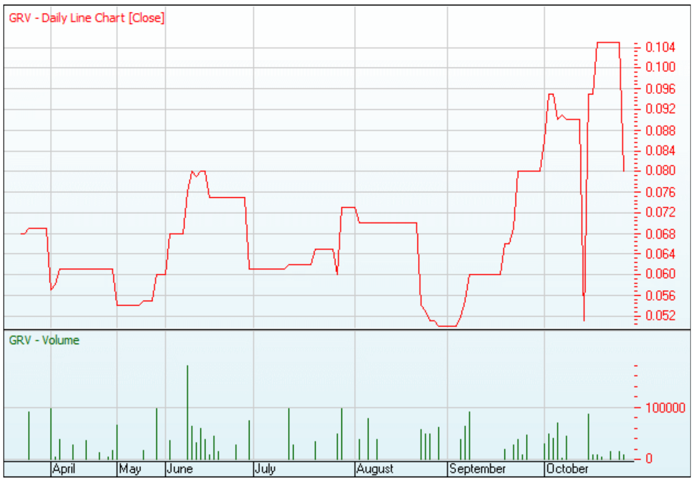
GREENVALE MINING NL

A$0.08

Initiation of coverage

27 October 2014



Recommendation	**BUY**
Sector:	Oil shale
Exchange & Ticker:	ASX: GRV
Shares in issue:	93.3m
Fully diluted equity:	137.9m
Market cap:	A$7.5m
Target price:	**A$0.30**

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Greenvale Mining NL (Greenvale) is an ASX-listed mineral exploration company with a specific focus on oil shale development opportunities in the State of Queensland, Australia. With the company planning to list on AIM in Q4 2014, investors are provided with an opportunity to gain early stage exposure to a highly prospective play at a very attractive initial valuation.

- Oil shale is a fine grained sedimentary rock that is rich in the solid organic compound, kerogen. Upon the application of heat, pyrolysis takes place and the kerogen is released as liquid and gases. The liquid kerogen oil is readily refined into transport fuels.
- Greenvale has major interests in three large oil shale deposits over four tenements in the State of Queensland, Australia. These are primarily Nagoorin and Lowmead in which Greenvale is partnered by private company, Queensland Energy Resources (QER), owned by private company Ziff Brothers International. Greenvale also has a 100% interest in the Alpha deposit, a smaller but extremely rich oil shale deposit.
- Queensland represents a particularly exciting opportunity for Greenvale given that a 20-year moratorium, imposed in 2008 on oil shale development in the State, was relaxed in February 2013. The relaxation of the moratorium has created a strongly validated route-map for commercialisation of the Queensland assets. Given that Greenvale was involved in the sector prior to the relaxation of the ban on oil shale development, the company has positioned itself as a pioneer with first mover advantage in the sector.
- With improved technology now close to commercialisation, the inherent value in oil shale including low cost entry, low reserve booking costs, relative lack of reservoir risk and easily definable economics, makes it increasingly attractive to large integrated oil companies. Consequently, we see strong commercial logic behind Greenvale's strategy to develop its core assets to a sufficient level in order to attract the attention of the oil majors.

Compared to a global peer group which includes AIM-quoted Tomco Energy, and contemplating only the Measured Resource of the Nagoorin asset at this stage, we believe that Greenvale could be worth up to A$42.0m prior to listing on AIM. This is equivalent to A$0.30 per share on a heavily discounted and fully diluted basis. This represents a significant premium to the current share price. The issuance of new equity upon a London listing will dilute Greenvale's headline valuation. However, we believe that this will be more than offset by the next-stage growth potential enabled by a relatively modest injection of fresh capital.

Contents

Executive summary

Greenvale Mining NL is an ASX-listed mineral exploration company focusing on oil shale development opportunities in Australia. The company's core assets are its interests in three highly promising tenements located within the State of Queensland. The company is seeking a dual listing on AIM in Q4 2014.

Oil shale is a fine grained sedimentary rock that is rich in the solid organic compound, kerogen, from which liquid hydrocarbons and combustible gases can be harvested following the application of heat. The combustible gases are typically used to power the processing plant and the condensed liquids readily refine into high value transport fuels; primarily low sulphur diesel.

Oil shale should not be confused with 'shale oil' which relates to conventional hydrocarbons trapped in impermeable geological formations and recovered by drilling and fracture stimulation methods.

Oil shale exploitation has been practised for centuries and large scale operations have been ongoing in Estonia and China for many years where it is used for simultaneous power generation and hydrocarbon production. Oil shale is also exploited in Brazil solely for hydrocarbon production.

Oil shale is widely distributed around the world with over 600 known deposits and estimates of up to one trillion barrels that may be commercially exploitable. The largest deposit in the world is the Green River Formation in Colorado and Wyoming. However, there are other very large oil shale accumulations in China, Russia, Estonia, Brazil, Australia and Jordan. In all of these locations, oil shale is either being commercially exploited or major investment to reach this stage is underway.

