TERAX Waste Deconstruction

Eliminating landfilling of organic waste streams

Lakes TAG Update -2 August 2013

Overview

- RDC Solid waste management
- Development History
- TERAX at RDC WWTP
- Further Research Underway
- Future Opportunities

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RDC SOLID WASTE MANAGEMENT BACKGROUND

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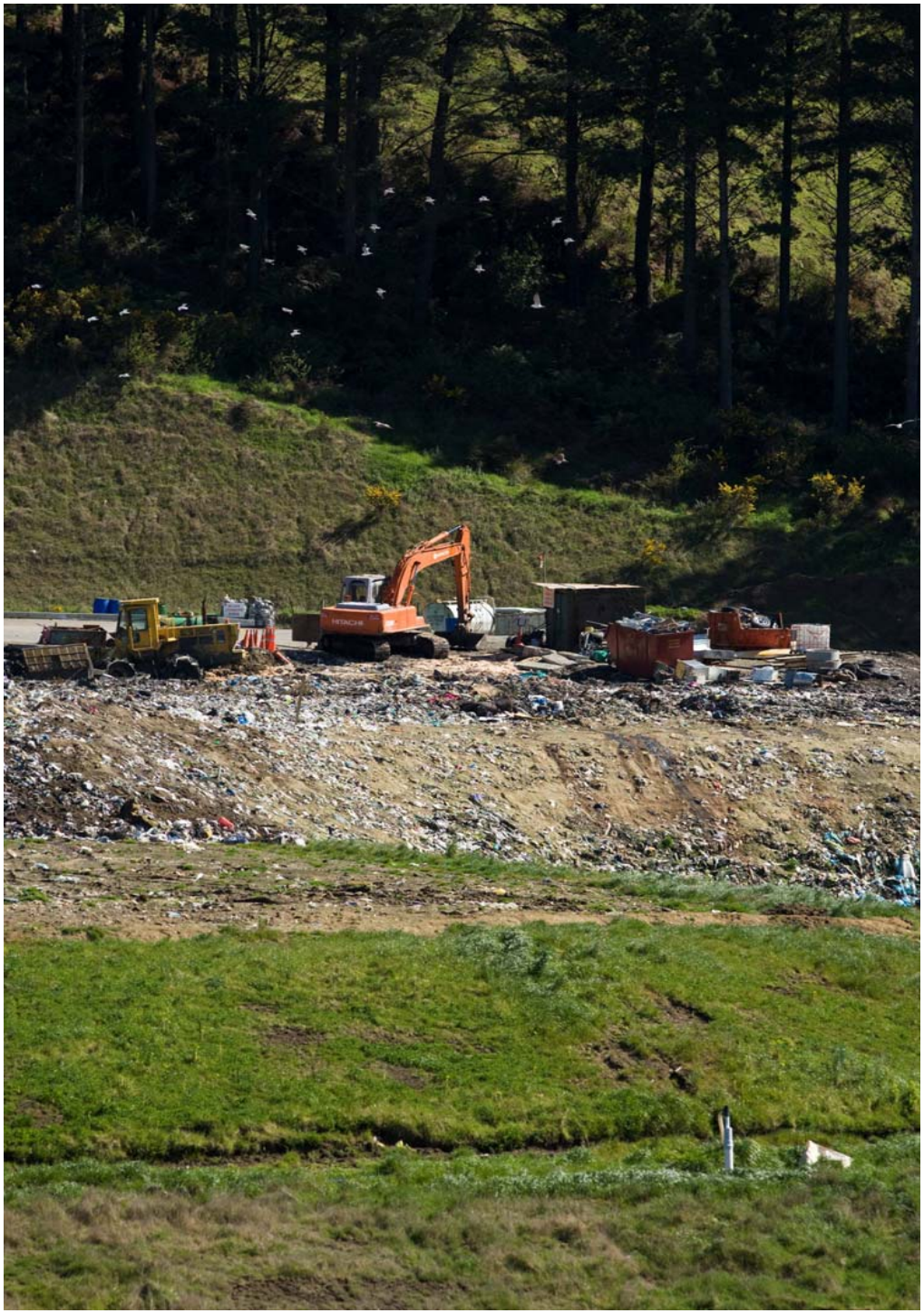
Landfill Impacts

- ~125,000 tonnes p.a. landfilled in BOP
- >60% organics
- Leachate treatment
- GHG emissions
- Increasing costs



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Biosolids

- Original Plant 1973 – Digesters
- Upgrade 1991 - Composting
  Late 1990's - Landfill
  2011 - Vermicomposting

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Biosolids (continued)

- Approximately 10,000 t/annum currently

NZ Waste Strategy

- Beneficial use of Biosolids
- Tendered options

RDC Waste Management and Minimisation Plan 2010

- Waste Assessment considered all options
- Wet Oxidation Preferred option

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Other Organic Waste

Wider Organic Waste

- RDC own landfill
- 65% organic - 30,000t per annum
- Increasing Costs – exposure to ETS etc

Waste Management and Minimisation Plan

- Greenwaste Seperation 6 →7000 t composted
- Preferred option – wet oxidation
- Consideration of organic waste collection

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The biosolids challenge…..

- 85% moisture content
  - Maintain aqueous conditions
- Carbon content = 450 kg/t dry weight
  - Recover carbon as add value feedstock
- Energy content = 19 GJ/t dry weight
  - Recover energy during deconstruction
- Nutrient content contributes to eutrophication
  - Segregate and recover nitrogen and phosphorus

