

Towards a Green Future

Clean Technology and Scion

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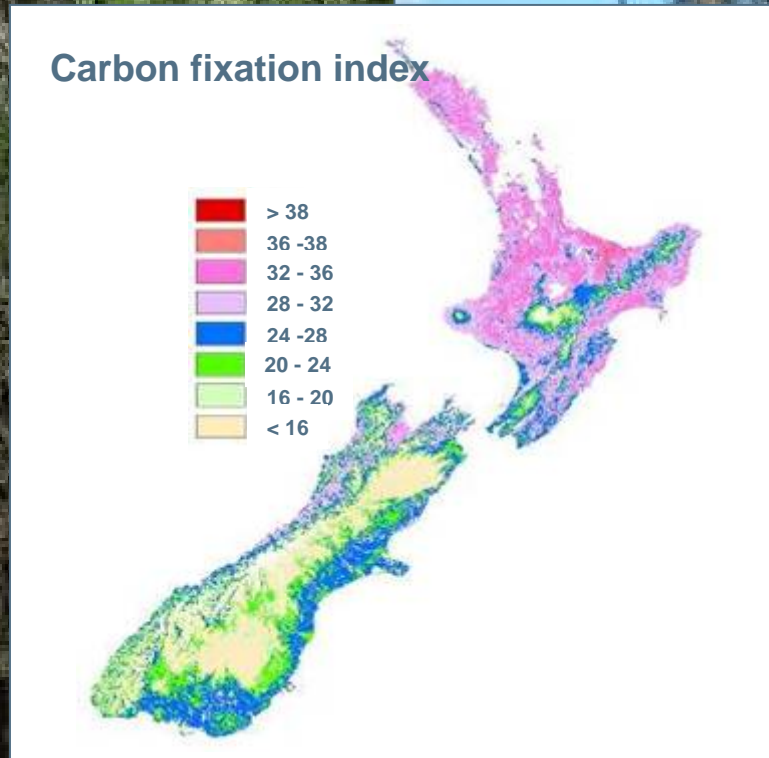
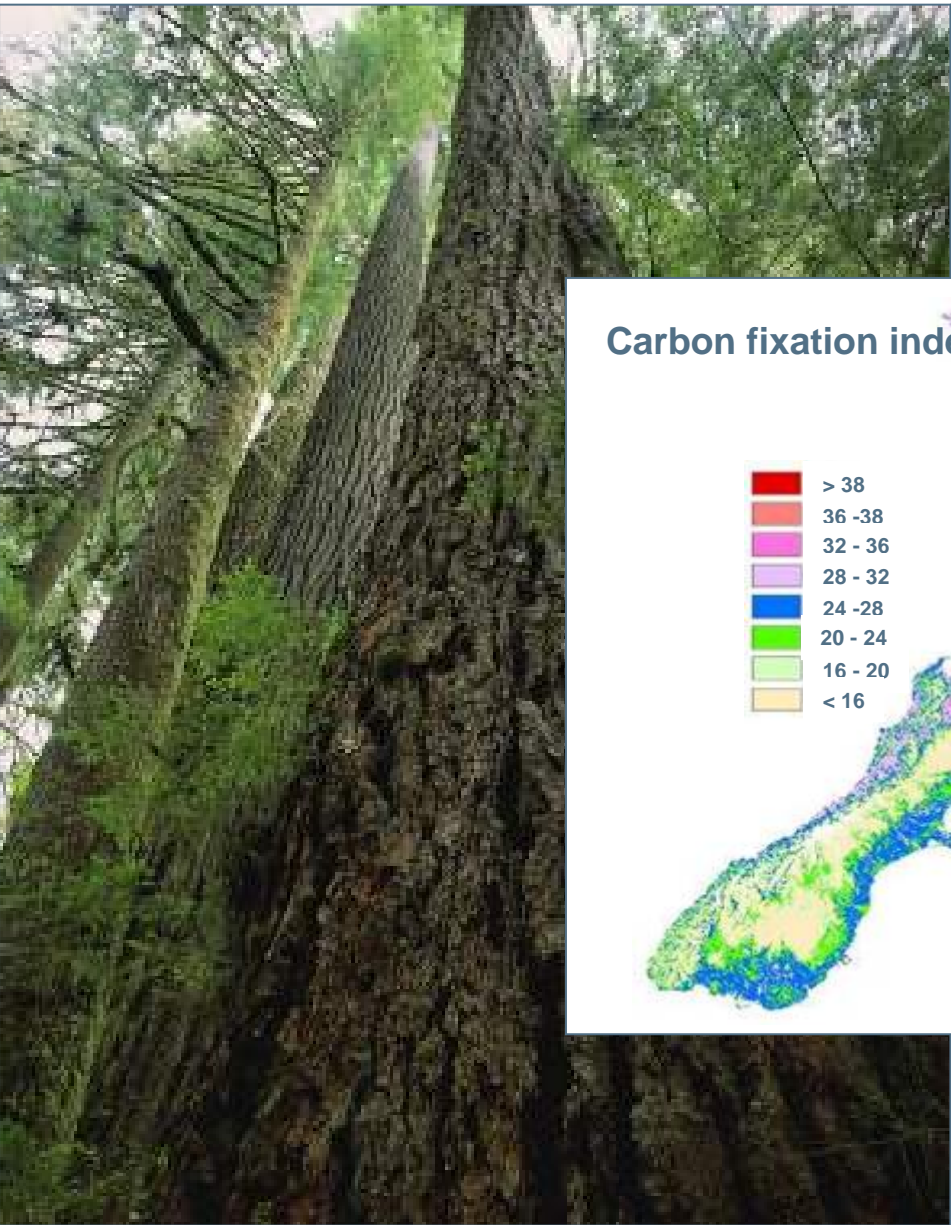