Greenvale has interests in three large oil shale deposits in Queensland, Australia. These are 'Nagoorin' (GRV: 66.67%) and 'Lowmead' (GRV: 50%) in which Greenvale is partnered with Queensland Energy Resources Limited (QER), a private company owned by Ziff Brothers International, and 'Alpha' with early monetisation potential, in which Greenvale has a 100% interest.

Queensland is particularly exciting for Greenvale given that a 20-year moratorium on oil shale development in the State, imposed in 2008, was lifted well ahead of schedule in February 2013 and has led to an acceleration of activity.

The moratorium was imposed due to valid environmental concerns around the processing technologies available at the time. However, the lifting of the moratorium well before term is a testament to the advances made by technology such as QER's Paraho II™ process which has demonstrated full environmental compliance on its $100m pilot plant and has already produced high quality fuels from oil shale successfully. Other progressive technologies have also emerged including Red Leaf Resources' EcoShale® technology, which has achieved similar levels of fully acceptable environmental performance in Utah in the US.

There is a wide range of existing processes for extracting hydrocarbons from oil shale available to Greenvale with several having recently benefitted from significant upgrading and improvement. At this stage it is Greenvale's strategy is to remain 'technology agnostic' in order to maximise future value.

We expect that improved technologies will allow smaller companies to demonstrate the commerciality of oil shale to the satisfaction of the reserve classification agencies. This could enable a change in the classification of resources under JORC and Society of Petroleum Engineers (SPE) from a Contingent Resource to a Proved Reserve, adding hugely significant value to the sector.

With greatly improved technologies now near commercialisation, the inherent value in oil shale including low cost entry, low reserve booking costs, relative lack of reservoir risk and easily definable economics makes it increasingly attractive to large integrated oil companies. Consequently, it is Greenvale's strategy to develop its core assets to a level sufficient to attract the attention of the global oil majors.

Acquiring a benchmark valuation for Greenvale at this stage is speculative given that most of its peers are privately owned. However, we have identified a select global peer group which includes AIM quoted Tomco Energy and we believe that Greenvale's assets could be worth up to A$42.0m, equivalent to $0.30 per share on a heavily discounted and fully diluted basis ahead of a listing on AIM. This valuation is based on the Measured Resource of the Nagoorin asset only and represents a significant uplift on the group's current market valuation.

Introduction to oil shale

Historically, oil shale has been known colloquially as 'the rock that burns' and has been mined in the same manner as coal. Oil shale is a fine-grained sedimentary rock that is rich in the solid organic compound, kerogen, from which liquid hydrocarbons such as diesel fuel can be produced by refining the liquid kerogen. Kerogen is produced by pyrolysis (application of heat) of the rock and the trapping of the associated gases and liquids.

It is very important to note that 'oil shale' should not be confused with 'shale oil' which relates to conventional hydrocarbons trapped in impermeable or 'tight' geological formations and released by drilling and fracture stimulation methods.

Oil shale and oil shale combusting

Source: University of Southampton

Commercialising oil shale

On a geological scale, oil shale deposits are less mature than conventional hydrocarbon deposits. As such, the extraction method for oil shale requires additional temperature as part of the liquids extraction process in order to release the hydrocarbons from the kerogen.

This implies that the cost of oil shale extraction can be comparatively higher than conventional hydrocarbon production. However, the costs of development for deep-water oil and other unconventional oils such as tar sands are currently very high and with projected operating costs of $35-$50 per barrel for oil shale production, large scale exploitation looks to be a relatively attractive proposition.

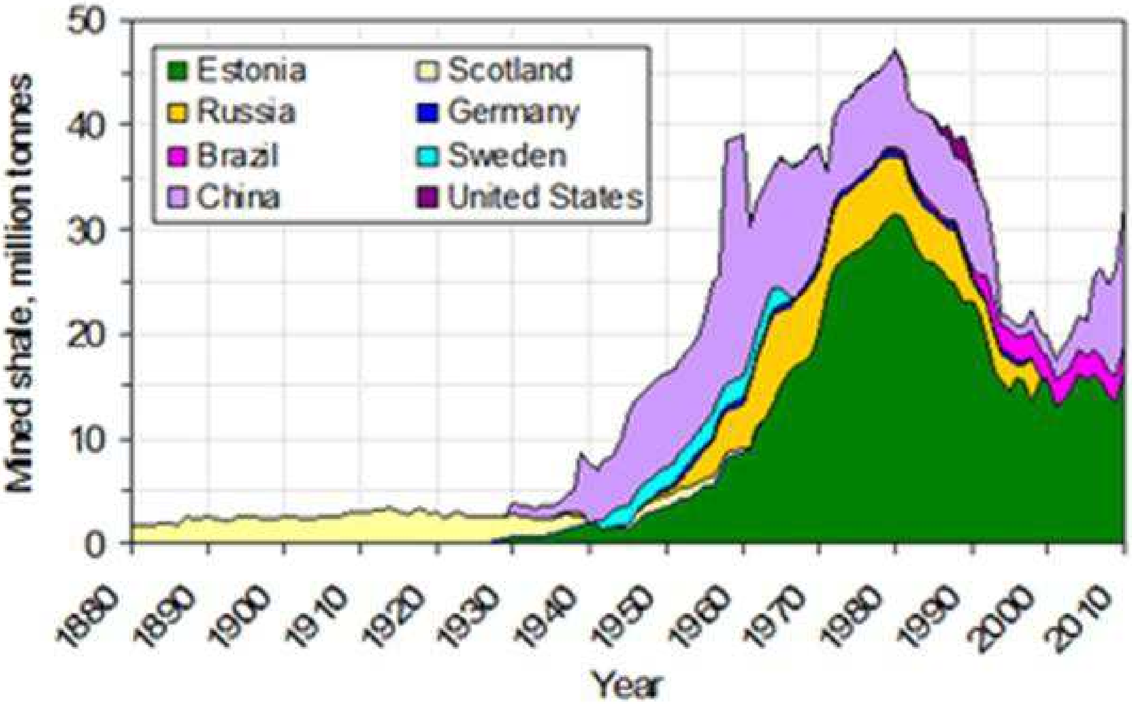
The analysis of oil shale industry costs has been difficult historically due to the difficulties in assessing the dynamics of projects owned by state entities in China, Estonia and Brazil. However, the recent intensive investment in the latest generation of processing technologies strongly suggests that the operating costs will be in the range of $35-$50 per barrel which, as stated previously, is comparable with conventional oil once the cost of exploration for conventional oil is stripped out. Furthermore, the economics for oil shale are more favourable as there is inherently less "reservoir risk" as the composition of the whole body of ore is well understood before exploitation.

