New Zealand Natural Resource Development

COMMERCIAL IN CONFIDENCE

Presentation to the Minister of Energy
26 February 2010
Agenda

- Introduction and strategic overview

- Update on key New Energy projects
  - Lignite Conversion
  - Underground Coal Gasification
  - Coal Seam Gas

- Other significant resource development opportunities for NZ

- Proposed development plan
At future commodity prices (US$200+/bbl oil) Natural resource could provide an additional $60B per annum in export equivalent revenue
Development Risks Facing NZ

- Offshore ‘Super Profits’
  - Super normal returns extracted from offshore developers

- Resource Speculators
  - Creates a barrier to resource development
  - Wealth extracted by under-capitalised speculators

- Development delays
  - History of limited new resource activity generated based on 'free market' philosophy
The Goal for New Zealand

- To **stimulate development** from natural resources AND capture **maximum value** and wealth for New Zealanders

- To achieve this there is a need for:
  - Exploration Cashflow
  - Development Capital
  - Technology
  - Knowledge/expertise – people
  - New Zealand development experience (Stakeholders, Iwi, Environmental, Regulators etc.)
  - NZ owned/controlled entity to lead this development
There is a perception that Solid Energy is ‘sitting-on’ resources ...

“Need to provide Solid Energy with incentives to commercialise known resource more quickly … or divesting mining interests where others are better positioned to monetise in-situ resource”

McDouall Stuart “Stepping up”

Nothing could be further from the truth …
Lignite Conversion Update

Greg Visser
Stefan Harms
The Lucky Country endowed with the greatest coal resource per capita

- Significant Lignite Resource in the South Island

![World coal reserves per capita (tonnes)](image)
Solid Energy Land and Resource

SE selected and secured the key lignite resource following a detailed evaluation process.
# Solid Energy Resource and Access

<table>
<thead>
<tr>
<th>Coal Resource</th>
<th>Secure (Mt)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mataura</td>
<td>1,180</td>
</tr>
<tr>
<td>Croydon</td>
<td>170</td>
</tr>
<tr>
<td>Waimumu</td>
<td>50</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,400</strong></td>
</tr>
</tbody>
</table>

Even with all proposed lignite projects operating in parallel, SE owns and controls sufficient land and resource to operate for 50+ years.
Southern Lignite: A Strategic Energy Resource

- But...
  - Low rank coal
  - High moisture
  - Low energy
  - Difficult to handle
  - Expensive to transport

= Onsite Conversion
World Leading Lignite Conversion Technologies

Lignite ➔ Syngas ➔ Upgrading ➔ Briquettes
          ➔ Ammonia ➔ Fertiliser ➔ Urea
          ➔ Methanol ➔ Fuels ➔ Ammonium sulphate/nitrate etc
          ➔ Fischer Tropsch ➔ Syn nat gas ➔ Diesel Fuel
          ➔ Hydrogen ➔ Chemicals ➔ LPG Kerosene Fuel Cell
          ➔ Waxes ➔ Detergents Plastics Synthetic Fibers Synthetic Rubbers
          ➔ Steam ➔ Lube Oils Specialty Waxes Electricity
Lignite Upgrading

Lignite → Upgrading → Briquettes
Lignite Upgrading

- Upgrade lignite through binderless briquetting
- Benefits
  - Increases thermal value by 30% over mined lignite
  - Reduces emissions
  - Improves handling characteristics
  - Eliminates dust during transportation
  - Increases the market value of the lignite
- Stage 1 – demo plant ~100,000 t/a plant (Commissioning 2011)
  - Final project approval mid 2010
- Stage 2 – Export plant 1Mt – 5Mtpa (2014)
- Annual revenue - [Redacted]
Lignite to Fertiliser

Lignite → Coal to Fertiliser Process → Urea → Sulphur
Ravensdown

Urea Market

- Import substitution (500ktpa) $200 - $700Mpa
- New Export Revenue (700ktpa) $300 - $900Mpa
Summary of World Scale Fertiliser Project

