



**Relevance of the Liquid Fuels Trust Board
Work to Present Day Energy Issues.**

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**2005 New Zealand Minerals Conference,
Auckland, 13-16 November, 2005**

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Coverage

The Lignite Resource

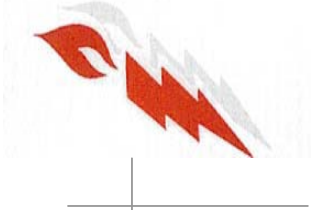
Development Options

Development Costs

The Value of the Lignite Resource

Contemporary Importance

Key Points



South Island Lignite Valuation



| Location | In Ground | Tech Reserve | Recovery Factor | NCV | Energy Content | Gas equiv. | cf Maui |
|---------------------------|-----------|--------------|-----------------|-------|----------------|------------|---------|
| Deposit | mil.t | mil.t | % | MJ/kg | PJ | tcf | |
| Central Otago | | | | | | | |
| Hawkdun | 812 | 649 | 79.9% | 11.04 | 7,165 | 6.60 | 1.9 |
| Home Hills | 346 | 246 | 71.1% | 11.10 | 2,731 | 2.52 | 0.7 |
| Roxburgh | 245 | 132 | 53.9% | 12.71 | 1,678 | 1.55 | 0.4 |
| South Otago | | | | | | | |
| Benhar | n.a. | 887 | - | 14.59 | 12,941 | 11.93 | 3.5 |
| Eastern Southland | | | | | | | |
| Croydon | 484 | 309 | 63.8% | 14.04 | 4,338 | 4.00 | 1.2 |
| Waimumu | 286 | 217 | 75.9% | 12.98 | 2,817 | 2.60 | 0.8 |
| Mataura | 2,940 | 1,808 | 61.5% | 12.68 | 22,925 | 21.13 | 6.1 |
| Southern Southland | | | | | | | |
| Morton Mains | 1,226 | 507 | 41.4% | 8.57 | 4,345 | 4.00 | 1.2 |
| Waimatua | 962 | 775 | 80.6% | 9.72 | 7,533 | 6.94 | 2.0 |
| Ashers Waituna | 1,357 | 746 | 55.0% | 10.26 | 7,654 | 7.05 | 2.1 |

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The Lignite Resource

Lignite in Ground >9.6 billion tonnes

Technically Recoverable 6.3 billion tonnes

Average Recovery Factor ~70%

Specific Energy (NCV) 8.57 – 14.59 MJ/kg

Recoverable Energy 74,127 PJ

Natural Gas Equivalence 68.3 tcf

Equivalent to 20 Maui Gas Fields!

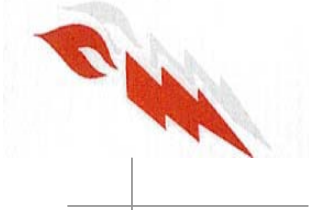
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South Island Lignite Valuation



| Processes | Products | Prod/Lignite tonne/tonne | Product GPV NZ\$ million | Process GPV NZ\$ million |
|--------------|-------------|-----------------------------|--------------------------------|--------------------------------|
| Gasification | Syn. Gas | 10.86 GJ /t | 35,247 | 35,247 |
| | Gasoline | 0.027 | 19,607 | 82,780 |
| | Diesel | 0.108 | 63,173 | |
| Liquefaction | Gasoline | 0.082 | 59,295 | 120,057 |
| | Diesel | 0.079 | 46,051 | |
| | Avtur | 0.030 | 14,711 | |
| Methanol | Methanol | 0.277 | 74,498 | 74,498 |
| Ammonia/Urea | Ammonia | 0.309 | 83,001 | 130,552 |
| | Urea | 0.167 | 47,552 | |
| Electricity | Electricity | 1,225 kWh/t | 77,918 | 77,918 |

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The LFTB Lignite Programme

Phase I – 9 Lignite deposits

- **Geology:** Drilling, Geotechnical, Hydrology,
- **Lignite Characterisation:** Proximate & Ultimate analyses, Lithology, Mineral classification,
- **Reactivity Evaluation:** Gasification, Liquefaction,
- **Mine Planning – 24 Mine Plans,**
- **Socioeconomics:** Workforce, Housing, Regional Development,
- **Infrastructure:** Water and Power supply, Roothing, Settlements,
- **Offsites:** Pipelines, Port Facilities,
- **Environmental:** Land use, Water & Air pollution, Wildlife impacts,
- **Rehabilitation:** Mine water management, Land rehabilitation,
- **Engineering Costs & Economics:** National & Commercial Benefit.

A “Whole Project” Evaluation

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The LFTB Lignite Programme

Phase II – 3 Short listed deposits

Hawkdun, Benhar, Ashers-Waituna,

- Much more in detail in all aspects,

Targeted ~ 10 Mtpa,

Methanol production,

30 year Project Life,

Ashers-Waituna selected as preferred deposit,

- 11.4 Mtpa,

More than **\$30 million** spent (Q3 2005).