To determine commerciality and to select the most attractive projects, a combination of mining based analysis and conventional oil company analysis must be used in the assessment process. In mining terms, the size of the resource, depth, overburden and the ability to mine must be assessed alongside the yield profile of the shale. This information must then be considered alongside technical and commercial risk, assessment of the market for product, taxation and overall project operability.

History of oil shale production

Although oil shale exploitation has practised for centuries, it is understood that modern oil shale mining began around 1837 at the Autun mines in Eastern France. Subsequent production in the 1800s also commenced in Germany and Scotland and the chart below depicts clearly that output from Scotland was the benchmark until the 1930s.

Global production of oil shale (millions of tonnes)



Source: Pierre Allix, Alan K. Burnham

Post WWII expansion

The oil shale industry began to expand in earnest after the First World War as a result of the mass production of automobiles and apparent shortages of petrol and diesel for transportation. Of particular interest was the establishment of the first power plant to be fired by oil shale in Tallinn in Estonia in 1924. Following this landmark, Estonia went on to become the world's largest oil shale producer by some distance, accounting for some 70% of the world's processed oil shale by 2007.

Other major players in the sector include China, Russia and more recently Brazil. However, interest has increased in other regions including the USA, Jordan, Morocco and Australia where a number of potential projects are being piloted or tested.

Activity in the sector waned significantly in the 1980s and 1990s following a series of oil price shocks on the downside. The slump in sector activity coincided with historically low oil prices at the end of the 1990s. However, following the sustained recovery in global oil prices from the mid-2000s and the relative stability of prices in recent years, the sector has rallied substantially and a significant number of projects are in various stage of development globally.

Geographical location of oil shale

There are estimated to be over 600 known oil shale deposits across 27 countries. The largest ones are outlined in the table below and constitute those estimated to be in excess of 1.0 billion metric tonnes. For the purposes of consistency and comparison throughout this note, we have chosen to depict these in-place resource estimates in barrels as outlined in our table.

There are several countries conspicuously absent from this list primarily as a result of difficulty of verification of accurate or reliable resource estimates. These include China with estimated resources in place of some 354 billion barrels.

According to the 2010 World Economic Outlook published by the International Energy Agency, there is an estimated 5 trillion barrels of oil in place in oil shale deposits of which up to 1 trillion may be technically and commercially accessible. This is a very important figure as the world's proven conventional oil reserves are estimated to be only slightly larger at some 1.3 trillion barrels.

Allocation of the world's major shale oil deposits

Deposit	Country	Period	Oil shale in place (bn bbls)
Green River Formation	USA	Paleogene	1,466
Phosphoria Formation	USA	Permian	250
Eastern Devonian	USA	Devonian	189
Heath Formation	USA	Early Carboniferous	180
Olenyok Formation	Russia	Cambrian	168
Congo	DRC	N/A	100
Irati Formation	Brazil	Permian	80-82
Sicily	Italy	N/A	63
Tarfaya	Morocco	Cretaceous	42-53
Volga Basin	Russia	N/A	31
Leningard deposit	Russia	Ordovician	25
Queensland	Australia	Eocene/Oligocene	24
Vychegodsk	Russia	Jurassic	20
Wadi Maghar	Jordan	Cretaceous	34
Graptolitic argillite	Estonia	Ordovician	12-16
Timahdit	Morocco	Cretaceous	11
Collingwood Shale	Canada	Ordovician	12-15
Italy	Italy	Triassic	10

Source: John R. Dyni (2006). Geology and resources of some world oil-shale deposits. Scientific Investigations Report 2005–5294 (PDF). US Department of the Interior. US Geological Survey.