- **Mine**
  - Opencast
  - 3 Mt/a lignite
  - Redacted

- **Plant**
  - 1.2 Mt/a urea
  - Redacted

- **Status**
  - Working with Ravensdown to completed joint Concept study
  - Complete mid 2010
  - Proceed to feasibility Jun 10
Macro Economic Impacts of Coal to Fertiliser

- Employment
  - 200 staff at mine
  - 180 staff at plant
  - Supporting industries and multiplier effect

- Project revenue $500M – 1.5Bpa

- CO2
  - 2 Mt/a CO2
  - 1.2 Mt/a sequesterable
  - Carbon penalty - NZ$50m/a (at $25/t CO2)
  - Equivalent to US$29/t urea (5 – 10% of Urea value)
## Coal to Fertiliser Timeline

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Concept Study</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design &amp; Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Consenting</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SocioEconomic Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEE Prep and Granting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Financing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Lignite to Transport Fuel

Lignite → Fischer-Tropsch → Diesel Fuel, LPG, Kerosene, Fuel Cell Fuel
NZ Transport Fuels Market

- Import substitution (30bblpa) $2 – 4Bpa
- New Export Revenue (7bblpa) – $200 - $400Mpa

Current NZ Refinery

100 kbbi/day crude oil

30-40 kbbi/day final product

AUCKLAND

WELLINGTON

CHRISTCHURCH

DUNEDIN

BLUFF

30-40 kbbi/day product

CURRENT TRADE FLOWS

FUTURE TRADE FLOWS

naphtha exports
Summary of Transport Fuel Project

- **Mine**
  - Opencast mine
  - 12-15 Mt/a lignite

- **Plant**
  - Sized to displace imported finished product: 30-40k bbl/day (1.5-2 Bt/a)
  - 75% Diesel, 25% Naphtha
  - High quality product: zero sulphur, high cetane

- **Status**
  - Pre-feasibility study
  - Complete late 2010
Key drivers for a viable CTL business
Macro Economic Impacts of CTL

- Employment
  - 500 staff at mine
  - 300 staff at plant
  - Supporting industries and multiplier effect

- Project Revenue $1.5B - $3.5Bpa
  - Security of fuel supply
  - National economic development
    - Tax benefits
    - Royalties and levies
    - Reducing the vulnerability to external supply shocks
  - Regional economic development

- CO₂
  - 13.5 Mt/a CO₂
  - 7.5 Mt/a sequesterable
# Coal to Liquids Timeline

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Complete Pre-feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design &amp; Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consenting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SocioEconomic Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEE Prep and Granting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**BAU Development timeline – 2019 … Extreme “China” timeframes 2016**

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plant</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Basic Engineering</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>EPC</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commissioning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Mine</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre-Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design &amp; Construction</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Consenting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>SocioEconomic Analysis</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>AEE Prep and Granting</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financing</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Carbon Management Plan

Biomass and Municipal waste other renewable feedstock

Renewable power import

STP plant

Optimise CTL technology and design

Bio-sequestration

Geological Sequestration (CCS)

Other direct off-set opportunities

Global off-sets/credits

Through portfolio approach carbon impacts can be effectively managed
Underground Coal Gasification (UCG)

Dr Steve Pearce
Dean Fergusson
The revolutionary UCG Process

Pressure in the gasifier is less than pressure in the coal seam and surrounding strata. No flow from gasifier into surroundings is allowed, preventing loss of product and escape of contaminants.
A Global Energy Technology Breakthrough …

- Provides access to deep unminable coal resources
  - ~85% of known coal reserves are deemed unmineable with surface mining techniques
  - UCG could **triple or quadruple** the available energy reserves from coal globally

- Provides very low cost energy

- Increases resource recovery 50 – 70% recovery

- Enables utilisation of coal based energy in higher value markets
  - Transport fuel
  - Methanol
  - Steel production