A photograph of a forest with many tall, thin tree trunks. Some of the trunks are covered in green moss. The background is slightly blurred, showing more trees and a soft, overcast sky.

Goal 1:

**Increase the profitability
of New Zealand's forest
industries**

New value chains

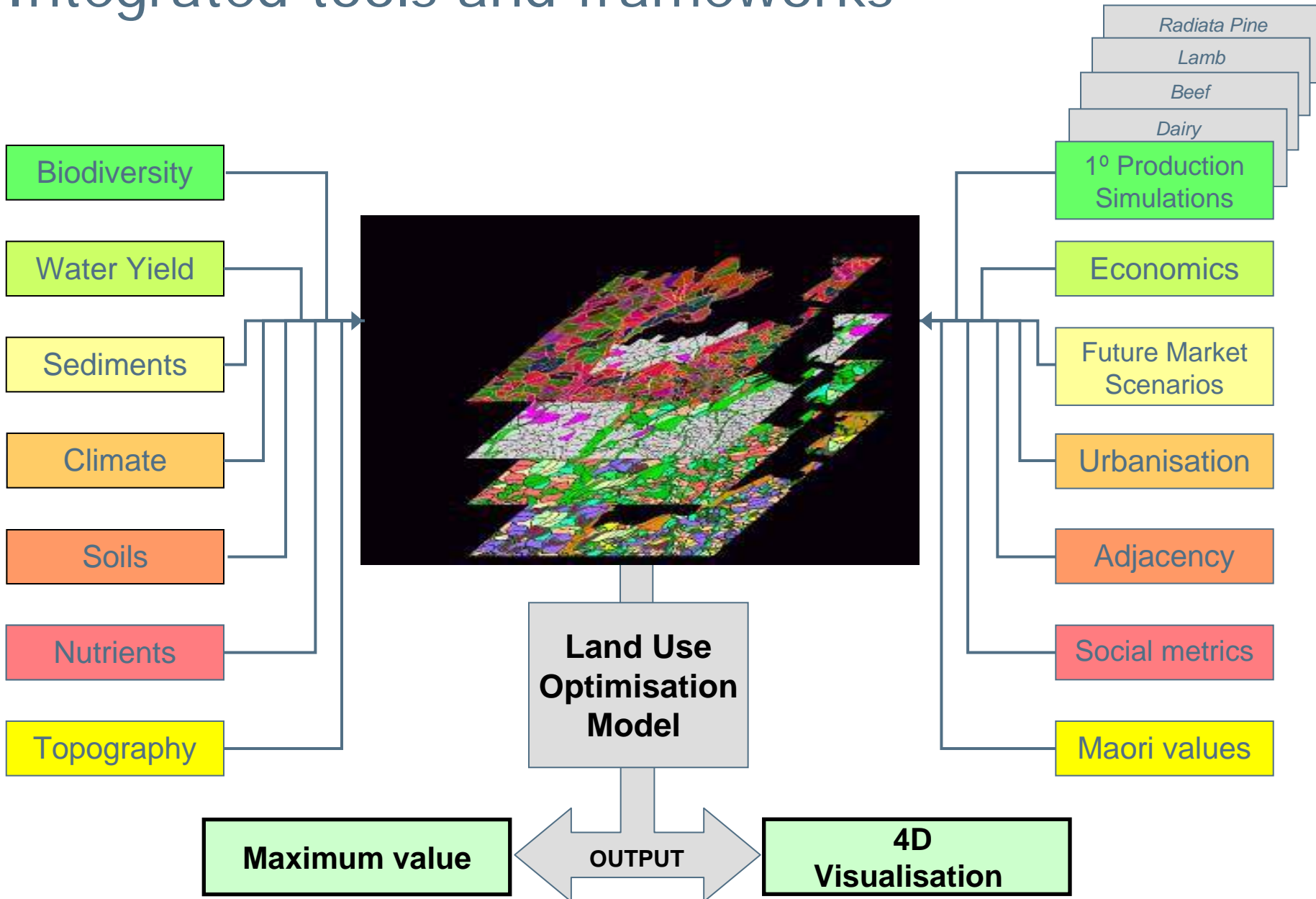




Goal 2:

**Optimise the value of marginal
land**