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TERAX DEVELOPMENT HISTORY

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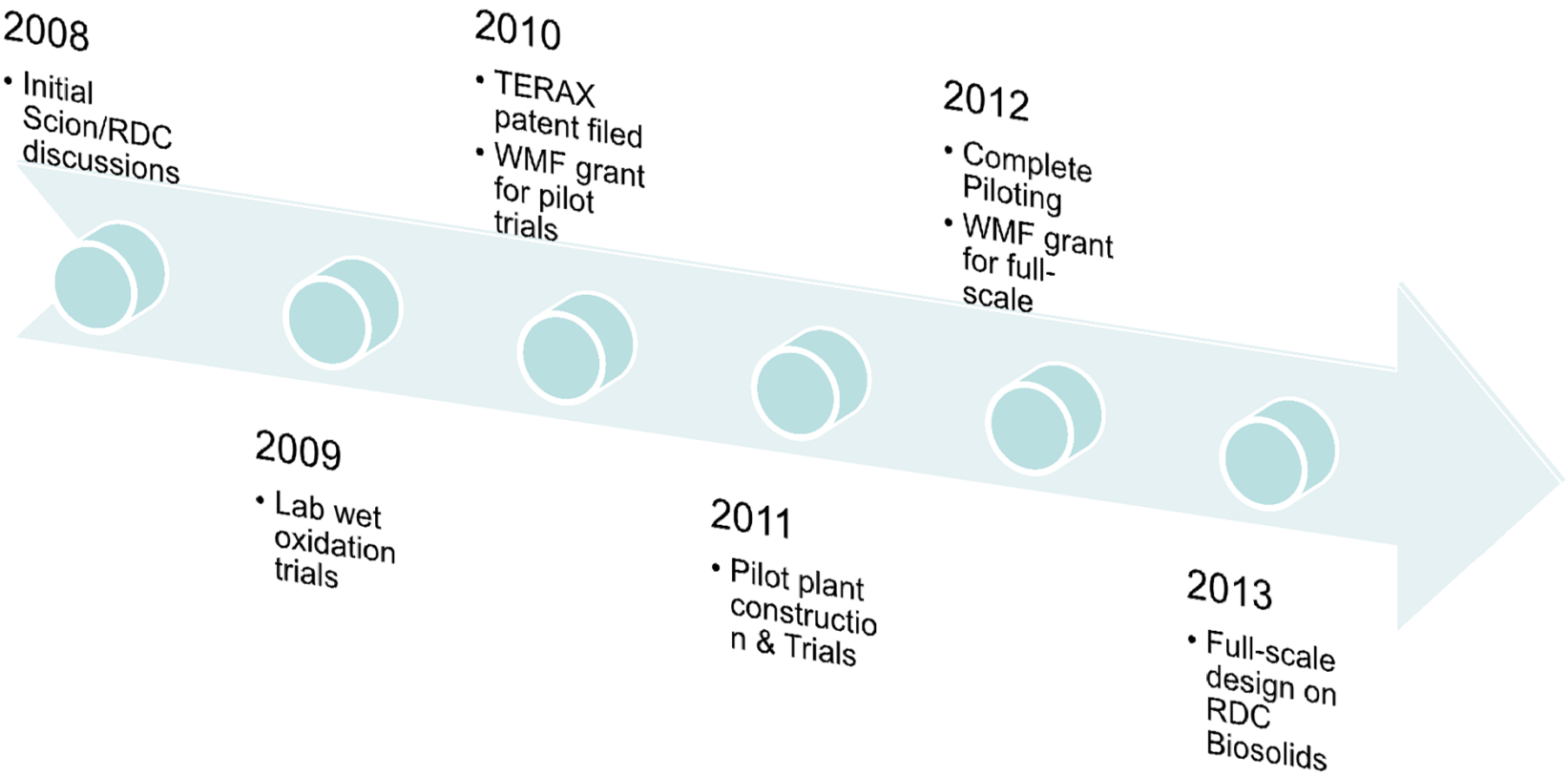
Timeline



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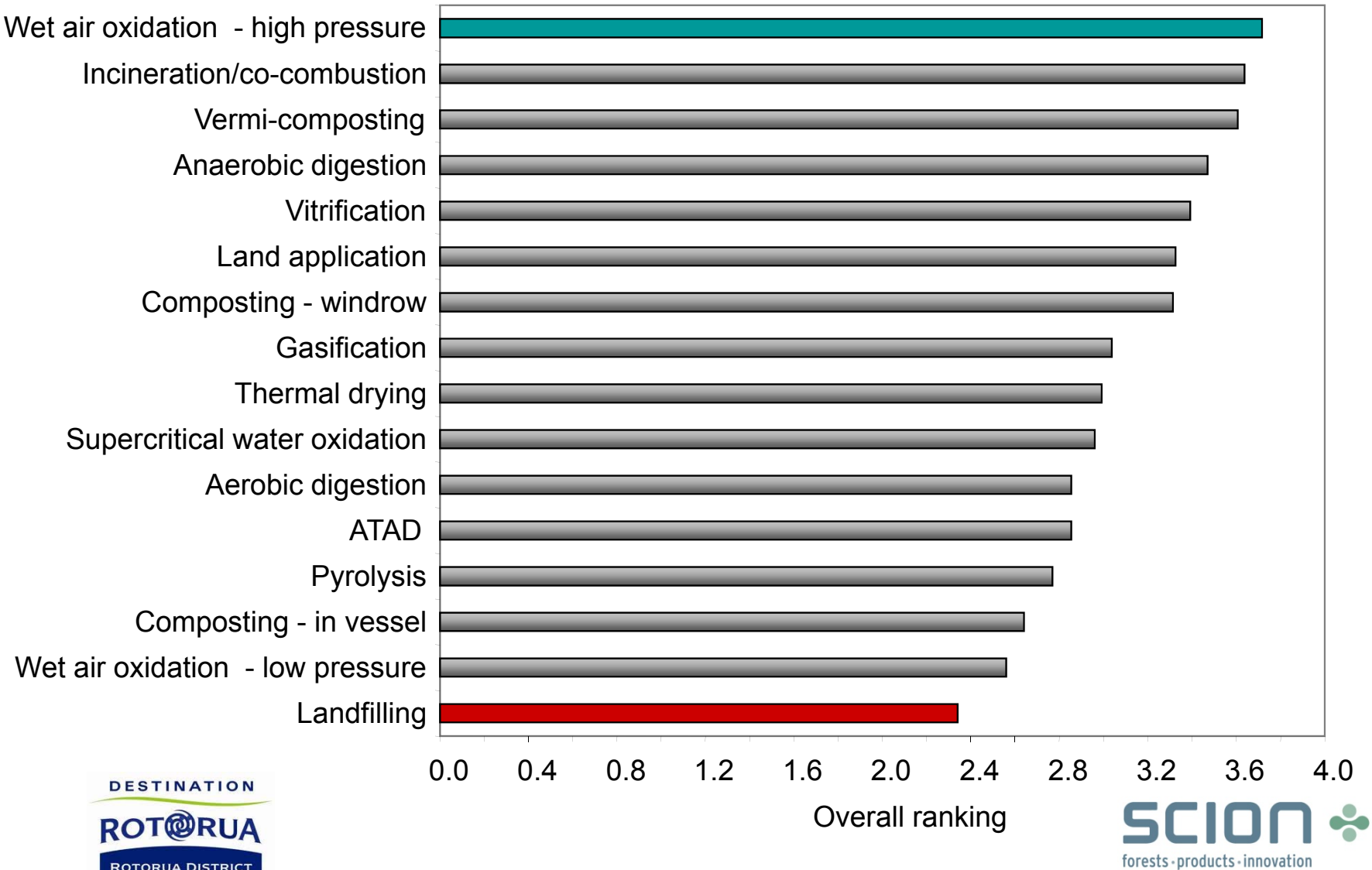
Technology assessment – Biosolids case study



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Wet oxidation

- Invented in 1935, F.J. Zimmermann
- Complex polymers into low mass chemicals
- Pulping liquor from a pulp and paper mill
- Produce artificial vanilla flavouring
- By 1940, supplied 70% of vanillin in USA