Oil shale formation in Queensland

As is confirmed by the previous table, the range of global oil shale deposits were formed in different geological eras and a combination of processes will have likely been in play. The largest known deposit, the Green River Formation in the US, was formed as the result of a large inland lake and the formation of the Queensland oil shale deposits share distinct similarities which we can examine in greater detail.

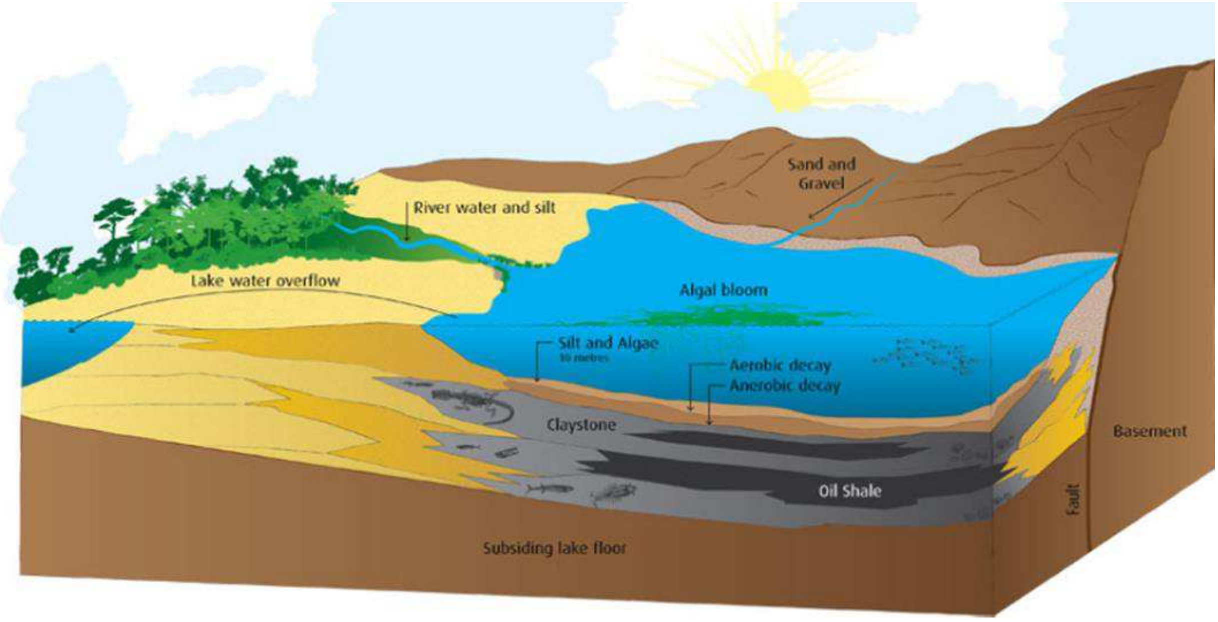
Similarities with the Green River Formation

Approximately 40 million years ago, the central Queensland region witnessed the formation of a series of large elongated, fault-bounded lake basins. This coincided with a time when sea levels were some 150 metres lower than the present day. Coupled with this, the region was more elevated and approximately 200km south west of the coastline as it was at the time.

The diagram below depicts a typical lake basin from the time described. Over millions of years, the lake's water level rose and fell due to a combination of the basin floor sinking and changes in climate. Variations in water depth and chemistry over time resulted in periodic algal blooms along with a variety of plants and aquatic animals of the time. As such, dead algae fell to the lake floor with the accumulated silt and mud.

When the rate of sediment and organic matter accumulation periodically exceeded basin floor subsidence and filled the lake, the water level would become considerably shallower and even dry out. However, renewed subsidence would allow the lake to subsequently reform. This cycle of filling and subsidence resulted in the accumulation and preservation of the thick sequence of algae-rich lake sediments we now call oil shale.

Queensland oil shale formation illustration



Source: Queensland Energy Resources

Location of the Queensland Basin

This process as described above took place at a location west of Gladstone on the south Queensland coast. Approximately 500 metres of oil shale has accumulated in the lake basin known as the Narrows Graben over a 10 million year period during the late Eocene to early Oligocene periods between 40 million and 30 million years ago. As indicated previously, this a considerably shorter period than required for the accumulation of conventional hydrocarbons, which typically form after at least 65 million years.

The oil shale deposit in Queensland has formed as a sequence of layers. There are estimated to be approximately 100 climatically controlled layers with thicknesses ranging from one to seven metres thick. However, three metres thick is considered the average in the region. It is estimated that each layer took about 75,000 years to accumulate on the lake floor. The map below outlines the extent of the Queensland Basin and a number of important oil shale accumulations.

