

System change for polymers in New Zealand Working towards a circular bioeconomy

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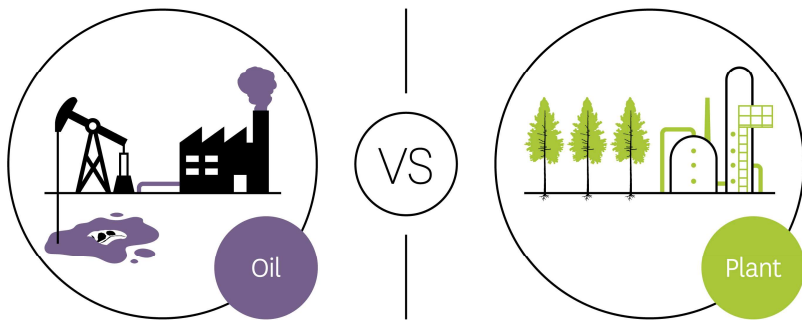


Changing Landscape

- Climate change is the challenge of our generation, with many organisations targeting net zero CO₂ emissions by 2050
- Reducing industry emissions will entail coordinated action throughout value chain :
 - Improving energy efficiency carbon management.
 - Transformational changes in production processes in development
 - Legalisation change (Internationally and in New Zealand)
- Plastics and Packaging a key component. A significant problem, but huge opportunity!



The 'system'



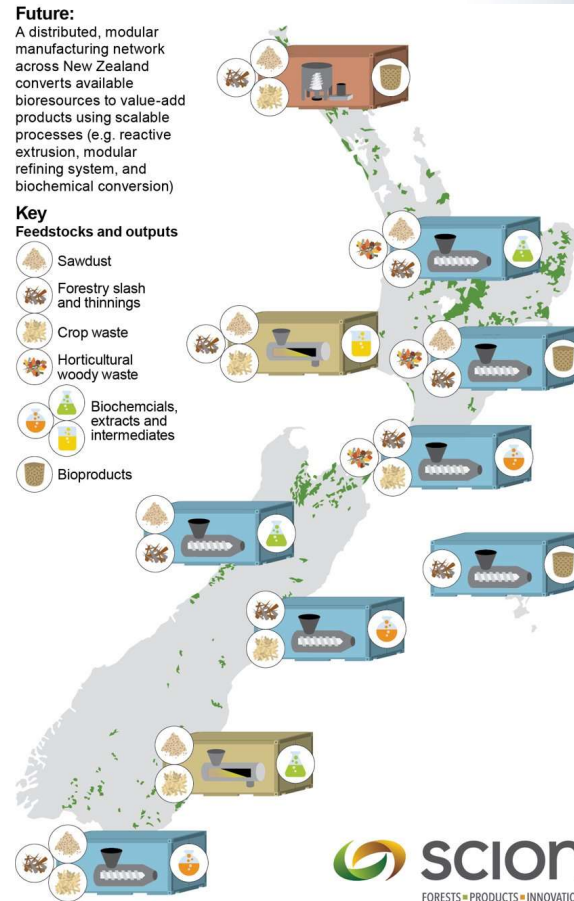
Anything we can make from oil can be made from plants in the future



Source: <https://www.managementors.co.uk/a-circular-economy-are-you-prepared-for-the-step-change-in-waste-management/>

Future systems

- We know how to grow biomass
- We don't have to transition a petro-chemical industry
- We can define 'value' and be a global technology and thought leader.



Source: Scion (2022)



Regional Biorefinery – Ireland



Circa successfully completes €56 Million IPO and starts trading on Euronext Growth Oslo

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Opportunity

- Bioeconomy projected to be worth \$4 to \$30 USD trillion globally with bioplastics to grow in the next seven years to have a compounded annual growth rate of 13.1% (\$25.9bn by 2029)
- Paradigm shift is occurring worldwide, we need to ensure NZ
 - Reaches 2050 net zero targets
 - Enable our exporters to access foreign markets
 - Decrease our dependence on foreign resources
 - Add resilience to supply chains
 - Create a more sustainable/ healthier environment
 - Exploit new markets from polymers that cant be created from traditional chemistry.



Options are not simple, not binary

- Right material, application, and end of life – Spectrum of solutions required.
 - Different countries have different legislation for end of life and food contact rules. Carbon Levies.
 - Plastics provide inherent benefits in packaging
 - Food quality
 - Shelf Life
 - Fresher/Safer
 - Reduced Spoilage
- Lots of energy goes into making products. To benefit the environment we must consider all elements

“Each cucumber that lands in the trash because of spoilage would have the same climate impact as the amount of plastic used to wrap 93 cucumbers”



The new plastics economy: capturing the opportunity

- Create an effective after-use plastics economy.
- Scale up the adoption of reusable packaging
- Scale up the adoption of industrially compostable plastic packaging for targeted applications
- Increase the economic attractiveness of keeping materials in the system.
- Steer innovation investment towards creating materials and formats that reduce the negative environmental impact of plastic packaging leakage.
- Decouple plastics from fossil feedstocks.



Scion Strategy to help New Zealand

1 Short Term [2021-2024]

- Onshoring PHA production within New Zealand
- Single cell protein solutions with improved amino acidic and value add components (PHA, carotenoids)
- New technology for the direct conversion of Methane/CO₂ into Bioplastics
- Scion's domestic and international authority on bioplastics and fibre-based technologies strengthened through high-impact research and collaboration
- Composters and recyclers supported through collaboration and innovation

2 Medium Term [2025-2029]

- Fast-degrading bioplastic solutions developed, and the technology transferred
- 5 PHA compositions, from low-cost New Zealand feedstocks
- Proof of concept of new performance Polymer.
- Development of fermentation and synthetic biology toolkit
- Problematic wastes de-risked for Composters and Recyclers

3 Long Term [2029+]

- Commercial production of biopolymers using forestry derived streams with 3 partners by 2030.
- High performance high value bioplastics in commercial production in New Zealand
- Exports of New Zealand made Bioplastics
- Negative carbon biopolymer production. Bioconversion of low value feedstock streams
- A novel high-performance polymer from low-cost feedstock
- Consumers have fully modified behaviour and expect all packaging to be sustainable
- Biobased industries have increased their contribution to GDP
- Economic growth due to a thriving, up-to-date, and flexible packaging industry

Biotechnology – PHAs and other polymers

Imagine a future state of new industries utilising waste

- Next generation of plastics that degrade to harmless compounds in seawater and soil or that can be more easily recycled or reused
- Biodegradable and compostable plastic whose production is associated with a 200% reduction in greenhouse gases
- Robust and scalable technology that can revitalise urban and environmental economies (Similar to microbreweries)
- Utilisation of Waste feedstocks, with flexible material/chemical production (swap-in and out the microorganisms for new products)
- Synthetic biology platform for high value applications



We need to embrace change for a greener, more sustainable future!

www.scionresearch.com



Prosperity from trees *Mai i te ngahere oranga*

Scion is the trading name of the New Zealand Forest Research Institute Limited