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Elements of wet oxidation

Waste

+oxygen

+temperature

+ time

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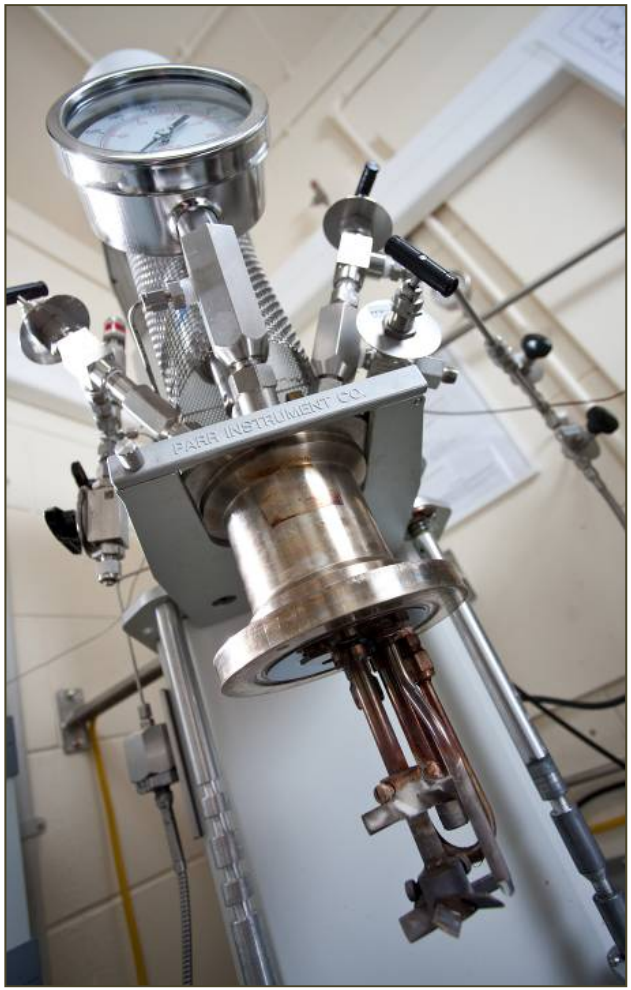
Scion’s laboratory wet oxidation system



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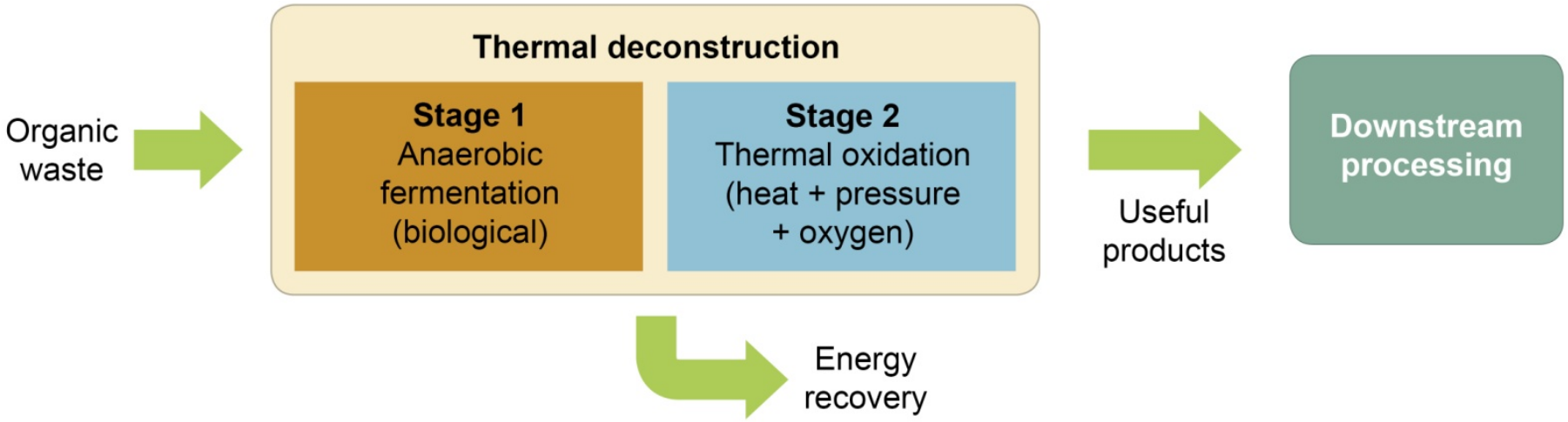
TERAX™ Process



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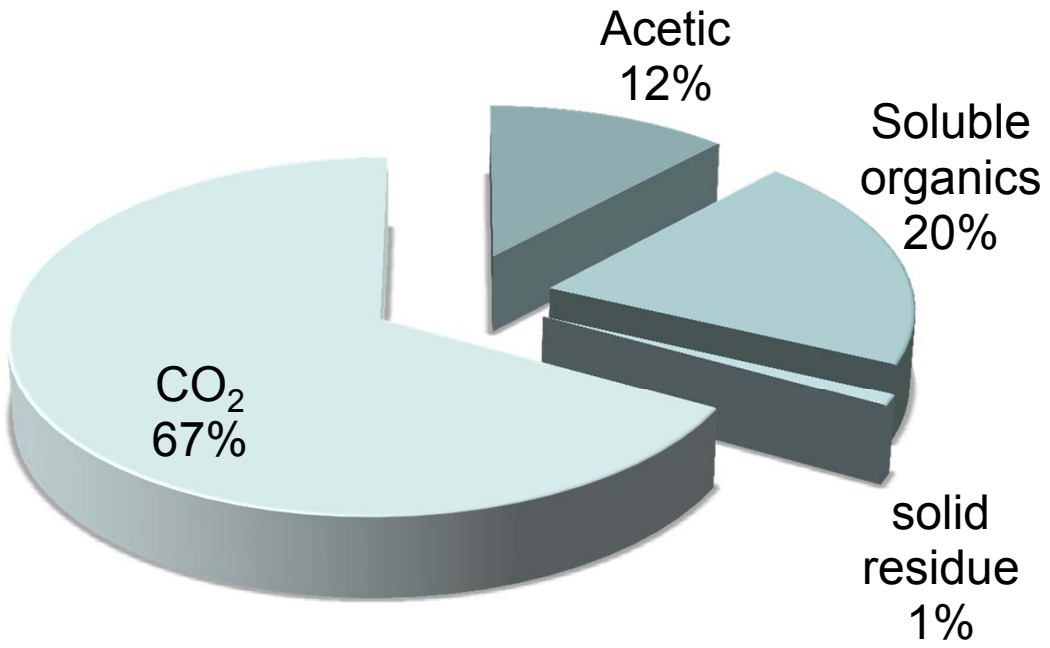
Organic sludge conversion