Extent of the Queensland Basin in Australia (in grey)

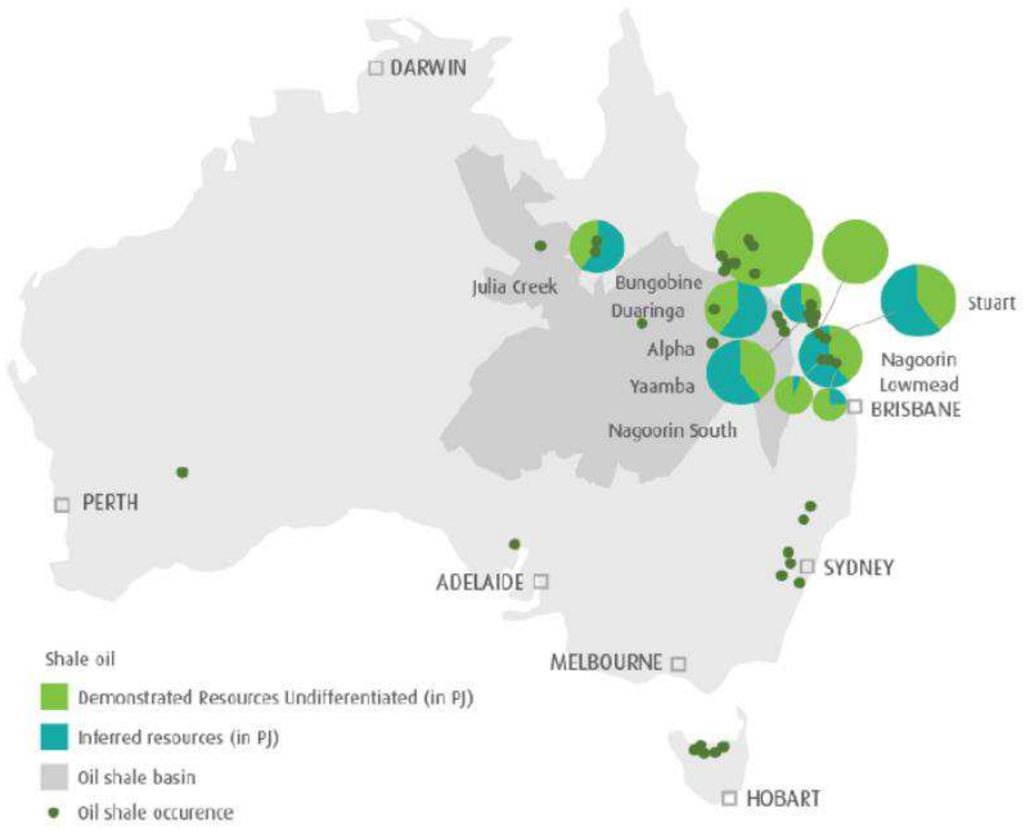


Figure 1: Distribution of Australian indicated shale oil resources (200PJ = 34Mbbl oil)
Source: Australian Government Geoscience Australia

Source: Greenvale

The value of oil shale to Greenvale

Technologies to exploit oil shale deposits have been in existence and commercial operation for many decades. However, Greenvale believes that investment in more modern processes has revived the oil shale sector and confirmed that this unconventional resource could be very valuable.

Advantages of oil shale as a resource

The early stages of oil shale development are appealing to hydrocarbon development companies given that large 'strategic' deposits of the type outlined in the earlier sections of this report are comparatively easy to prove up and cost effective when compared to conventional oil and gas deposits.

As with many unconventional shale oil and gas deposits, reservoir risk is negligible as the reservoir also represents the trap and migration of the resource over time is impossible

Once oil shale can be extracted on a commercial scale, the raw material can be readily refined into high value transport fuels such as diesel and jet fuels, which are both internationally tradable commodities.

Attractive to larger players

With reserve replacement increasingly a major issue for the major oil companies, Greenvale believes that oil shale is highly appealing to larger integrated oil companies. For example, oil shale currently has a low entry cost and crucially very low reserve booking cost which is of great interest to 'Big Oil' seeking reserves to replace production.

Additionally, oil shale has easily definable economics from the development of ore bodies as opposed to significant reservoir risk that exists with conventional hydrocarbon development, particularly in the offshore sector where unit development costs are higher.

Australia poised for growth

As outlined earlier, Australia has a long history of oil shale exploitation from the early 1900s when there were over twelve torbanite (a form of oil shale) mines operational in the Sydney area of New South Wales alone. Oil shale was processed into paraffin replacing the refining of whale oil for years until local ore bodies were mined out.

Focus on Queensland

Australia makes strategic sense for Greenvale for several reasons. Primarily, Australia is one of the most mature mining provinces in the world with strong levels of government support for major projects. The country has a highly developed infrastructure and engineering and support services at hand across the country.

In addition, Australia has large high yielding deposits in situ and a huge ongoing demand for transport fuels. In the event that domestic demand can be satisfied by oil shale projects and similar coal to liquids projects also planned in the country, Australia is ideally placed to supply the rapidly expanding Chinese and South East Asian markets for diesel fuel.

Relaxing the moratorium

The system of politics and the process of gaining development approvals in Australia are clearly defined. Historically, the major impediment to creating value has been the moratorium. However, with this having now been relaxed, development can continue on an accelerated trajectory.

The moratorium on oil shale developments was relaxed in February 2013 after being in place for nearly five years of a proposed 20 years period, expected to last until August 2028. The original moratorium was put in place after Southern Pacific Petroleum's (SPP) development was closed down in 2008 by the State Government following poor environmental performance. This led to the financial collapse of Southern Pacific and the subsequent state-wide moratorium.

