



BioEthanol as a transport fuel

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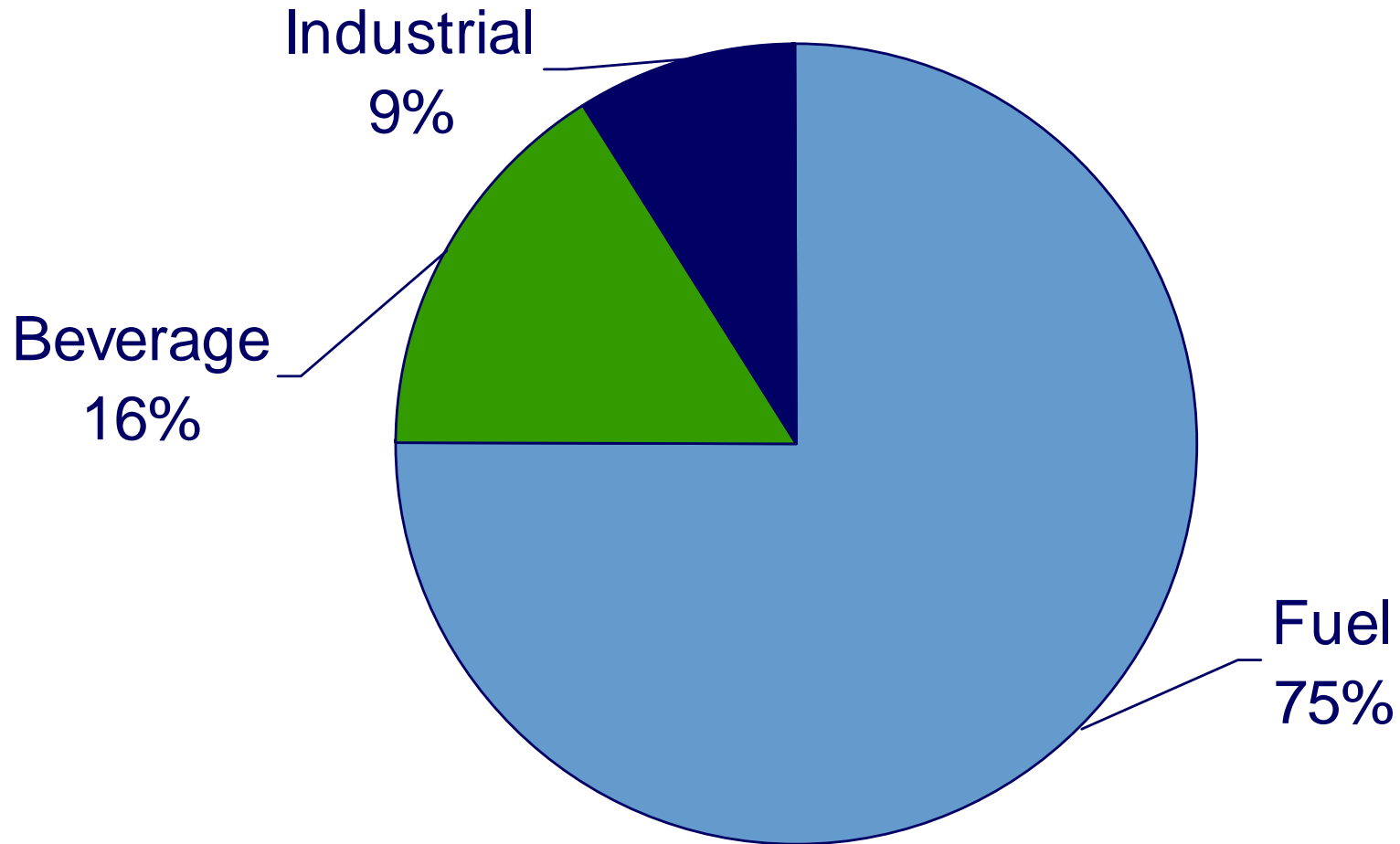
BioEthanol as a transport fuel - AGENDA

- What is bioethanol
- Use of bioethanol as a transport fuel
- Global production and use of bioethanol
- Bioethanol production and use in Australia
- Bioethanol production in New Zealand
- Promotional activities on bioethanol as a fuel
- Bioethanol as a transport fuel in New Zealand
- Strategic issues and summary

What is bioethanol?