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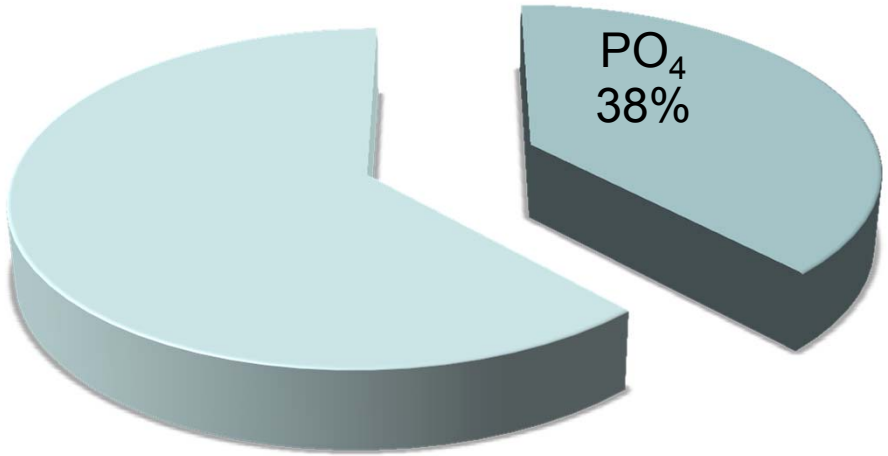
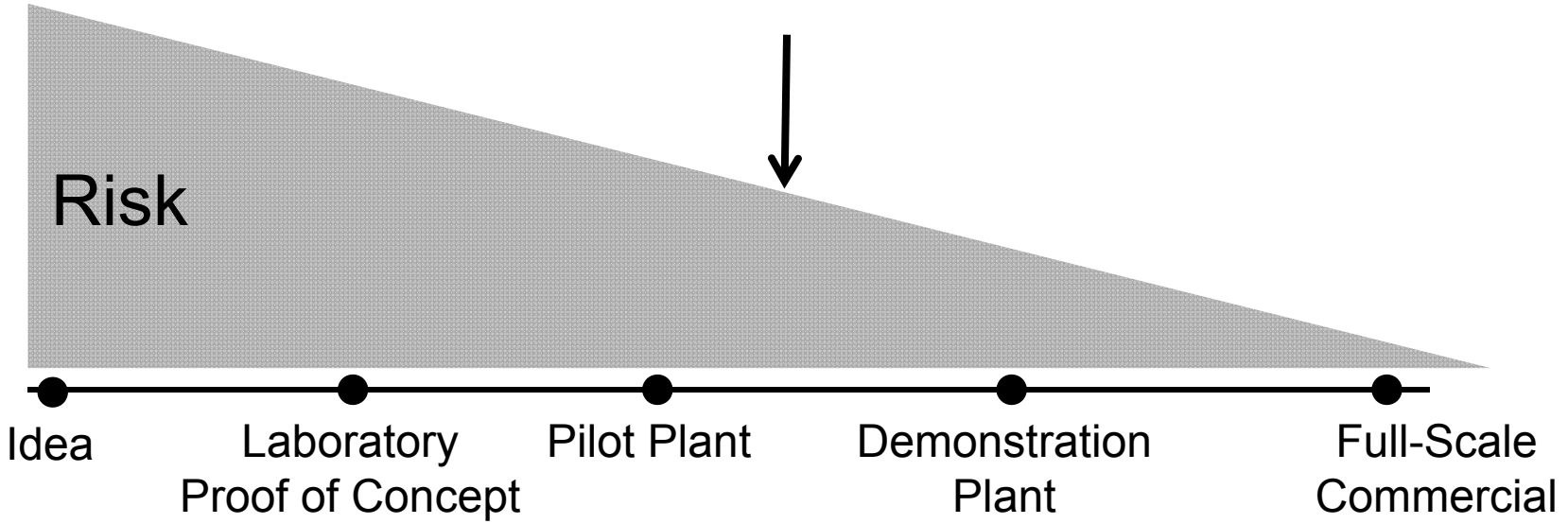
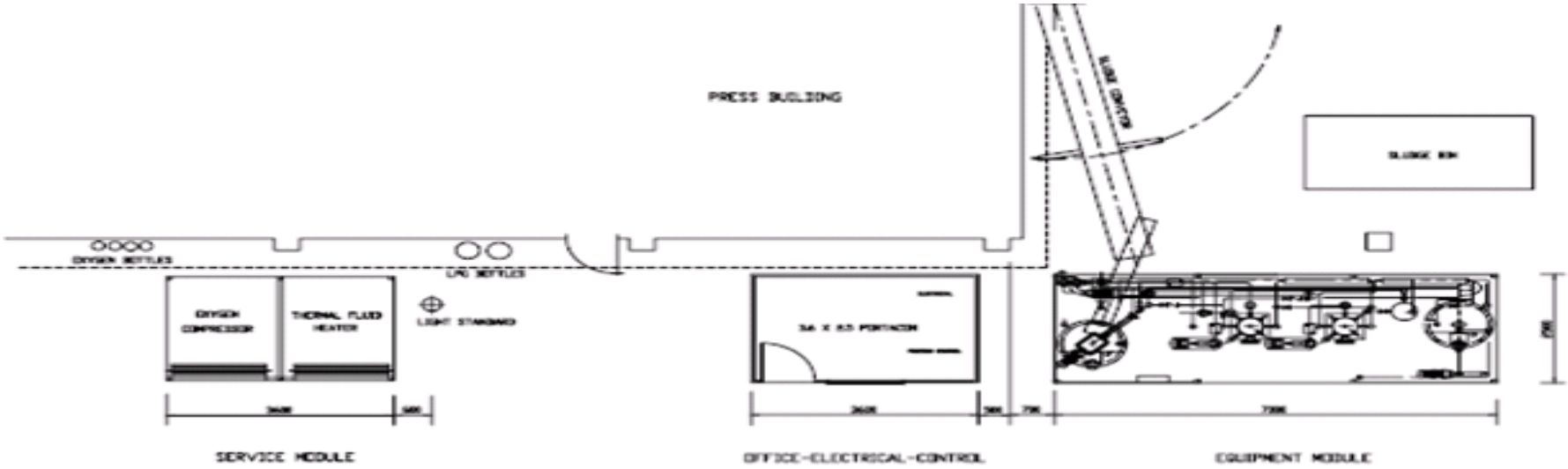
A high Phosphorus ash

