Al Lajjun Oil Shale Project – Jordan

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30th Oil Shale Symposium
Golden, Colorado
18-20 October 2010
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1. Background
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   • Project Summary

2. Project Description
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Background
Why Jordan?

- Abundant oil shale resources
- Development of Oil Shale in Jordan in line with Energy Strategy
- Good and supportive business environment
- Active companies in Jordan oil shale – Shell, Total, Petrobras, Enefit, Saudi’s, BP (gas) Exxon Mobil in 2010

<table>
<thead>
<tr>
<th></th>
<th>Demonstrated Resources B bbls (source USGS)</th>
<th>Proven Reserves B bbls</th>
</tr>
</thead>
<tbody>
<tr>
<td>USA</td>
<td>1539</td>
<td>560</td>
</tr>
<tr>
<td>Russia</td>
<td>147</td>
<td>2</td>
</tr>
<tr>
<td>Australia</td>
<td>145</td>
<td>12</td>
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<td><strong>Jordan</strong></td>
<td><strong>102</strong></td>
<td><strong>28</strong></td>
</tr>
<tr>
<td>Brazil</td>
<td>80</td>
<td>11</td>
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</tbody>
</table>
Project Summary

• Surface mining and retorting of oil shale in Jordan
• Desert location
• ATP Retorts providing initial production 15,800 bbl/d
• 40 year concession agreement with Government
• Exclusive use in Jordan of proven ATP technology with process guarantees
• EPC with performance guarantees provide comfort for scale up
• 2 train production for flexible operation
• Gas import for desulphurisation
• Water abstracted from brackish aquifer for dust suppression
• SCO or refined product exported via tanker to port at Aqaba
• Inert spent shale for backfilling or sale to cement factory
• Commercial grade sulphur
• Spill power 35MW exported to national grid
2

Project Description

ATP Plant China - Fushun
Project Description
Proven Process Technology

- Proven ATP Retorting Process – Exclusivity to JEML on Al Lajjun
- Engineered and constructed by Thyssen Krupp Group (Germany)
- Waste gases used to power Turbines producing 90 MW of power
- Comparable CO$_2$ emissions with conventional oil sources
- Minimal Water requirements

By products:
- Sulphur – 120,000 ton/yr.
- Spent shale – cement industries
- Power - for national grid (to 35 MW)
Project Description
Schematic of Products

Power generation
Off gas

ATP Processor

Oil shale feed from mine

Spent shale

Cement

SCO
- Naphtha
- Kerosene
- Diesel
- Gas Oil
- Sulphur

Hydrotreater

Light oil

Transport

Refining

Fertiliser
Project Description
Al Lajjun Plant site – visualisation

Desert location: low environmental risk
Project Status
Project Status
Progress to date

• November 2006  MOU for Al Lajjun resource signed with MEMR / NRA
• May 2007      Pre-Feasibility Study completed
• November 2007 Environment / Social Public Hearing
• June 08       Successful fund raising
                6000m exploration drilling / 50,000t trial mining
• 2008 / 2009   3 Pilot plant runs in Calgary
                Bankable Feasibility Study (BFS) – accepted by NRA
                EIA completed – accepted by Ministry
• 2010         Update of BFS, expanded EIA, finalise
                Concession Agreement, further fund raising
Project Status
Successful Pilot Plant test runs 2006, 2008 and 2009

• 4 successful pilot plant runs in 2006, 2008 and 2009
• Independently witnessed and reported
• Oil shale handles well in retort – over 100% of energy and oil products in rock captured and utilised
• No external power or heat resources required
• Overall energy recovery = ~120% Fischer assay
• Range of Refinery ready products produced plus gases for power generation
Pilot Plant Oil Upgrading
• Engaged 2 well known Licensors
• To ensure reliability and minimise project risk with respect to producing stable and marketable oil products

Licensor Conclusions:
• Pilot plant test program successfully demonstrated that shale oil can be hydro-processed to finished Euro grade distillates
• Scheme uses commercially proven Isocracking and Isotreating technology
• Project economics could be improved further if JEML were to develop the project based on a nominal capacity of 30,000 barrels per day rather than 15,000 barrels per day

The upgrading process is ready for commercialization
Project Status
Project Schedule

<table>
<thead>
<tr>
<th>2008</th>
<th>2009</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tbody>
<tr>
<td>Phase I</td>
<td></td>
<td>Feasibility, Concession Agreement &amp; Project Financing</td>
<td></td>
<td>FEED</td>
<td></td>
<td></td>
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<tr>
<td>Phase II</td>
<td></td>
<td>EPC</td>
<td></td>
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<tr>
<td>Phase III</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td>Start-up and operation</td>
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</tbody>
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FEED = Front End Engineering and Design
EPC = Engineering Procurement and Construction

Overall lifetime of the mine / proven reserves:
30 years @ 15,000 bpd increasing to 30,000 bpd then to 60,000 bpd by 2024
Project Structure

EPC Contract Packages

Geology, Resources & Mining
Crushing, Materials Handling
Retort Process
Oil Upgrading, Utilities
Power Plant, Power & Gas Hook Ups
Civil Works & Construction
General Infra. Workshops, Housing etc.

Consortium

EPC Contract
4

Investment Considerations

$25
International finding and development cost per barrel of conventional oil

$1
JEML finding and development cost per barrel of shale oil

$70–80
International required oil price per barrel for new conventional oil projects

$50–60
JEML required oil price per barrel for Al Lajjun project

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### Production – 2 x ATP trains (1000 tph oil shale)

<table>
<thead>
<tr>
<th>Description</th>
<th>Value</th>
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</thead>
<tbody>
<tr>
<td>Oil Produced (~18,000 bpsd)</td>
<td>5.7 M bbl/yr</td>
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<tr>
<td>Useable Secondary Energy Produced / exported</td>
<td>90 MW / 35 MW</td>
</tr>
<tr>
<td>Oil Shale Consumed – Total</td>
<td>7.6 M Tons/yr</td>
</tr>
<tr>
<td>Construction period</td>
<td>3-4 years</td>
</tr>
<tr>
<td>Total Revenue ($75/bbl oil – flat no escalation)</td>
<td>$514 M/yr</td>
</tr>
<tr>
<td>Operating Costs</td>
<td>$128M/yr</td>
</tr>
<tr>
<td>Unit Operating costs – steady state</td>
<td>$23/bbl</td>
</tr>
<tr>
<td>Full Costs – breakeven oil price</td>
<td>$38/bbl</td>
</tr>
</tbody>
</table>
Investment Considerations

Summary

• Stable country – all insurance markets open for cover
• Strong government support evidenced in the Concession Agreement
• Experienced management team
• Compliant with environment requirements of lending institutions
• Scale up of proven technology with process guarantees
• Turnkey construction contract
• Low risk of environmental catastrophe
• Optionality for export of SCO or finished product
• Strong project economics giving attractive returns in a growth sector
• Upside potential on existing resource
• Replica projects achievable in other locations with oil shale
Al Lajjun Oil Shale Project – Jordan
Investor Presentation
Jordan Energy and Mining Limited

Thank you