Greenvale's partner, QER which is 100% owned by Ziff Brothers Investments, subsequently purchased the assets of SPP and dispensed with the technology which had caused the moratorium to be put in place, whilst simultaneously developing the technology behind the Paraho II™ retort with Shale Technologies LLC (as outlined later in this report). As part of this venture, QER built a $100m demonstration plant that has already successfully produced high quality fuels with a fully compliant independently verified environmental impact.

The lifting of the moratorium well before term is a testament to the strides made by processes such as Paraho II™ which has demonstrated full environmental compliance on its pilot plant. Other progressive technologies have also progressed, including Red Leaf Resources' EcoShale® technology, which has achieved similar levels of fully acceptable environmental performance in Utah.

In conclusion, we believe that the recent developments in technology over the last five years have made great strides to improve the environmental performance and cost efficiency of hydrocarbon extraction from oil shale.

Extraction technologies available to Greenvale

In straightforward terms, there are two main methods of extracting Kerogen from oil shale: ex situ or in situ. Both methods use the application of heat to create pyrolysis in the shale, which leads to the release of the hydrocarbons.

The ex-situ processes are more prevalent and have been operating commercially for many years. The central feature of an ex-situ process is a horizontal or vertical retort (combustion chamber) in which the pyrolysis takes place. The shale is mined and transported, usually by conveyor, to the ex situ plant. The vast majority of ex-situ based operations mine the shale using opencast surface mining techniques.

Leading ex situ technologies

The Kiviter process

This technology has been used in Estonia since 1921 and the first commercial scale plant was built in 1924. The technology was also used in Russia between 1955 and 2003 at the Slantsy oil shale processing plant near Leningrad.

In Estonia, the Viru Keemia Group continues to use the Kivter process and owns a number of Kiviter retorts. The largest plant owned by Viru Keemia has a processing capacity of 40 tonnes per hour of oil shale feedstock

Enefit – the Galoter process

The Galoter process is an above-ground oil-shale retorting technology using a near-horizontal cylindrical rotating kiln-type retort, which is slightly declined.

Two Galoter process plants have been operational in Estonia since 1980 and are used for oil production by Narva Oil Plant, a subsidiary of Eesti Energia. Both plants are estimated to process approximately 125 tonnes of oil shale per hour.

Of particular interest is the Enefit process, which is a modification of the Galoter process being developed by Enefit Outotec Technology, a joint venture between the Estonian company, Enefit and Finnish entity, Outotec, established in 2009.

In the Enefit process, Galoter technology is combined with already proven circulating fluidised bed (CFB) combustion technology used in coal-fired power plants. Oil shale particles and hot oil shale ash are mixed in a rotary drum as in the classical Galoter process. However, the primary modification is the replacing of the Galoter semi-coke furnace with a CFB furnace.

The Enefit process converts waste heat to steam for power generation and compared to the traditional Galoter process, Enefit allows complete combustion of carbonaceous residue. This implies improved energy efficiency, maximum utilisation of waste heat and lower water consumption for cooling.

The Enefit process is also claimed to have a lower retorting time compare to the classical Galoter process and therefore the potential for greater throughput of raw material.

Application of the Enefit process in Jordan

The Saudi Arabian International Corporation for Oil Shale Investment (INCOSIN) has major plans to utilise the Enefit/Galoter process to build a 30,000 barrels per day oil shale processing plant in Jordan. INCOSIN has signed a MOU with the Jordanian government to evaluate the El Lajjun and Attarat Umm Ghudran deposits.

The concession was approved in March 2013 and although the project is still in the testing phase, the current plan that is estimated to cost over $2.0 billion, is scheduled to commence production in 2019. If the project reaches its expected capacity, production of 30,000 bopd would be reached in 2025 and the project would also generate 600MW of electricity for the Jordanian national grid.

Jordan’s government has also signed a deal directly with Enefit to endorse a $2.4 billion oil shale project which is planned to generate 470MW of electricity over 26 years, representing the largest oil shale venture in the world to date.

Jordan is a particularly prospective region for the development of oil shale given that it is estimated to have 40-80 billion tonnes of shale resources and crucially, strong government support for major projects as outlined.

Petrosix

The Petrosix process is an above ground application that has been tailored to the Permian aged Irati oil shale formation in Brazil. Petrosix is owned and operated by Brazilian state oil company, Petrobras and is the largest surface oil shale pyrolysis retort in the world with an 11-metre shaft diameter.

Petrosix uses externally generated hot gas for the oil shale pyrolysis. The mined oil shale is crushed to particles between 12mm and 75mm which are transported on a belt to a vertical cylindrical vessel and heated up to c.500°C. Hot gases are injected into the middle of the retort and the oil shale is heated by the gases as it moves down the retort. Consequently, the kerogen in the shale decomposes to yield oil vapour and additional gas.

Cold gas is injected into the bottom of the retort to cool and recover heat from the spent shale and cooled spent shale is discharged through a water seal with conveyor belt below the retort.