Phosphate content of the ash



Integrated development programme

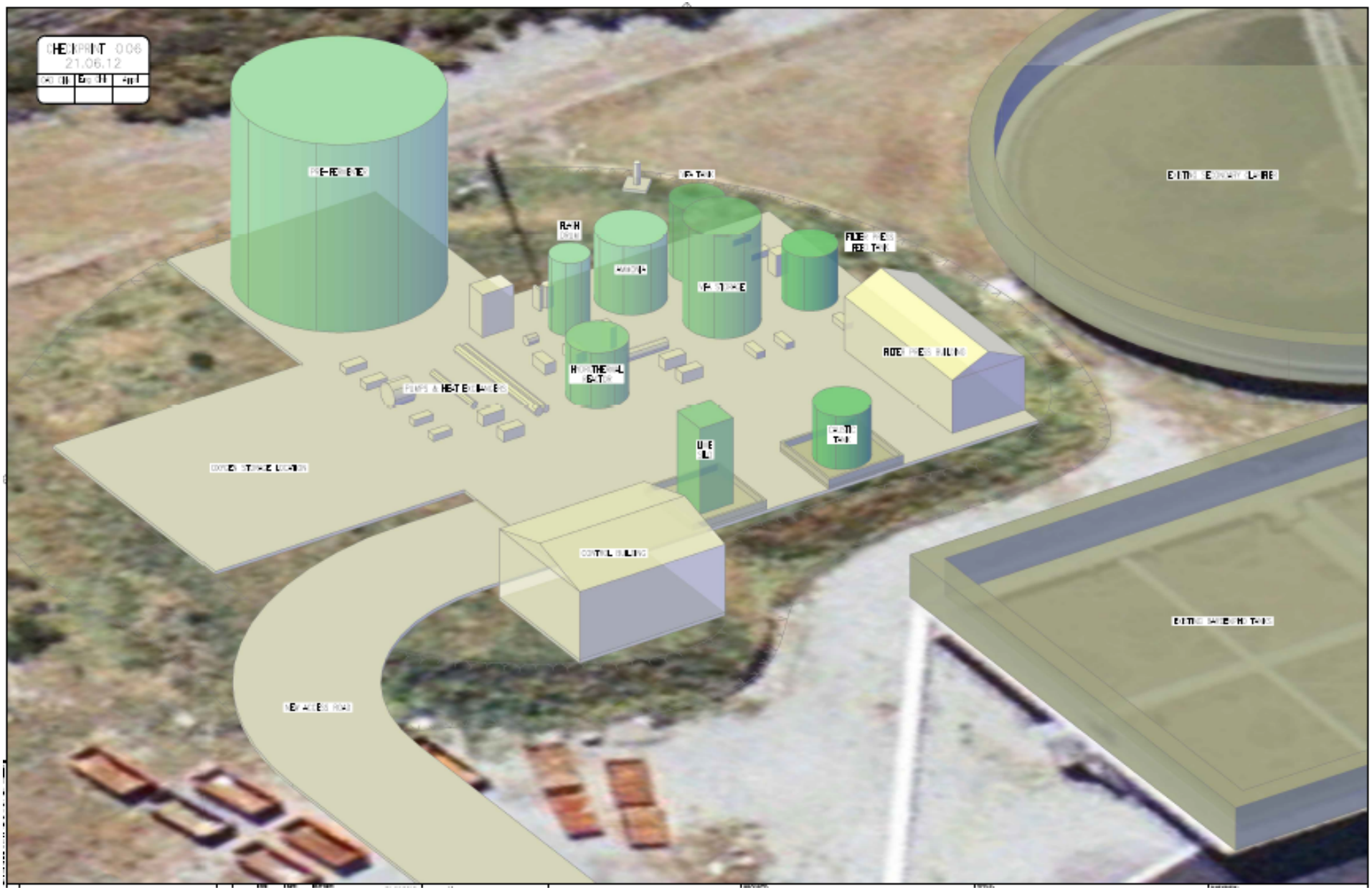




Thermal deconstruction module

Biochemical deconstruction module

Concept design



TERAX AT RDC WWTP

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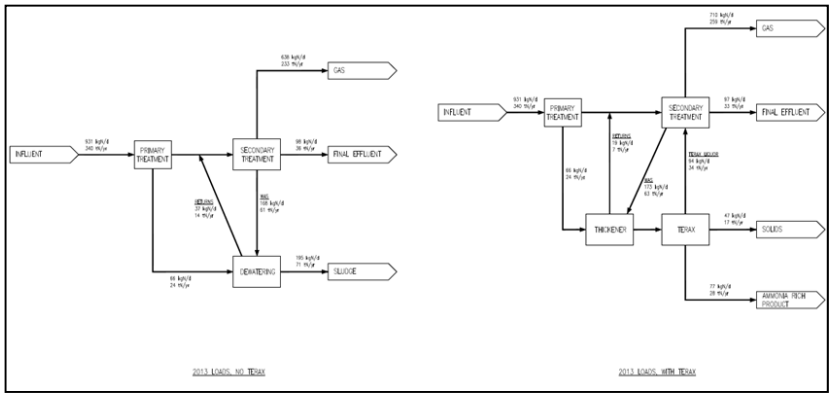
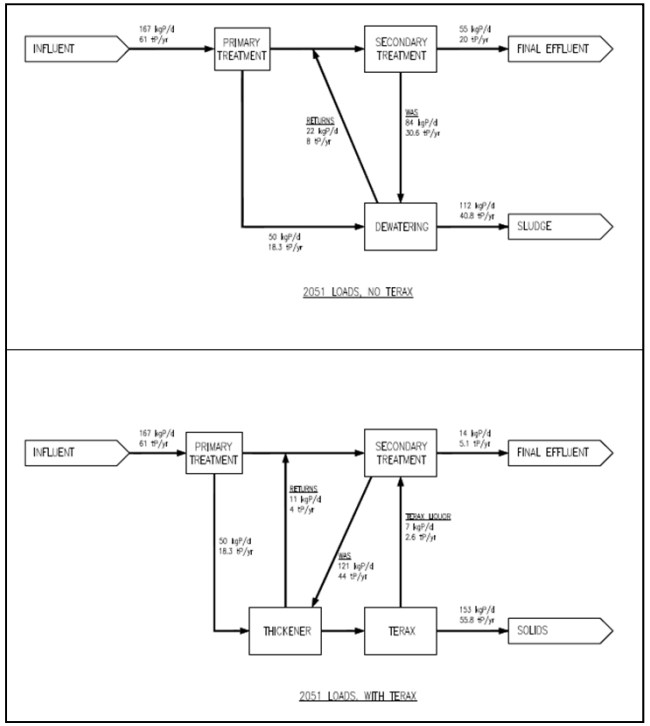
Process Modelling





- Focus on nutrient flows
- Ensure final effluent quality is not compromised
- Optimise WWTP process and cost impacts

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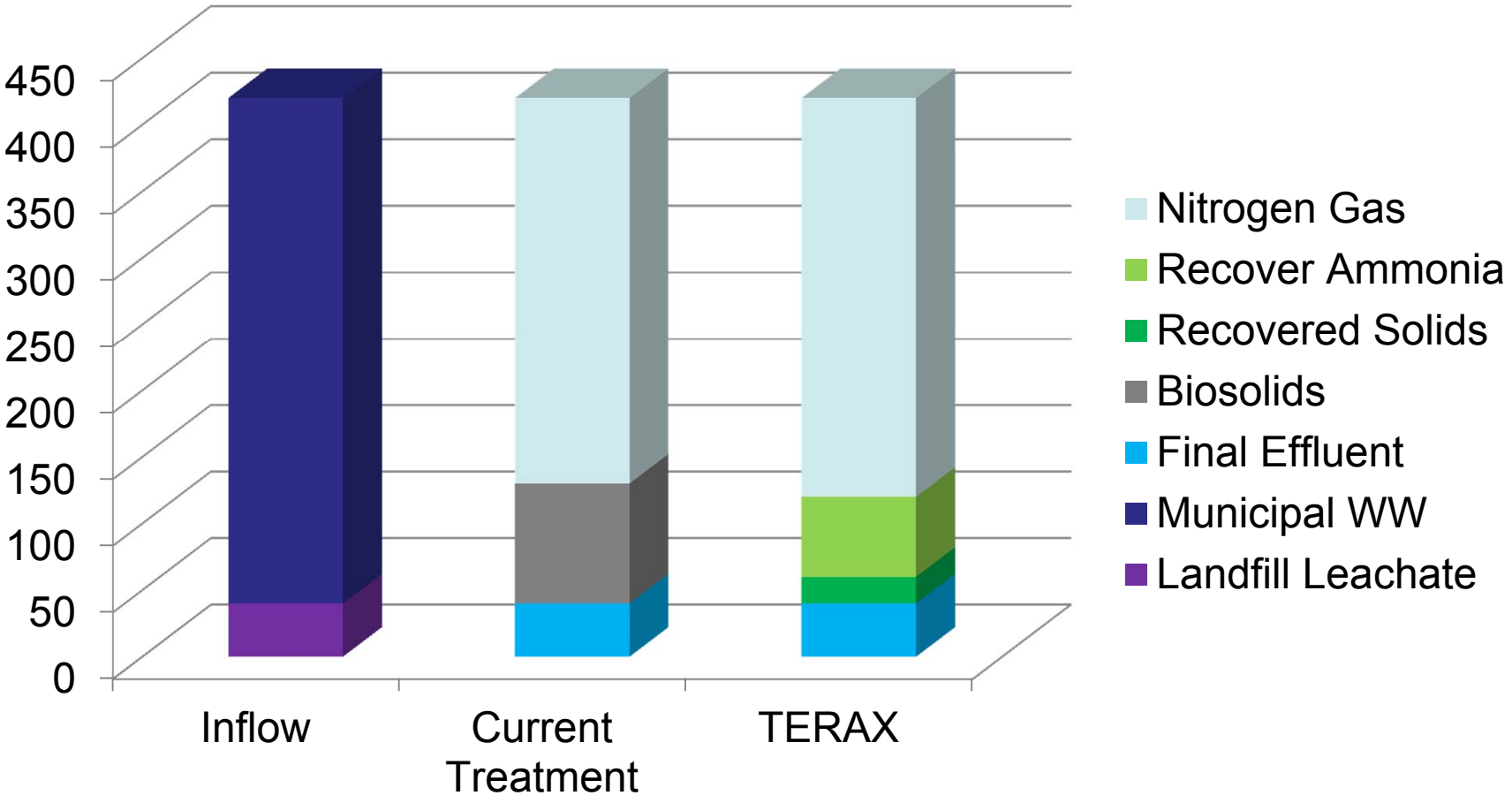
Nitrogen Flows