Integrated tools and frameworks





Goal 3:

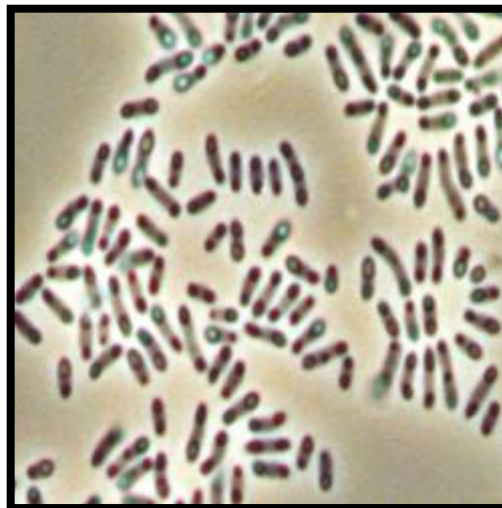
**Accelerate growth of the
bioeconomy**

Bio-based Prototypes



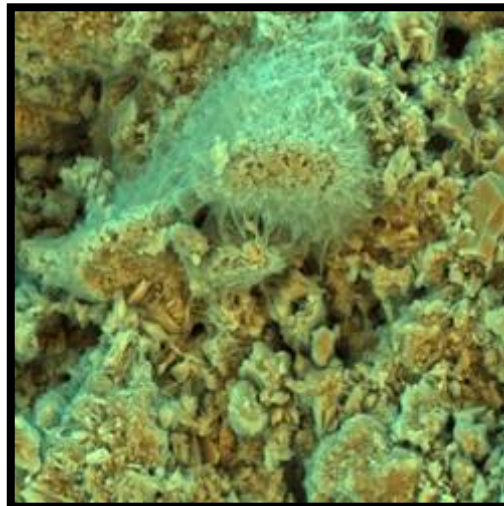
Biotechnology Platforms

- N-Fix Technologies:
 - N-ViroTech[®] wastewater treatment
 - 35% savings per mill (approx. \$800,000/year)
 - N-ViroPol[®] bioplastics production
 - 60%+ PHA w/w cell biomass