Practical application in Brazil

The Petrosix process has huge capacity and one 11-metre diameter retort has a capacity of 6,200 tonnes of oil shale per day. This is sufficient to produce up to 3,870 barrels of oil per day (bopd), equivalent to one tonne of oil per 11 tonnes of shale. The Petrosix process was piloted in 1982 and the 11 metre retort was brought into production in 1992.

Fushun

The Fushun process is only used in China, having been developed in Fushun in northeast China in the 1920s. However, the process only started production in 1992. The Fushun process is an internal combustion technology which includes external gas heating. It uses a vertical cylindrical shaft retort lined with fire bricks. The retort is over 10 metres in height and has a diameter of approximately three metres.

Crushed oil shale particles of 10mm - 75mm are fed from the top of the retort and dried by ascending hot gases. This causes the decomposition of the rock. Pyrolysis takes place at about 500°C and the produced oil vapour and gases exit from the top of the retort. The vapour and gases move from the bottom to the top directly, not diagonally as in the Kiviter process.

During pyrolysis, oil shale is decomposed to char, which together with the ascending air-steam is burnt in the lower part of the retort to heat gases necessary for pyrolysis. These gases are re-heated and recirculated after leaving the retort before being reintroduced into the retort. The shale ash exits from a rotating water dish that acts as a seal and cooler at the bottom of the retort.

The Paraho process

The Paraho process can be operated in two different heating modes; direct and indirect. The Paraho process is classified as an internal combustion method. The retort employs a vertical shaft retort similar to the Kiviter and Fushun retorts. However, the Paraho retort's raw oil shale feeding mechanism, gas distributor, and discharge grate have different designs.

In the Paraho process, the crushed raw oil shale is fed into the top of the retort through a rotating distributor and descends the retort as a moving bed. The oil shale is heated by rising combustion gases from the lower part of the retort and the Kerogen in the shale decomposes at about 500°C to oil vapour, shale oil gas and spent shale. Heat for pyrolysis comes from the combustion of char in the spent shale.

The combustion takes place where air is injected at two levels in the middle of the retort below the pyrolysis section raising the temperature of the shale and the gas to 700°C. Collecting tubes at the top of the retort carry shale oil mist and combustion gases into the product separation unit.

Cooled shale ash exits the retort through the discharge grate in the bottom of the retort and is disposed of. The liquid oil is separated from produced water and may be further refined into high quality products. The mixture of evolved gases and combustion gases can be used as a low quality fuel gas for drying or power generation.

Advantages over existing processes

The core advantage of the Paraho process is its process and design. It has low construction costs and few moving parts which imply lower operating costs when compared to more sophisticated technologies. Critically, the Paraho retort consumes no water making it a compelling solution in arid regions such as Queensland.

Paraho II – QER Demonstration Plant

Shale Technologies LLC in the US owns and operates a Paraho process plant in Colorado where the technology was originally developed. However, of even greater interest to Greenvale is Queensland Energy Resources (QER) Paraho II™ $100m demonstration plant in Queensland, which can process average raw, crushed oil shale of approximately 10mm.

The plant has successfully extracted oil from the kerogen in the shale and recycled waste heat and gas in the retorting process. Treatment facilities have been able to extract the ammonia and sulphur from the produced oil and waste water has been returned to the mine area for rehabilitation.

Shale Technologies' Colorado plant

Source: Shale Technologies LLC

In situ solutions

With in situ methods, the kerogen is converted to a liquid form while it is still in the form of an oil shale deposit. This arguably requires a higher level of engineering and understanding of the subsurface deposit. However, there are now in situ extraction techniques that are in the testing and pilot production phase.

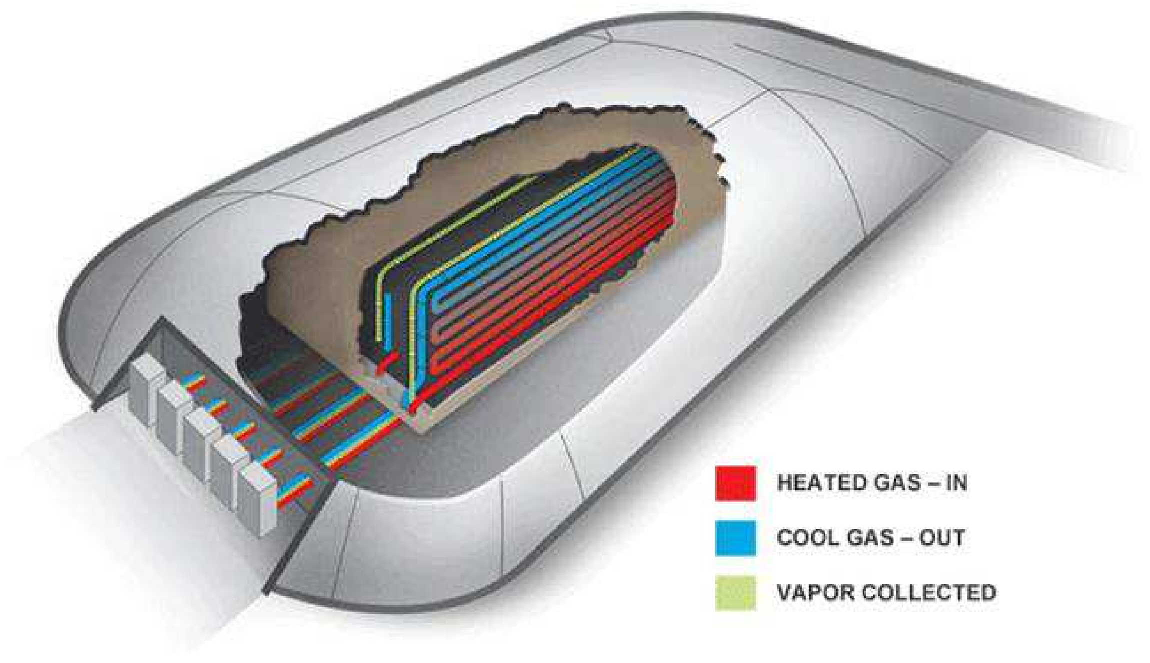
The Red Leaf Resources EcoShale® process