- UCG in combination with CCS (CO₂ capture and storage) provides a low cost solution to carbon abatement.
... with SENZ at the forefront of global development

- SE has developed a **global leadership position** in UCG development through:
  - Utilising SE's extensive resource characterisation skills
  - Securing the world's leading UCG technology (Ergo Exergy's UCG technology)
  - Utilising SE's extensive NZ resource position
  - Assembled a world class project team

Creating world class opportunities in NZ & offshore

- **New Zealand**
  - The Waikato coalfields alone contain 1Bt of coal > 300m deep - UCG resource equivalent to 5 Maui gas fields
  - Similar scale opportunities exist in Taranaki and South Island fields

- **Offshore**
  - Opportunities to leverage leadership position into Chile, Australia, Asia
Initial UCG Development - Waikato Project

- 20 PJ pa (equivalent to e3p – 380MW - gas feed)
- Staged development
  - Pilot → Demonstration → Commercial
- Pilot plant development underway
- Gas production expected 2010
- Initial market - electricity generation
- Consider high value energy and chemical products long term (transport fuel, methanol fertiliser)
Low impact pilot site in Waikato
Development Timelines

- Waikato
  - Pilot plant
    2011 - 2012
  - Demonstration plant
    2015 - 2017
  - Commercial plant
    2018 onwards

- Taranaki
  ➢ 2016 onwards

- Chile/offshore
  ➢ 2012 onwards
UCG Revenue Potential > $1Bpa

The chart illustrates the projected revenue growth for UCG (Unconventional Gas) over the years from 2010 to 2030. The revenue potential is projected to exceed $1 billion per annum, with significant growth expected from 2018 onwards. The chart indicates a steady increase in revenue, with projections reaching $1.4 billion by 2030.
Coal Seam Gas (CSG)

Grant Redman
Dean Fergusson
CSG Technology

- Pure Methane (natural gas) is trapped in deep coal seams ~400m – 1km
- Pressure is released through de-watered to ‘free’ the gas
- Gas flows to surface and into collection network
- Produced water collected and treated or injected into basement rock
CSG Technology

- Coal remains in situ and unaffected
- Minimal surface infrastructure and low environmental impact
- Market for CSG – NZ gas transmission line
CSG on the global stage

- North America
  - Established contributor to gas supplies for last 15 years
  - Numerous producing basins (San Juan, Powder River)
  - US CSG production is 10x NZ total gas demand
  - Powder River (successfully developed) has similar characteristics to NZ coals
CSG on the global stage

- Queensland
  - 130PJ pa current – 3,000 PJpa
  - 6,000 holes to be drilled in 2010
  - Government anticipating [$4b] in royalties
  - 12,000 jobs to be created
  - ~80% of natural gas production

China and Asia

- Huge potential but are further behind in development maturity
NZ Permits

- Strategically located in the North Island
- Close to major growth centres
- Close proximity to gas & electricity transmission networks
- All permits have high methane content and a lower emission factor than pipeline gas
- Well placed to provide security of supply to both gas and electricity systems
Huntly

1st field to produce commercial gas in NZ

- Producing gas consistently since Feb 2008 for a period of 18 months

- Market gas from appraisal wells exported into local electricity distribution network

- Produced water solution close to completion
Huntly

- Certified reserves of ~100PJ (3P)
- Provide between 3-5 PJ/pa into gas transmission system
- Redacted capital to develop the field
- Have drilled 6 production and 6 exploration holes

- **Stage 1 commercialisation** (start Sep 10)
  - 5 production wells
  - Electricity generation into distribution network

- **Stage 2 commercialisation** (start Sep 12)
  - 10 production wells
  - Connection to gas transmission network
  - Annual Revenue
  - Redacted
Taranaki

- Certified resources of ~100PJ (3C) at present
- Extension of coal field is significant - up to 300 production wells
- Close to gas transmission and electricity transmission networks
- Leverage off established oil and gas sector

