efforts, establishment of multiple funding programs, and the tech transfer and scale up of novel technologies. Beau also runs the waste-to-energy technical assistance program which pairs DOE National Laboratory experts with community partners to assess how novel technologies could be deployed in their community.



INGE JOHANSSON (Sweden)
Tech. Lic. Researcher, RISE Research Institutes of Sweden, Division Built Environment- Energy and Circular economy

For the past 9 years Inge worked as a researcher at RISE- Research Institutes of Sweden. He has been working with different sections of waste management, but with a focus on the role of waste-to-energy in a circular economy.

For the last 6 years he has lead the IEA Bioenergy Task 36 and is also engaged in the work on standardisation of solid recovered fuels.

Before his time at RISE he has worked as an energy consultant at a small engineering firm, and then as a technical adviser at the trade organisation "Avfall Sverige- Swedish waste management" which was the trade organisation for the Swedish municipalities.



Alberto Borello has been working for 19 years in the renewable energy market, climate change and waste industry for global engineering companies, currently leading an engineering firm in South Africa for the development of renewable energy projects and the reduction of greenhouse gases. Since 2016, He is Head of FCE Fortuin Green Energy.

As Secretary General of the Southern African Biogas Industry Association (SABIA) NFO Alberto is responsible for the development and promotion of the association, the coordination of the activities and the relationship with the institutions to support the biogas industry in South Africa. From May 2020 Alberto serves in the Council of the World Biogas Association.



CRISTINA TROIS (South Africa)
Professor in Environmental Engineering,
South African Research Chair in Waste and Climate Change (SARCHI)

Prof. Trois serves in Task 36 since 2019 on behalf of SANEDI/DMRE.

Full Professor in Environmental Engineering, NRF/DSI/CSIR South African Research Chair in Waste and Climate Change (SARCHI) at the University of kwaZulu-Natal, Durban, South Africa.

Prof. Trois has over 20 years of experience in waste management and has been the principal investigator as well as the project coordinator of many feasibility and R&D waste management projects with municipalities in South Africa and Africa. Author of over 100 peer-reviewed publications in high-impact journals; she is a C1 rated scientist with the National Research Foundation.

She developed and coordinates the first Master Programme in Waste and Resources Management in South Africa.



DAVID NEWMAN
President - World Biogas Association (global trade association for biogas)

Executive Director of Greenpeace Italy (1994-1997). After working for the founder of Greenpeace David McTaggart (1999 - 2014) he led the Italian composting and biogas association CIC and the Italian Bioplastics Association from 2011 to 2015. Italy is the world leader for biowaste collection and treatment due to the laws David and his team implemented.

2012 - 2016 he was President of the International Solid Waste Association. During this time (2012-13) he was personal advisor to the Italian Minister of Environment, Andrea Orlando. In Italy he won many awards for his work.

David founded and leads the Bio Based and Biodegradable Industries Association UK since 2015 as well as the European Circular Bioeconomy Policy Initiative; both work in the UK and EU to promote the bioeconomy. He contributes to several EU research projects as Advisor.

He is President of the World Biogas Association since November 2016 finishing in July 2021.

He is a member of the Resources and Waste Stakeholder Advisory Group at DEFRA and a chartered member of the CIWM.

His e-book "Everything is Connected, understanding a complicated world" was published in September 2020.