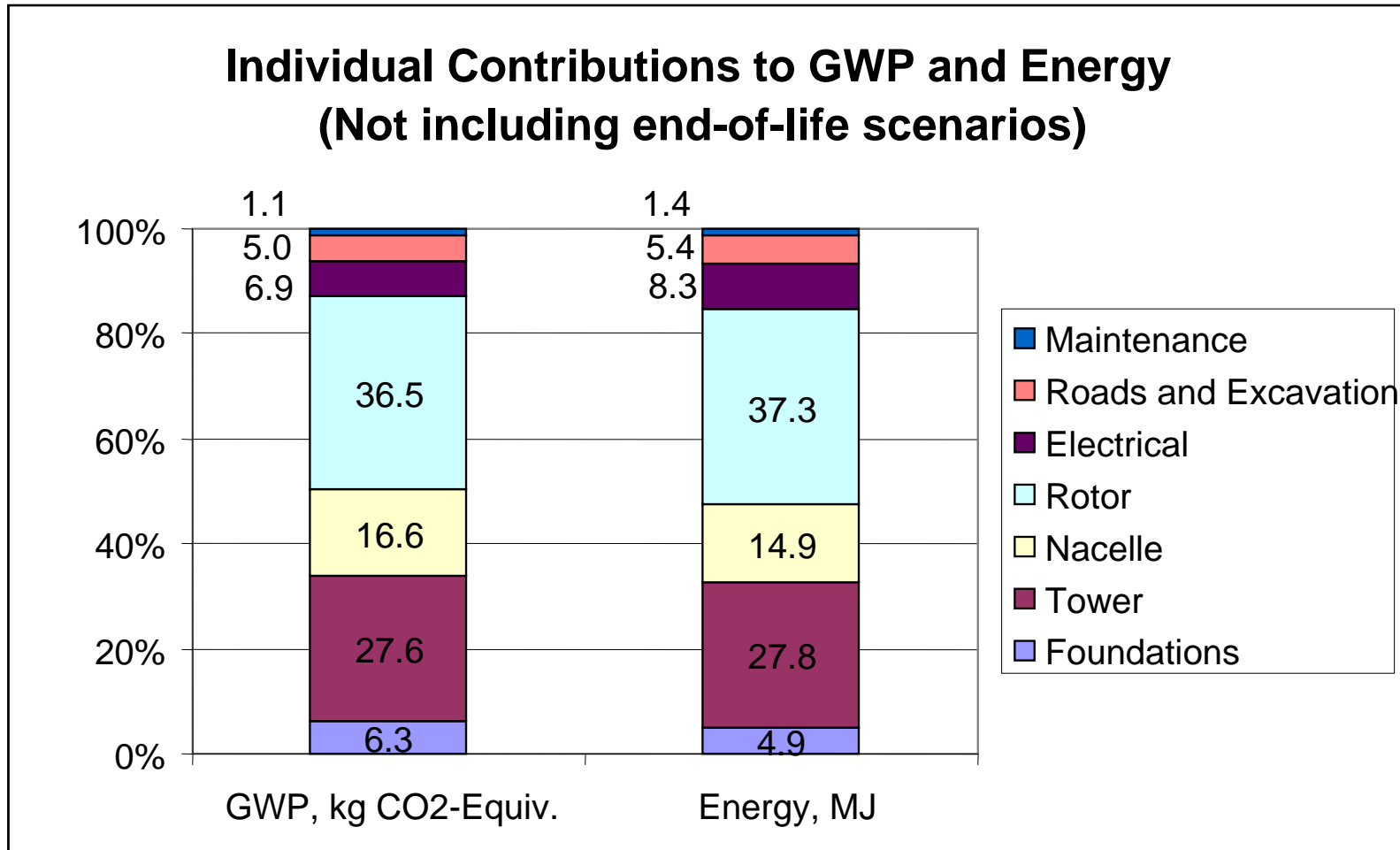


Chemitechnology Platforms

- Modified Zeolite Technologies:
 - Nutrient removal from eutrophic environments
 - Targets nitrogen and phosphorus species
 - Full-scale lake application completed
 - 60%+ phosphorus removal