- Development pathway
  - Exploration
    ➢ Drilled 10 exploration wells
    ➢ Currently drilling a further 3 (2010)
  - Production
    ➢ Drilled 1 production well
    ➢ Currently planning phase of 2 further production wells (2010)
    ➢ Gas production anticipated at the end of 2011
    ➢ Annual Revenue [Redacted]
There is a perception that Solid Energy is ‘sitting-on’ resources …

"Need to provide Solid Energy Development with a budget to commercialise known resource more aggressively and extend mining interests where others are not interested to monetise in-situ resource”

McDouall Stuart “Stepping up”

Nothing could be further from the truth …
Solid Energy is well positioned to maximise the value from coal resources for NZ... however ... New Zealand is not set up with the appropriate structures to maximise value from other natural resource opportunities.
The Goal for New Zealand

- To **stimulate development** from natural resources AND capture **maximum value and wealth for New Zealanders**

- NZ needs to achieve the following objectives:
  - $2B of exploration and development capital from 2011 to 2015
  - Access to and management control over world class technology
  - NZ based world class knowledge and experience
  - NZ specific major project development experience and relationships (Stakeholders, Iwi, Environmental, Regulators etc.)

- Various options could be proposed

The **only option** that can achieve these objectives and deliver the national goal is a NZ owned/controlled entity to lead this development
- National Resource Limited (NRL)
Oil and Gas

- Stimulate and control development – maximize value for NZ

• Current Status
  - Production dominated by 5 - 10 companies – majority offshore owned (Shell, Origin, OMV, Mitsui, AWE)
  - Further 5 - 10 medium to large explorers - majority offshore owned.
  - Significant unallocated prospective petroleum acreage (East Coast, Northland, Southern Basin)

• What NRL needs?
  - Compulsory allocation of new prospective acreage
  - Automatic allocation of existing permits not in compliance with agreed work programmes
  - Roll-up of existing SOE petroleum permits into 1 portfolio
    ➢ GEL – 31% Kupe, 55.1% Cardiff, 100% Matataoa
    ➢ MRP - 50% Taranaki, 50% Southland

• What would NRL do?
  - Undertake extensive E&P programme
    ➢ $500M - $1B (3 – 5 years)
    ➢ 10 – 20 Onshore wells, 5 – 10 Offshore wells
    ➢ Exploration resource pooling in frontier basins
  - Resource with world class staff and technology providers
  - Bring production of 50,000bbl/d to market

• Funding
  - ~$100Mpa free cashflow from Kupe
  - Other available free cash flows
  - Consider farm-in or low % external equity following exploration success
Iron Sands

Path to world scale resource development

Current Status
- 40,000+km² of prospective iron sands resources currently permitted by 6 offshore companies (FMG – 14,000km², Seafield – 10,000km², Trans-Tasman – 8,500km², SinoSteel – 4,800km², Sericho – 3,200km², Iron Sands off-shore Mining – 2,300km²)
- All resources held under prospecting permits expiring between Mar 2010 and Dec 2011

What NRL needs?
- Automatic allocation of existing permits not in compliance with agreed work programmes
- Allocation of current prospecting permits at termination (most 2010 and 2011) – directly or through onerous exploration permit conditions

What NRL would do?
- Undertake extensive exploration programme
  - $500M (3 – 5 years)
  - Resource with world class staff and technology providers
  - Prove resource and complete commercialisation plan
  - Prove value-add opportunities for Iron and steel production utilising leading edge technologies (e.g. UCG) – stage gate development
  - Commence global scale iron sands development – 12Mtpa

Funding
- Initial exploration – From available free cash flow
- Consider farm-in or low % external equity following exploration success
Steel Production

- Become the world leader in new ultra low cost steel production

- Opportunity
  - Add significant value to NZ resources by applying leading technologies to produce ultra low cost Steel from in [Redacted] [Redacted]