- Ethyl Alcohol - $\text{CH}_3\text{CH}_2\text{OH}$
 - Clear, colourless, flammable oxygenated hydrocarbon
 - Feedstock, Composition/quality, end use
 - Hydrous and Anhydrous
- Derived from fermentation of carbohydrates
 - Sugar crops (e.g. sugar cane, sugar beet, molasses)
 - Grain (e.g. corn/maize, wheat)
 - Synthetic – not 'bio'-ethanol
 - Byproducts (e.g. wood, whey)
- 12 different applications (most for any solvent)

Global bioethanol use (2005 forecast)



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Bioethanol as a transport fuel is not new!

- Henry Ford - “fuel of the future” and designed Model T to run on bioethanol.
- 1929 – 1957 all gasoline sold in Queensland contained 10% bioethanol!
- Sold in the USA for over 20 years – now bioethanol comprises 12% of all gasoline mixes sold.
- Standard in Brazil is 22% bioethanol content...with many cars running at 100%.
- Sweden, Canada, India, China, Thailand, some parts of Europe and Asia and Australia

Bioethanol in the global transport fuel market

- Often required Government support
 - Subsidies
 - Mandates
- Largest producers were based on Agricultural imperatives
- Reduced oil dependence
- Balance of Trade deficit
- Reduced air pollution
- Brazil has largest impact on traded prices and export volumes depend on sugar/ethanol stream returns

Features of bioethanol as a transport fuel

POSITIVES

- Renewable
- Non-toxic, biodegradable, water soluble
- Higher octane rating (113)
- Cleaner burning fuel
- Reduce fine particles
- Reduced Carbon Monoxide and CO₂

ISSUES

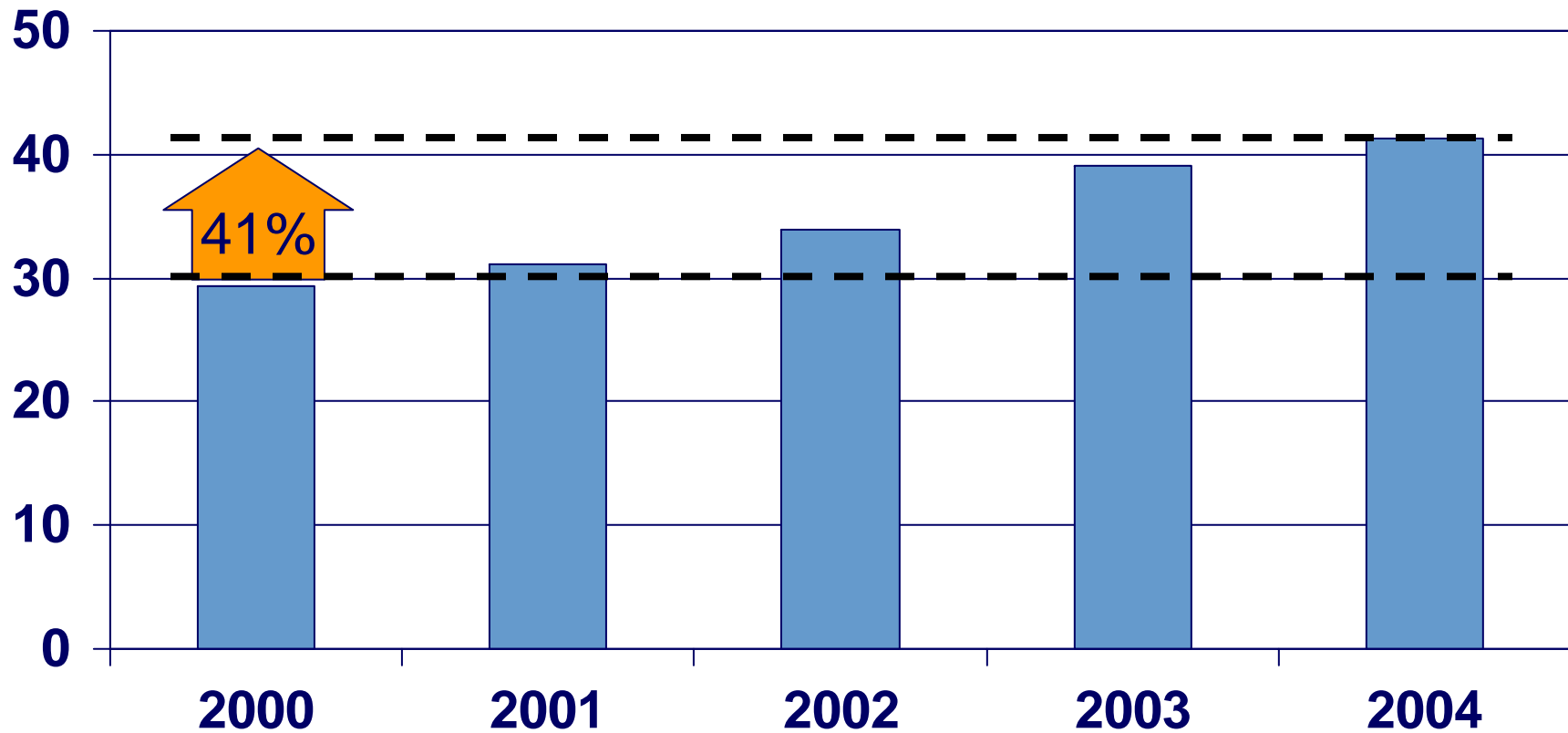
- Lower energy content
- Miscible in water
- Vapour pressure issues – requires appropriate blendstock to meet local specifications
- Cost