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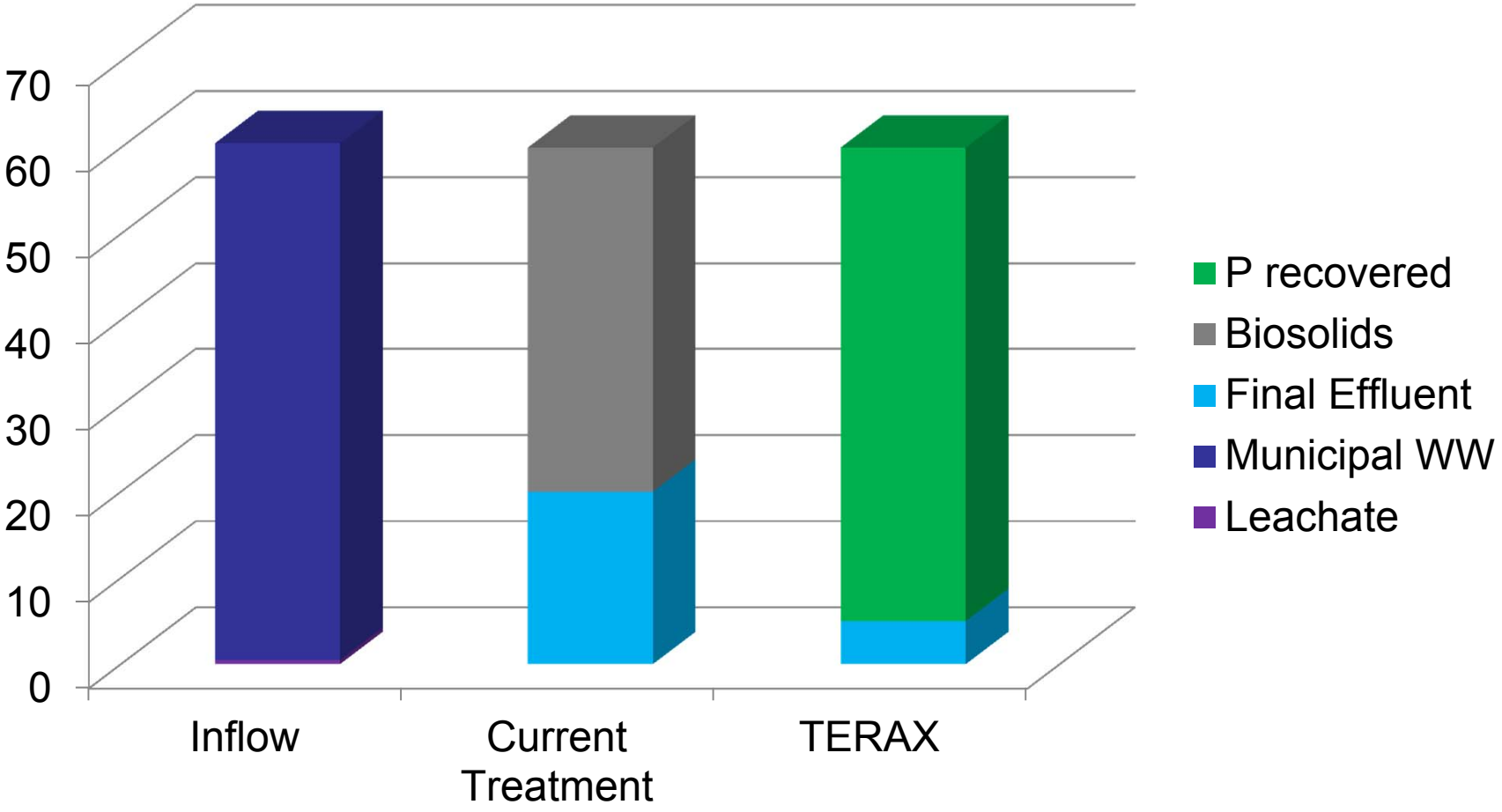
Phosphorus Flows



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CURRENT TERAX RESEARCH PROGRAM

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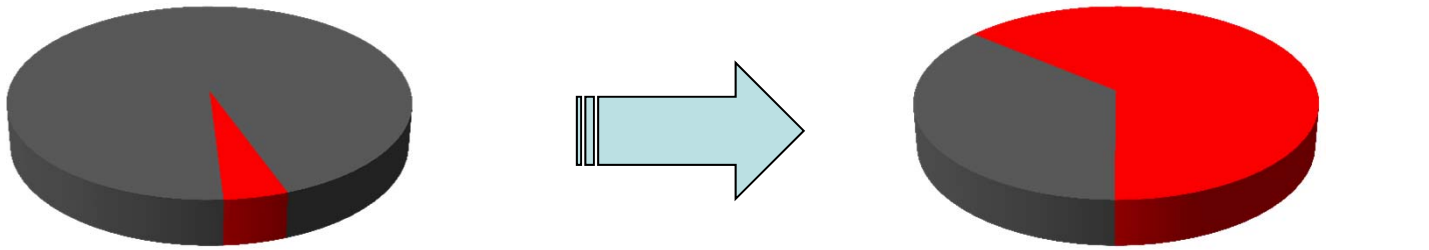
Project Purpose

Extend application of TERAX^{TM} technology into processing Municipal Solid Waste organics