- What NRL needs?
  - Iron sand resource allocation per previous slice

- What NRL would do?
  - Undertake detailed feasibility programme to confirm technical and commercial viability
  - Feasibility programme $200M (3 – 5 years)
  - Seek market/funding partners from SE extensive Steel Customer network
  - Develop and commission project through stage gate development - similar to lignite conversion process

- Funding
  - Initial feasibility – Available free cash flow
  - Consider market partner/equity following confirmation of project viability
Methane Hydrates

- Develop as the world leader in the next great energy source

• Current Status
  - Large methane hydrate deposits
  - 20+ tcf recoverable (150 years of resource)
  - Prospective Methane Hydrate acreage currently unallocated

• What NRL needs?
  - Compulsory allocation of new prospective acreage

• What NRL would do?
  - Undertake extensive exploration programme
    - $10 - $50M (3 – 5 years) exploration programme
    - Engage leading technology providers and suppliers (GNS/Schlumberger)
    - Establish global leadership position in methane hydrate development
    - Produce up to 300PJpa of gas
    - Position to leverage skills offshore

• Funding
  - Initial exploration - SE free cash flow
  - Consider farm-in or low % external equity following exploration success
Silicon Metals

- Produce the world's purest silicon metal

- Current Status
  - Very high quality quartz deposits in Southland
  - 2 large permit holders
  - Synergies with lignite development

- What NRL needs?
  - Compulsory allocation of new prospective acreage
  - Automatic allocation of existing permits not in compliance with agreed work programmes

- What NRL would do?
  - Undertake exploration programme
    - $500M (3 – 5 years)
    - Prove resource and complete commercialisation plan
    - Commission silicon metals plant – 100+ktpa
    - Establish synergies with existing projects

- Funding
  - Initial exploration - Available free cash flow
  - Consider farm-in or low % external equity following exploration success
Other Minerals

- Unlock NZ mineral potential

- Current Status
  - Very small contributor nationally
  - Known existence of copper, nickel, ilmenite, rare earth minerals, bentonite etc
  - Resource largely under explored
  - Large permits held by off-shore companies

- What NRL need?
  - Compulsory allocation of new prospective acreage
  - Automatic allocation of existing permits not in compliance with agreed work programmes

- What NRL would do?
  - Undertake extensive exploration programme
    - $50M (3 – 5 years)
    - Identify key resource targets and optimal locations
    - Utilise world class technology providers and suppliers
    - Undertake extraction of high value minerals
    - Optimise exploration programme across all minerals

- Funding
  - Initial exploration - Available free cash flow
  - Consider farm-in or low % external equity following exploration success
Resource development profile
- Export equivalent revenue $15B - $30B per year

NZ Natural Resources Limited

Revenue NZ$M


Capital Expenditure
Revenue @ US$150 Oil 2015
Revenue @ US$300 Oil 2015
Related Industry

- Opportunities Today

- Global Research Centres
  - Establishment of global research centers will support our global aspirations in a range of technologies - Gasification, underground gasification, Methane Hydrates
  - This will be done in association with technology leaders (e.g. Sasol, Ergo, Shell etc)
  - A necessary step in providing support to NZ and international industry
  - Provides key partners with a solution to managing resource drain from less desirable locations (for example South Africa, Russia)
  - Attracts highly skilled, highly paid workforce from offshore and creates excellent employment opportunities for NZ resource
  - Generates significant direct and indirect economic returns for NZ

- Global leadership in niche skills development
  - Create global centers of excellence in niche areas will be done in association with key University and tertiary training organisations
  - Is critical to manage resource constraints by creating supply of highly skilled resource to support ongoing development (directly or through the research centers)
  - Arrests the ‘Brain Drain’ to Australia and abroad by creating opportunities for education and highly paid employment
Opportunities for NZ from this picture

- Intergenerational step change for the future

- Environment
  - Wealth available for environmental funds extending NZ conservation values – e.g. enhancement of bio-diversity, protection of native animals, flora and fauna, extension of conservation land and facilities etc.