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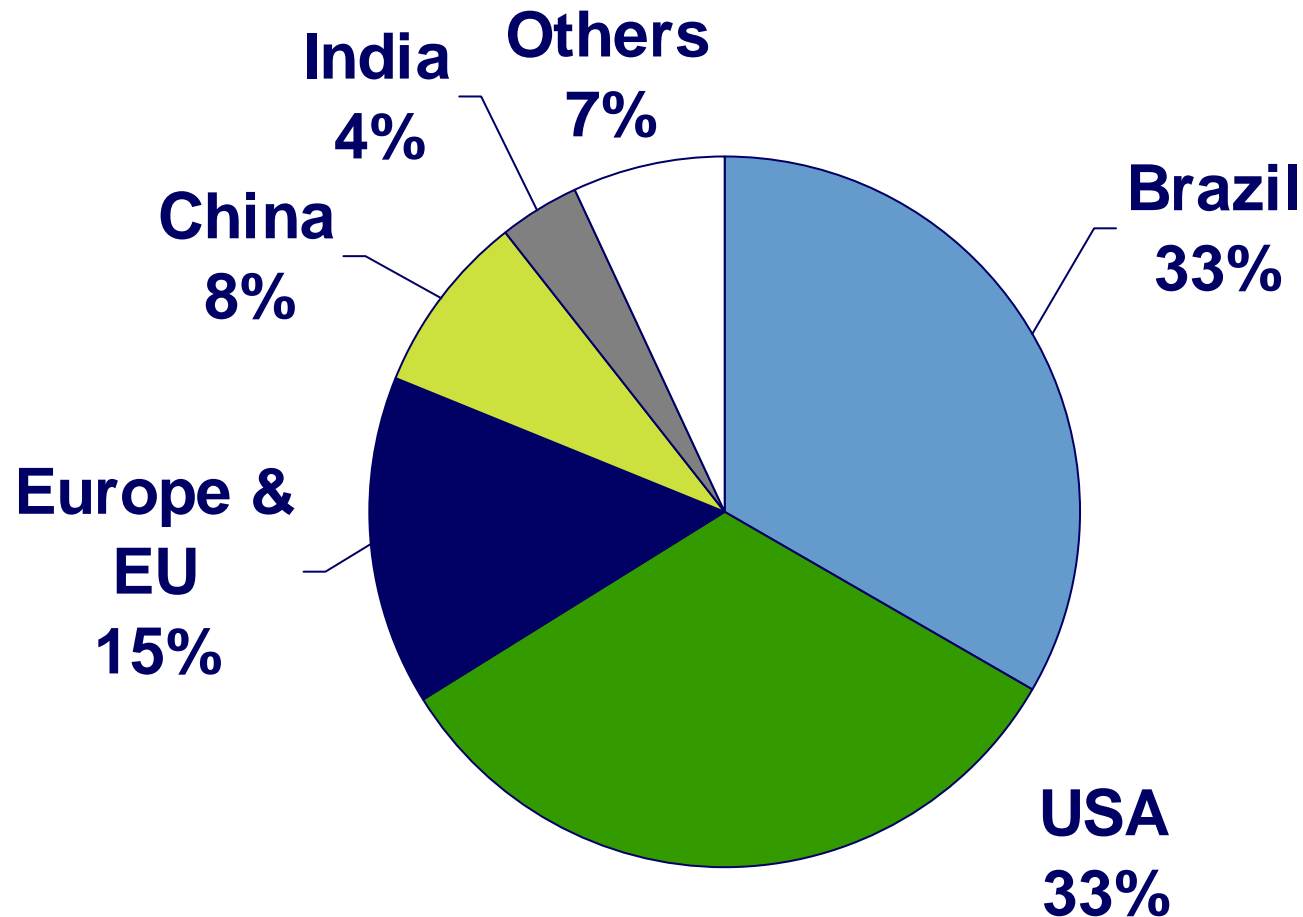
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Total World Ethanol Production