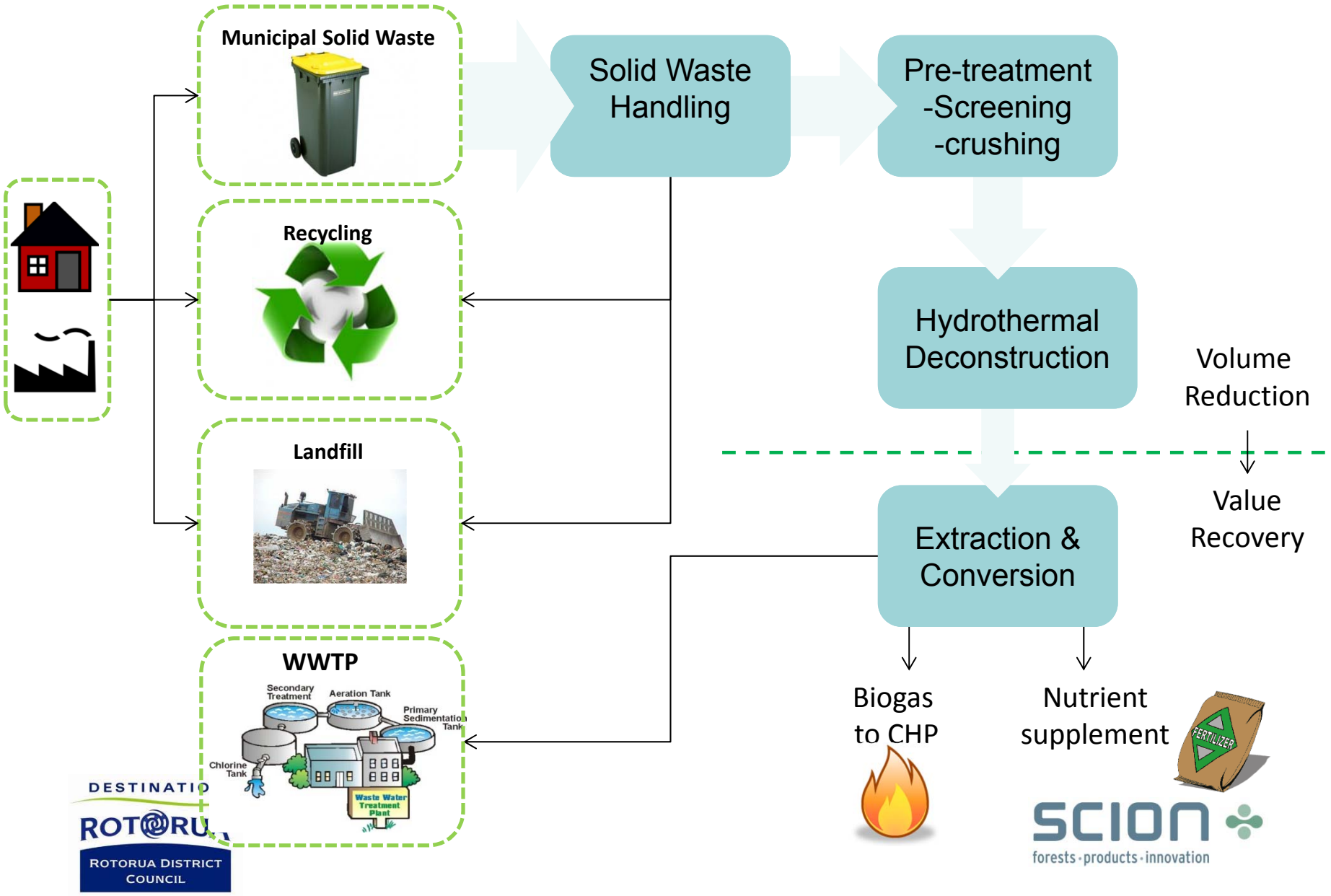
Increasing potential landfill diversion



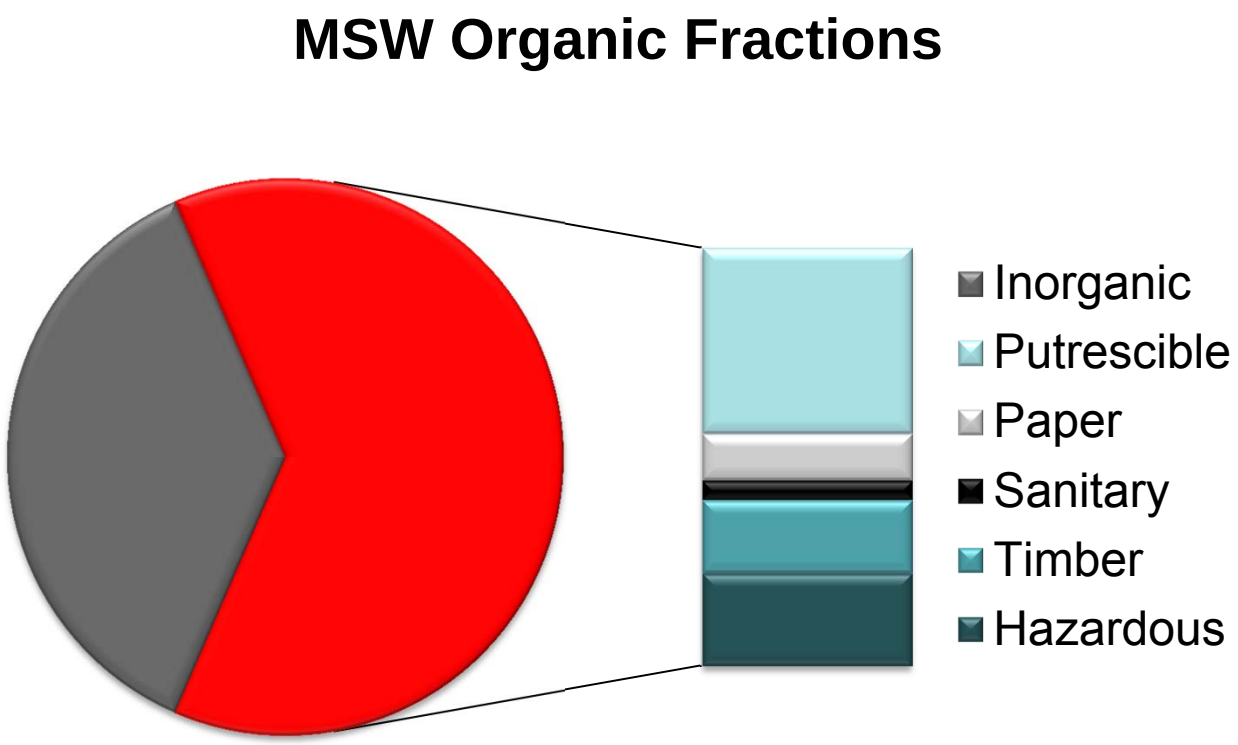
Biosolids

MSW Organics

TERAX™ Technology Diagram - MSW



Current Approach



- Initial focus on putrescible fraction –fast track to pilot
- Performance screening other fractions
- Impact screening expected contaminants