- Living standards for future NZers
  - Wealth
    - Social welfare
    - Education
    - Health
    - Retirement funding

- Opportunities for future NZers
  - Employment – highly skilled/highly paid

- Smoothest transition to 'post fossil fuel' world
  - Create a leadership position in transition technology
Solid Energy provides the foundation for NZ National Resources Limited

<table>
<thead>
<tr>
<th>Development Component</th>
<th>SE capability</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exploration cashflow</td>
<td>✓</td>
<td>• Solid Energy free cashflow - $40Mpa (2009)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Already investing $30 – 50Mpa in exploration and development projects</td>
</tr>
<tr>
<td>Development Capital</td>
<td>✓</td>
<td>• Proven ability to access capital (e.g. Cargill).</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Already strong interest from offshore capital markets – turning down</td>
</tr>
<tr>
<td></td>
<td></td>
<td>capital and partnership offers weekly.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Issue is not in raising the capital, but in structuring this to</td>
</tr>
<tr>
<td></td>
<td></td>
<td>maximise/retain value for NZ</td>
</tr>
<tr>
<td>Technology</td>
<td>✓</td>
<td>• Strong track record in accessing/securing world class technology.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ergo (UCG), GTLE (spite), Shell, Siemens, Uhde, Sasol (lignite</td>
</tr>
<tr>
<td></td>
<td></td>
<td>gasification). Experience with commericalising new and developing</td>
</tr>
<tr>
<td></td>
<td></td>
<td>technologies.</td>
</tr>
<tr>
<td>Knowledge/Expertise -</td>
<td>✓</td>
<td>• Successfully recruited world class in-house process engineering</td>
</tr>
<tr>
<td>People</td>
<td></td>
<td>capability (senior ex-Sasol engineers), working/partnering with</td>
</tr>
<tr>
<td></td>
<td></td>
<td>global leaders in resource development expertise Schlumberger,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Worley Parsons, Shell</td>
</tr>
<tr>
<td>New Zealand development</td>
<td></td>
<td>• Long history (100 years) of successful NZ extractive resource</td>
</tr>
<tr>
<td>experience</td>
<td></td>
<td>development expertise working with regulators, stakeholders, Iwi,</td>
</tr>
<tr>
<td></td>
<td></td>
<td>landowners etc.</td>
</tr>
<tr>
<td>NZ owned/controlled entity</td>
<td>✓</td>
<td>• SE fully NZ owned</td>
</tr>
<tr>
<td>to lead</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Solid Energy is already well advanced in delivering the key development components (above) for coal based New Energy opportunities ...
NZ National Resources Limited

Solid Energy (Coal)
- $1B pa revenue
- 120PJ
- 1,500 staff

Lignite Conversion (Urea, Diesel)
- $5B pa revenue
- 200PJ
- 1,500 jobs

Uground Coal Gasification
- $1B pa revenue
- 100PJ
- 300 jobs

Oil and Gas (incl CSG)
- $5Bpa revenue
- 50bbl/d
- 100 jobs

Iron Sands
- $1B pa revenue
- 15mtpa
- 5000 jobs

Methane Hydrates
- $10B pa revenue
- 300PJ

Silicon Metals
- $100m pa revenue
- 100ktpa
- 100 jobs

Other Minerals
- $?B pa revenue
- ?Tpa
- ? jobs

Up to $20B pa revenue in 10 years

Supported By
- Global Research Centers
- Centers of Excellence (University)
- Proving Funding to
  - Environment fund
  - Regional Development funds
  - Social Services (Healthcare, Education)
There are risks...