*Projects **not Economically Attractive.***

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South Island Lignite Valuation



| Deposit | Mining Rate million t/y | Production Cost Q2 1982 NZ\$/tonne | Production Cost Q2 1982 NZ\$/GJ |
|----------------|----------------------------|---------------------------------------|------------------------------------|
| Hawkdun | 9.5 | 7.00 | 0.63 |
| Home Hills | 8.0 | 9.00 | 0.81 |
| Roxburgh | 4.0 | 14.10 | 1.11 |
| Benhar | 9.1 | 7.10 | 0.49 |
| Croydon | 9.0 | 17.70 | 1.26 |
| Waimumu | 5.0 | 16.60 | 1.28 |
| Mataura | 10.0 | 13.00 | 1.03 |
| Morton Mains | 10.0 | 8.60 | 1.00 |
| Waimatua | 10.0 | 7.20 | 0.74 |
| Ashers Waituna | 10.0 | 6.60 | 0.64 |

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Current Economics

Updating earlier costs and economics to Q3 2005

Inflation:

- Consumer Price Indices (CPI),
- Product Price Indices (PPI),
- Construction Cost Index (CCI)

Exchange Rates:

- US\$, DM, NZ\$

Technology Improvements:

- Mining techniques (Hydraulic/Face Shovel & Truck),
- Lignite Gasification,
- Fischer-Tropsch Synthesis,
- Combined Cycle Power Generation,
- Greenhouse Gas Emissions from Lignite Feedstock.

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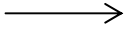
South Island Lignite Valuation



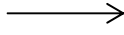
Current Economics

Q3 1981/Q3 1985 to **Q3 2005**

Q3 1985 US\$ → Inflation → Q3 2005 US\$



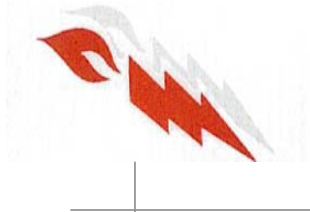
Exchange



Q3 1985 NZ\$ → **Q3 2005 NZ\$**

Not as Simple as it Seems!

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Current Economics

Lignite Mining – Hawkdun Updated to Q3 2005

| Mining Rate | Capital Cost | Production Cost | Transfer Price | GPV |
|-------------|--------------|-----------------|----------------|---------|
| Mtpa | \$ mil. | \$/GJ | \$/GJ | \$ mil. |
| 11.1 | 1,522 | 1.5-2.0 | 1.6-2.1 | 10,793 |

(Includes Offsites, Infrastructure, Royalties, Levies etc.)

Our Cheapest Source of Primary Energy

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South Island Lignite Valuation

Current Economics

Lignite Processing – Hawkdun Updated to Q3 2005

| Process | Products | Units | Product Cost | Transfer Price | Import Parity |
|--------------|-------------|----------|--------------|----------------|---------------|
| FT Liquids | Petrol | \$/tonne | 784 | 845 | 1,115 |
| | Diesel | \$/tonne | 632 | 681 | 899 |
| Liquefaction | Petrol | \$/tonne | 864 | 983 | 1,115 |
| | Diesel | \$/tonne | 697 | 793 | 899 |
| | Avtur | \$/tonne | 584 | 665 | 754 |
| Fertilizer | Ammonia | \$/tonne | 152 | 174 | 414 |
| | Urea | \$/tonne | 161 | 184 | 439 |
| Methanol | Methanol | \$/tonne | 362 | 396 | 414 |
| Power | Electricity | \$/MWh | 4,227 | 4,720 | 8,000 |

All Exceed National Benefit Criteria (10% IRR)

Some Exceed Commercial Hurdle Rates

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Relevance to Present Day Issues

Worldwide

- Continued High Oil Prices,
- Concerted move to FT Petroleum – **Lignite Feedstock Ideal,**
- National Self Sufficiency and Energy Security,

In New Zealand

- Must replace Maui,
- Lignite is our **Largest and Cheapest** Energy Resource,
- LFTB has assembled a Database – saved both money & time,
 - Resource Proving,
 - Mining and Conversion Technology,
 - Social/Socio-economic,
 - Environmental.
- Hawkdun and Home Hills at Risk – **High Country Tenure.**

Must Recognise the Value of our Lignites

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South Island Lignite Valuation



Key Points

- Lignite is our **Largest and Cheapest Energy Resource**,
- Technically Recoverable reserve is **20 x Maui**,
- Lignite Production costs are in the range **\$1.0-2.0/GJ**,
- Development of **One Deposit** would replace Maui,
- Production via Synthesis Gas is **Nationally Beneficial**,
- Environmental Impacts would be **Manageable and Positive**,
- The LFTB has established a **Valuable Database**, that will save considerable lead time and investment,
- Individual Lignite reserves must **Not** be lost to the Nation.

Lignite is the Key to our Energy Future!

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