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FUTURE OPPORTUNITIES

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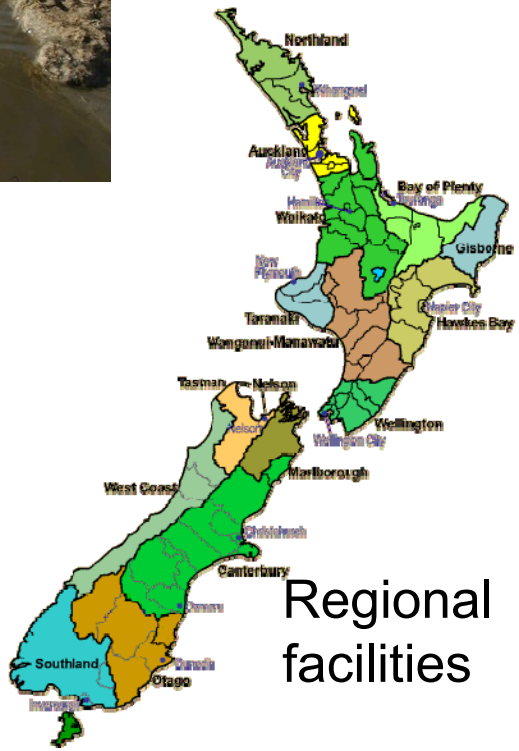
Further Development -Applications

Mobile Plant

Agricultural Waste

Industrial Waste



Regional facilities

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Future Development -Products

Bioplastics

Biofuels

Niche Fertilisers

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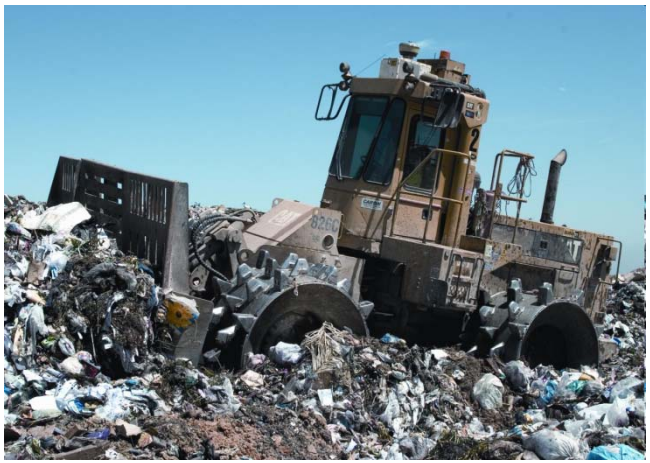
Scion organic waste audit for NZ

Waste type	Total (000 tonnes)
Putrescible	624
Green waste	492
Biosolids	253
Other	1,338
Total	2,707



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In summary

- Organic waste management is a challenge
- TERAX approach offers an exciting solution
- Recovery of nutrients from WWTP
- Improved WWTP discharge quality

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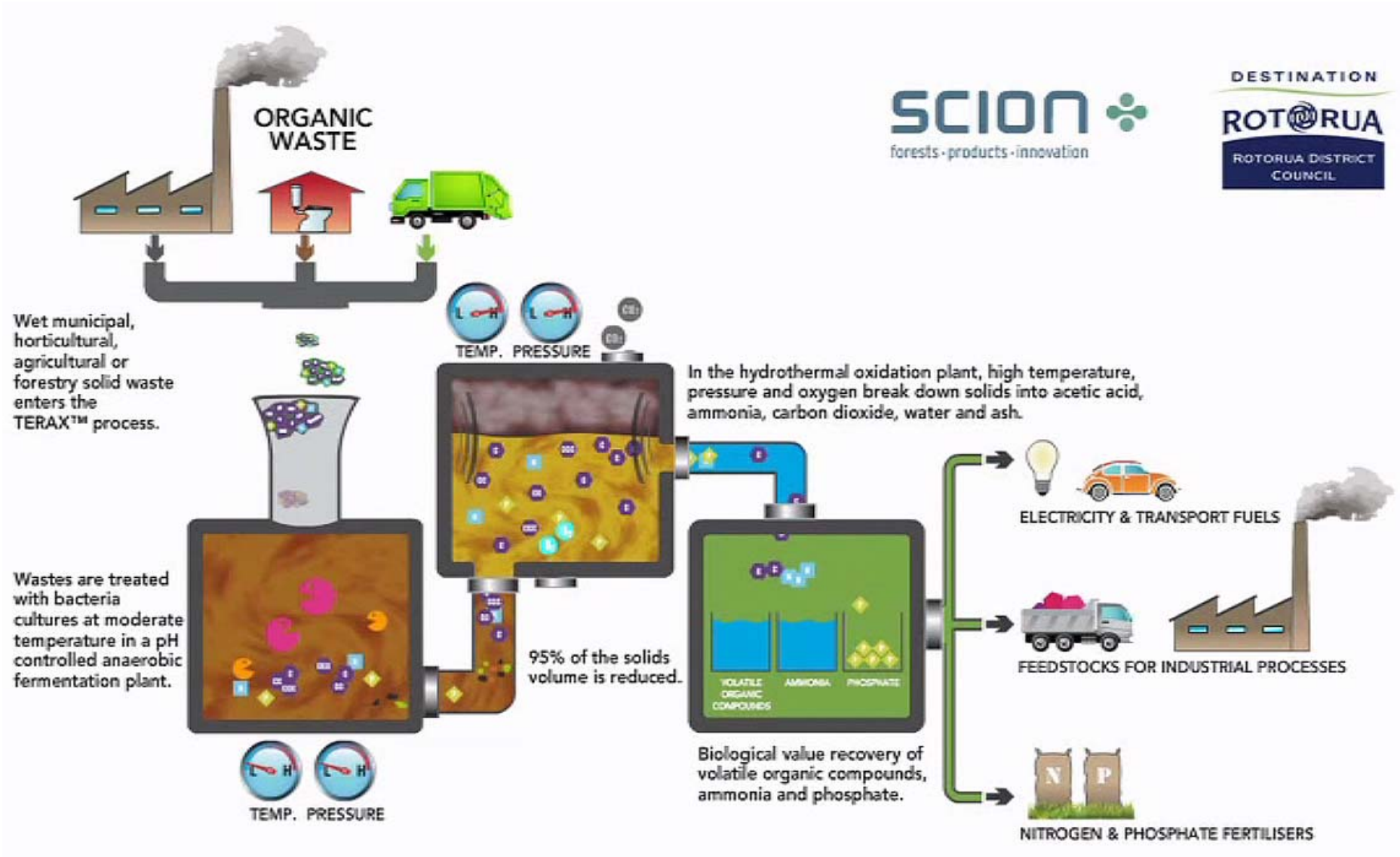
ORGANIC WASTE
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Wet municipal, horticultural, agricultural or forestry solid waste enters the TERAX™ process.
TEMP. PRESSURE
In the hydrothermal oxidation plant, high temperature, pressure and oxygen break down solids into acetic acid, ammonia, carbon dioxide, water and ash.
Wastes are treated with bacteria cultures at moderate temperature in a pH controlled anaerobic fermentation plant.
95% of the solids volume is reduced.
VOLATILE ORGANIC COMPOUNDS
AMMONIA
PHOSPHATE
Biological value recovery of volatile organic compounds, ammonia and phosphate.
ELECTRICITY & TRANSPORT FUELS
FEEDSTOCKS FOR INDUSTRIAL PROCESSES
N
P
NITROGEN & PHOSPHATE FERTILISERS
TEMP. PRESSURE