Sustainability Tools



Turning biomass into biofuels



**AGRONOMICS
BIOMASS
COLLECTION**



PRETREATMENT



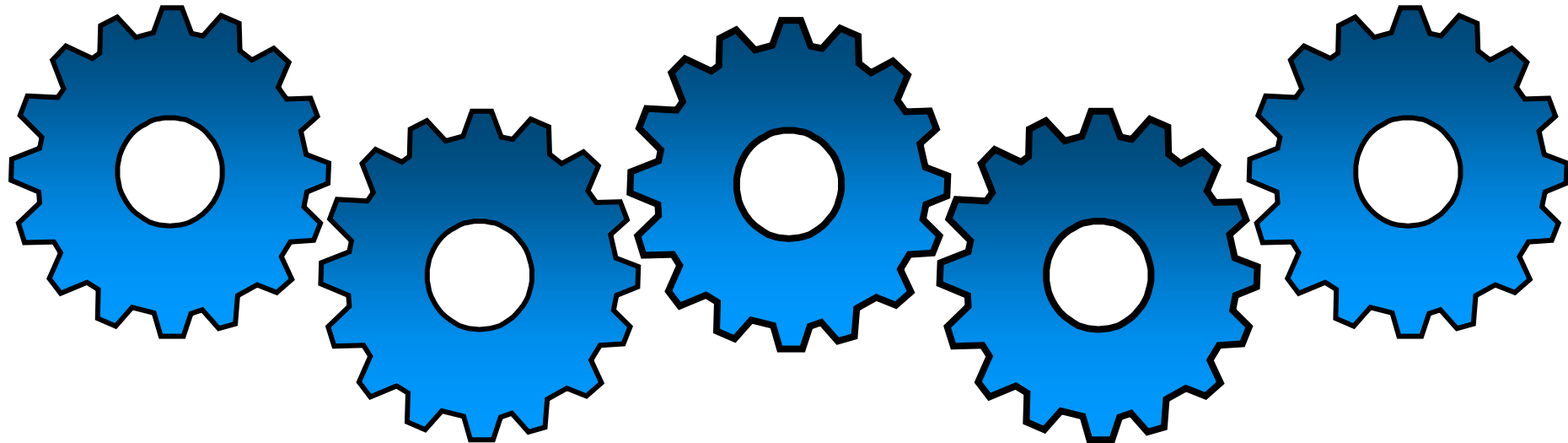
**ENZYMATIC
SACCHARIFICATION**



FERMENTATION



DISTILLATION



Framework for techno-economic modelling

Process Flow Diagrams

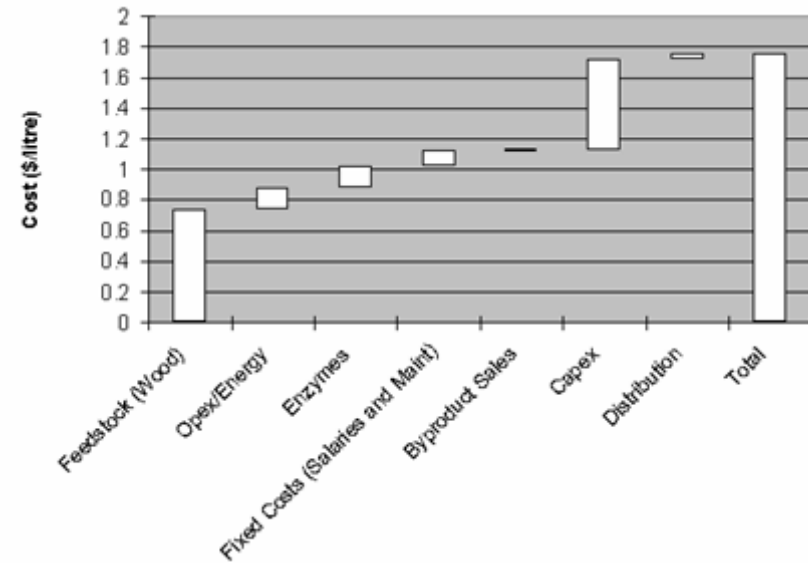
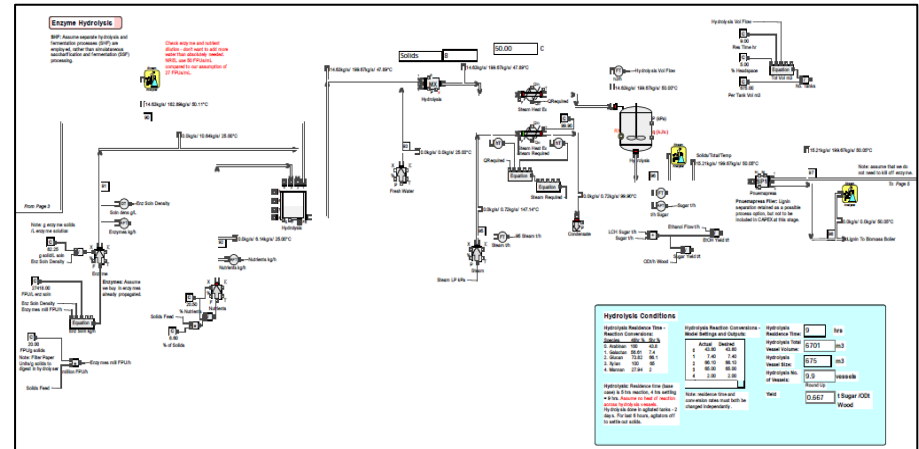
Materials and Energy Balance
(thermodynamically-correct physical models of unit operations)