<table>
<thead>
<tr>
<th>Risk/Threat</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accusations of using political ideology to control market or favour particular party;</td>
<td>Global drivers have changed and strong leadership is required</td>
</tr>
<tr>
<td>Political interference will not allow NRL to make economic decisions</td>
<td>Govt has operated as SOE model for 20 years without limited intervention Partial privatisation options</td>
</tr>
<tr>
<td>Existing resource owners may promote SOE as Bureaucratic and poor allocators of capital</td>
<td>SE has a track record of building a business that was ready for liquidation into a $2.5b business in 10 years</td>
</tr>
<tr>
<td>Corporate Governance</td>
<td></td>
</tr>
<tr>
<td>Funding strategy</td>
<td>The NZ government has the assets to seed this opportunity therefore can be undertaken with little capital in the first few years</td>
</tr>
<tr>
<td>Conflict of Interest and balance of control</td>
<td></td>
</tr>
</tbody>
</table>

... but the prize more than justifies taking them!
Is this out of step with the world?

- No! it is more consistent
- Global trend to more countries looking to nationalise natural resources after a period of privatisation in the 90's
  - Petroleum industry too important to economy
  - Nations looking to extract higher rent for their natural endowment
- National Oil Companies (NOC's) now control 78% of worldwide oil and gas (Kretschmar, 2009)

<table>
<thead>
<tr>
<th>Enterprise Name</th>
<th>State Ownership</th>
<th>Country</th>
<th>Oil &amp; Gas Reserves (Bboe)</th>
<th>Liquids (1000 bpd)</th>
<th>Gas (MMcf/day)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saudi Aramco</td>
<td>100%</td>
<td>Saudi Arabia</td>
<td>300.9</td>
<td>9,045</td>
<td>6,900</td>
</tr>
<tr>
<td>Pemex</td>
<td>100%</td>
<td>Mexico</td>
<td>18.7</td>
<td>3,723</td>
<td>3,244</td>
</tr>
<tr>
<td>Petrobras</td>
<td>51%</td>
<td>Brazil</td>
<td>11.1</td>
<td>1701</td>
<td>2010</td>
</tr>
<tr>
<td>Petronas</td>
<td>100%</td>
<td>Malaysia</td>
<td>24.9</td>
<td>731</td>
<td>4,172</td>
</tr>
<tr>
<td>Pertamina</td>
<td>90%</td>
<td>Indonesia</td>
<td>21.0</td>
<td>1139</td>
<td>2562</td>
</tr>
<tr>
<td>Petroecuador</td>
<td>66%</td>
<td>Ecuador</td>
<td>4.6</td>
<td>204</td>
<td>10</td>
</tr>
<tr>
<td>Statoil</td>
<td>82%</td>
<td>Norway</td>
<td>4.3</td>
<td>740</td>
<td>1921</td>
</tr>
<tr>
<td>CNOOC</td>
<td>71%</td>
<td>China</td>
<td>2.2</td>
<td>306</td>
<td>291</td>
</tr>
<tr>
<td>PTT</td>
<td>100%</td>
<td>Thailand</td>
<td>1.0</td>
<td>19</td>
<td>555</td>
</tr>
</tbody>
</table>

- International Oil Companies (IOC's) have underperformed the NOC's due to falling access reserves
- Petronas and Vale examples
# Milestones

- To achieve maximum success

<table>
<thead>
<tr>
<th>Action</th>
<th>By</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Decision in principle subject to business case</td>
<td>Mar 2010</td>
</tr>
<tr>
<td>2. Business case approval decision to proceed</td>
<td>Jun 2010</td>
</tr>
<tr>
<td>3. Set up Natural Resources Limited</td>
<td>Dec 2010</td>
</tr>
<tr>
<td>- Allocate permits</td>
<td></td>
</tr>
<tr>
<td>4. Exploration</td>
<td>2011/12</td>
</tr>
<tr>
<td>5. New equity/funding for commercial development</td>
<td>2012/13</td>
</tr>
<tr>
<td>6. First new revenue</td>
<td>2014</td>
</tr>
<tr>
<td>7. Revenue $15 to $30B</td>
<td>2020 onwards</td>
</tr>
</tbody>
</table>