Billion litres



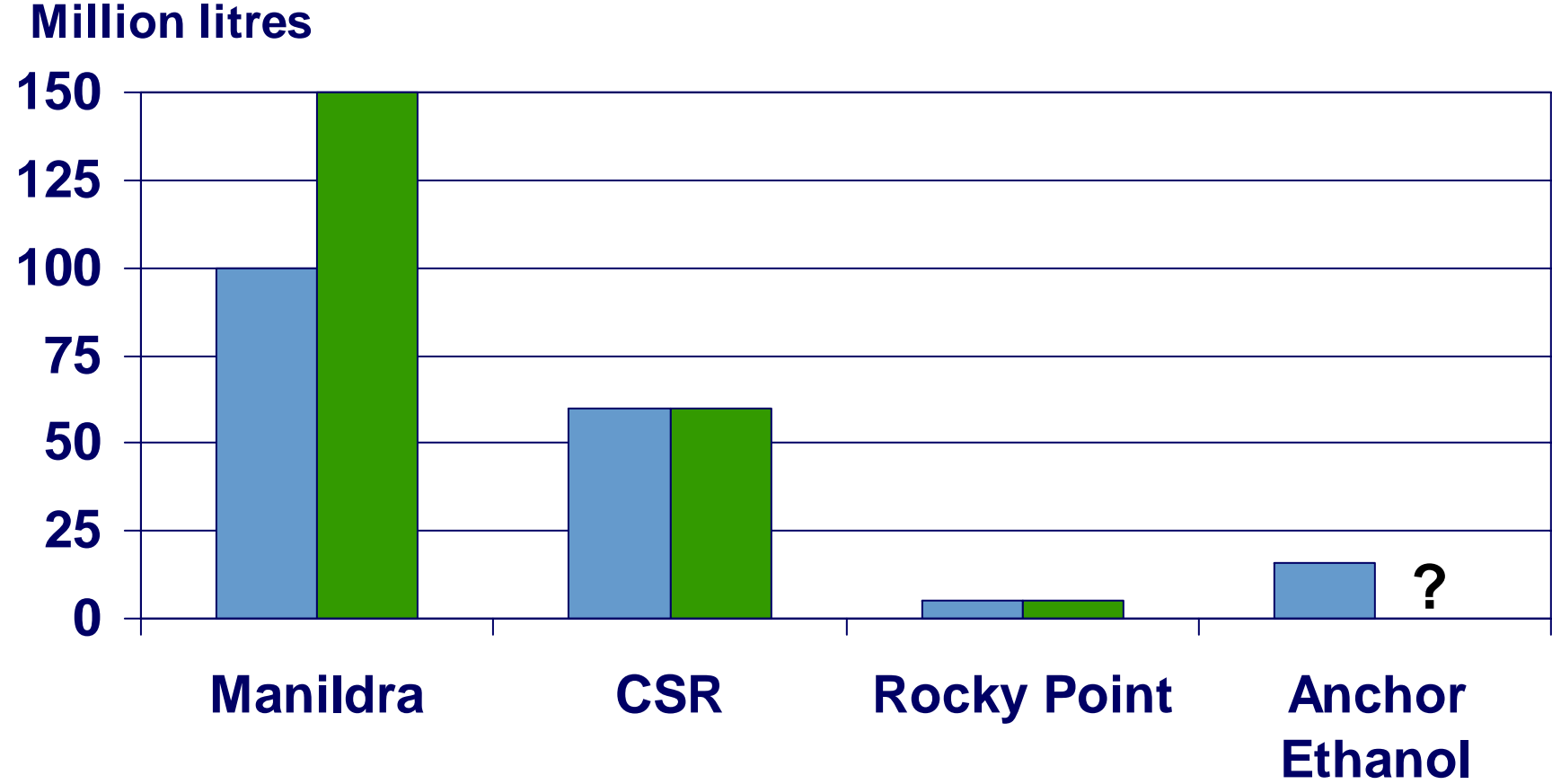
World Ethanol Production 2004



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Bioethanol production in Australia



Bioethanol production and use - Australia

- Long history in bioethanol as a transport fuel.
- Adverse publicity but consumer confidence / ambivalence is returning.
- No mandate
 - Consumer pull (high oil price) and or fuel standards (octane).
- Exemption on excise of bioethanol content of fuel until 2008...stepped up to 2015
- \$37 million capital grant for bioethanol and biodiesel production.
- Eight new plants planned ⇒ 455-620 million L capacity

Bioethanol production and use - Queensland

- Queensland Government proactive
- Benefits to sugarcane producers, local economy and environment
- Caltex and BP engaged on e10 in this State
- 50 sites offering bioethanol blended fuel and growing
- Some sites are selling 1%...others 40%
- Independents Evolve and Neumanns – 98 octane
- Retail promotions key strategy
- Qld govt sponsoring bioethanol conference in May

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Bioethanol production and use – New Zealand

- Anchor Ethanol Ltd.
- 100% Owned by Fonterra Cooperative Group
- Current production approximately 16-20 million litres/yr
- Produce just 0.0004% of world 2004 production
- Uses whey (lactose) from casein plants to produce ethanol
- Manufacture and sell 6 grades – 96% or 99.9%
- Can also manufacture fuel grade bioethanol