Capital and Operational Costs.
Use scaling laws, e.g.:

$$\text{New Cost} = \text{Original Cost} \left(\frac{\text{New Size}}{\text{Original Size}} \right)^{\text{exp}}$$

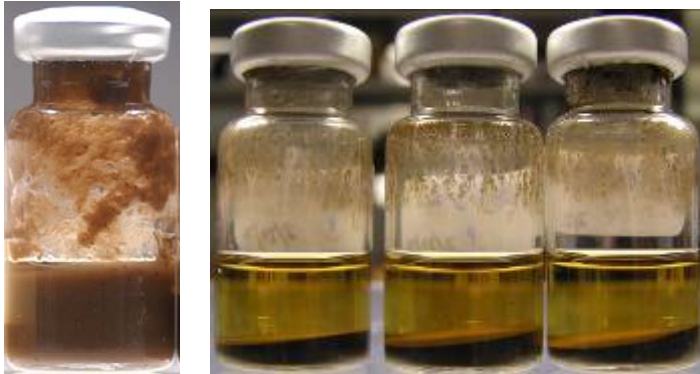
Discounted cash-flow economic model

Ethanol Production Cost
+ cost breakdown

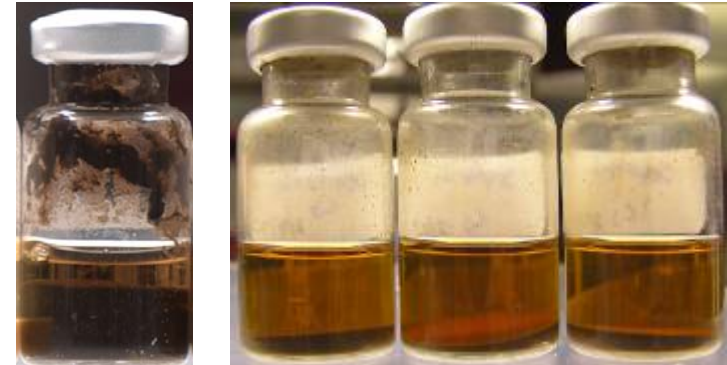


Radiata looks favourable

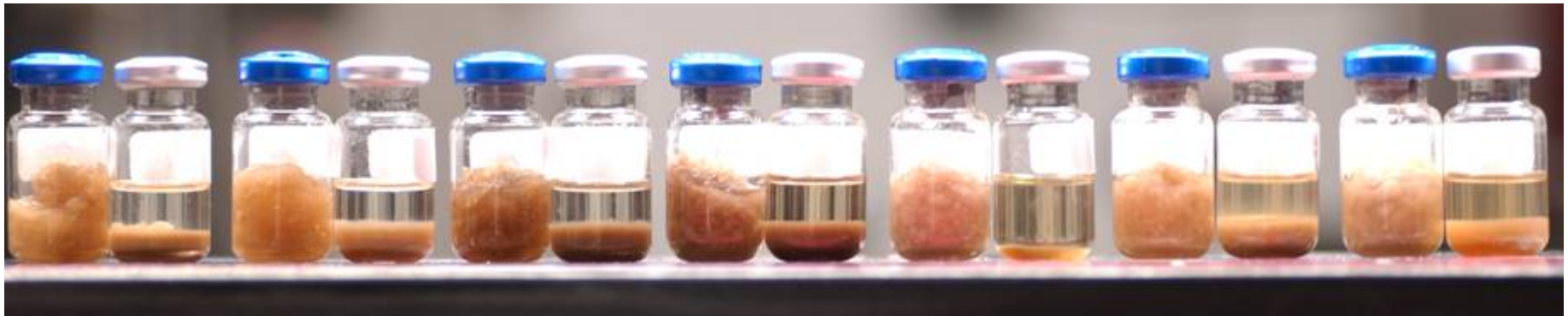
CORN STOVER



POPLAR



PINUS RADIATA*



** Preliminary studies on eucalypt also completed*



Sewage biosolids

- 150 kg/person/year
- 16 % total landfilled waste

	landfill	compost
1998	10	90
2008	90	10



Feed

180°C

220°C

260°C

Economic analysis – 8,500 T/yr

- Reduction in existing landfilling costs: 97%
- Reduction in GHG emissions (C tax): 76%
- Reduction in WWTP supplement costs: 36%

>>> Net savings c.f. landfilling: \$686,000/yr

>>> Net benefit per tonne biosolids: \$490/dry tonne



SCION 

Next generation
biomaterials

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