End Uses for Ethanol in NZ

Beverage - *Gin, vodka, RTDs, liqueurs, fortified wines*

Industrial Solvent - *printing Inks, paints, plastic films etc*

Solvent Extraction of Natural Products - *Echinacea, Lipids*

Toiletries and Cosmetics - *mouthwashes, deodorants, colognes, aerosols*

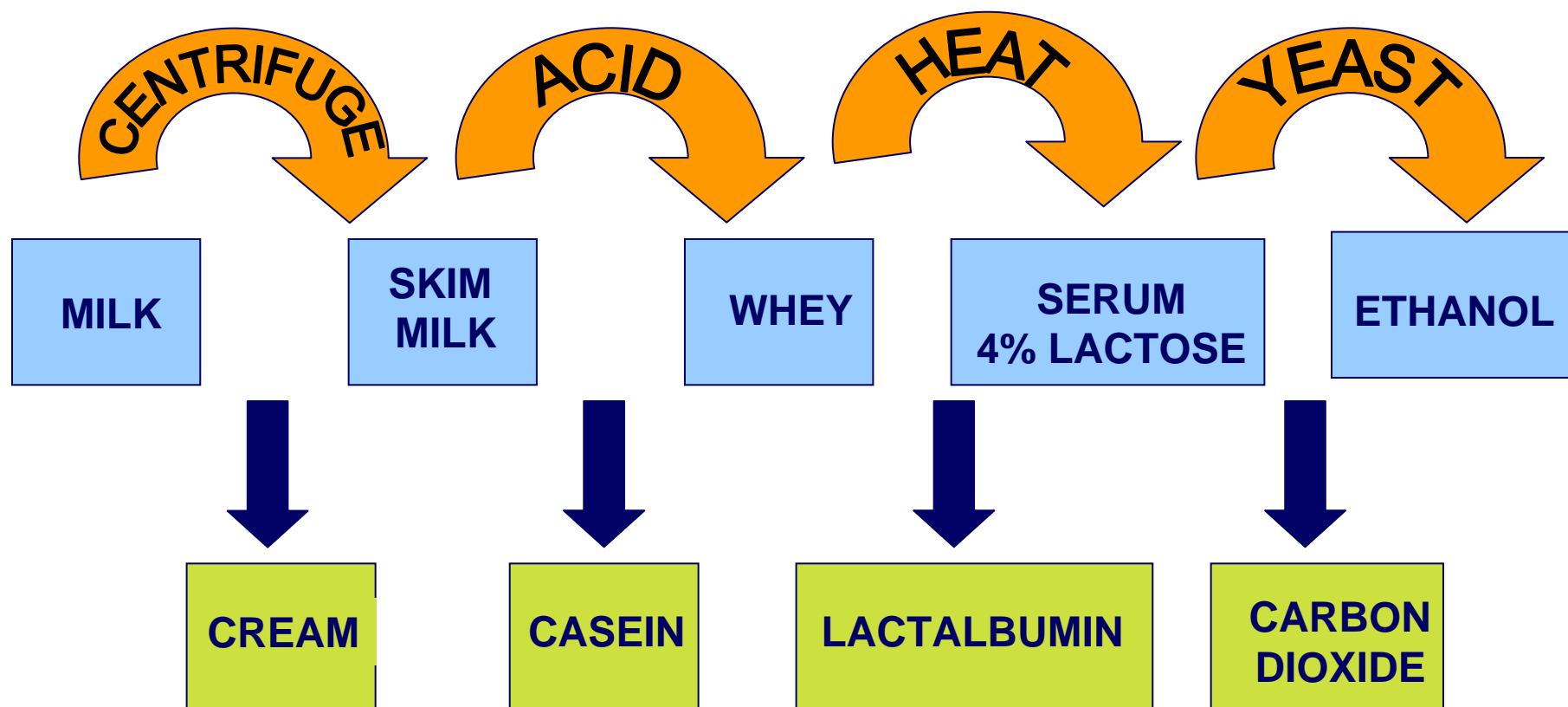
Pharmaceuticals, Hospitals, Laboratories

Retail Methylated Spirits

Food flavouring and colouring

Vinegar

Making ethanol from Milk



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Classic Car club – e10 rally



E10 Demonstration at Fonterra



e10 & e100 Demonstrations at Fonterra

e10

- e10 fuel for 3 months
- Petrol feedstock – Gull
- Four vehicles
 - Hyundai Lantra (1997)
 - Suzuki Carry (2002)
 - Ford Fairmont (2001)
- Monitored in-house
- No issues encountered

e100

- 93% strength semi processed
- Subaru Legacy 1.8L (1991)
- Energy performance ↑ 61 kW on petrol to 72 kW
- Cold-start issues below 40°C
 - add small start-up petrol tank
 - additive to ethanol
 - ↑ static compression ratio
- e100 doesn't need anhydrous

Energywise rally 2004



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Potential Fuel Ethanol Market in New Zealand

New Zealand Petrol Consumption (year ended March 2004):

Grade	Total consumption (m L)	E5 (m L)	E10 (m L)
Premium (96)	736	37	74
Regular (91)	2,558	128	256

Bridging the feedstock gap in New Zealand

- Further potential within Fonterra
- Limited scope for grain and sugar crops
- Long term potential lies in ligno-cellulose production from biomass
 - Wood pulp, straw
- Manufacturing process too expensive but costs will reduce with time.
- Short term supply could be supplemented by Australian bioethanol

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Strategic Issues and Summary

- Bioethanol is a viable option for New Zealand
- Fonterra is committed
- Enough homegrown stock to make a start
- Has to be a team effort! Require support from:
 - Producers
 - Oil Companies
 - Motor Industry
 - Government, and
 - Consumers



TO LEAD IN DAIRY