US company Red Leaf Resources Inc. (Red Leaf) has developed the EcoShale® In-Capsule process in order to economically produce oil shale based fuels from oil shale. Although the EcoShale® process technically extracts liquids in situ, the raw feedstock still has to be mined from a separate location, so it is arguable that the EcoShale® process is a type of hybrid technology.

In broad terms, EcoShale® involves surface mining oil shale and placing it in clay-lined excavated pits or 'capsules'. The shale is subsequently covered with layers of impermeable clay and soil and then heated with natural gas burners via expendable steel pipes within the shale to the point at which pyrolysis occurs and oil, condensate and natural gas are captured.

Collection pipes are located at the top and bottom of the capsule to recover wet gas and oil respectively. Upon depletion, the pipes in the capsule are sealed to prevent water contamination and the capsule is either stacked with another capsule on top, or it is covered with top soil and seeded with vegetation. A schematic of a notional capsule is outlined below.

Diagram of the Red Leaf EcoShale© process



Source: Red Leaf Resources Inc.

Development by Tomco Energy

Red Leaf tested the technology at its Seep Ridge site in 2008/09 and concluded that it could be commercial and now plans a 9,800 bopd commercial operation at the same site. AIM quoted Tomco Energy has indicated that it will attempt to bring its Holliday Block within the Green River Formation in Utah into production following this, subject to funding.

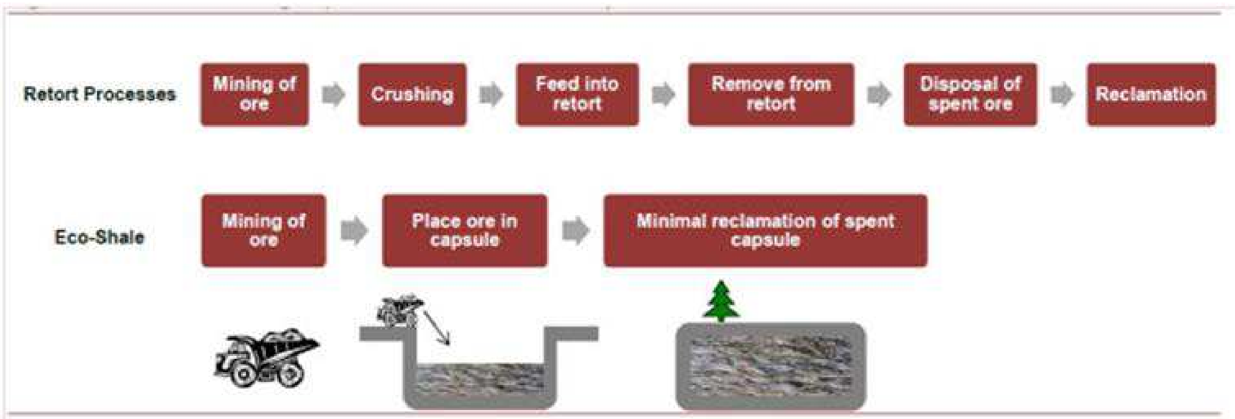
Red Leaf licenses its EcoShale® technology to third parties and Tomco has identified the EcoShale® technology as a potential solution to the commercialisation of its key asset and as such have entered into a Licensing Agreement with Red Leaf.

Pros and cons

As the diagram depicts, there appear to be fewer processes involved in the EcoShale® process which may have cost advantages. In addition, the EcoShale® process uses very little water and the water that it does use is primarily for dust remediation and saturating the bentonite amended soil lining for the capsule. Of distinct environmental advantage is that reclamation of the capsule site can begin as soon as the capsule is heated.

Nevertheless, the EcoShale® still requires the establishment of a mine with the associated mining related environmental challenges. In contrast, the Shell ICP system does not need a mine but has its own challenges (see next section). Although there is no subsequent waste ore products generated from the process, Tomco has identified that the key design challenge is extracting the oil and gas from the capsule in order to maximise the efficiency and subsequent commercial viability of the technology.

Comparison between EcoShale® and standard retort processes



Source: Tomco Energy

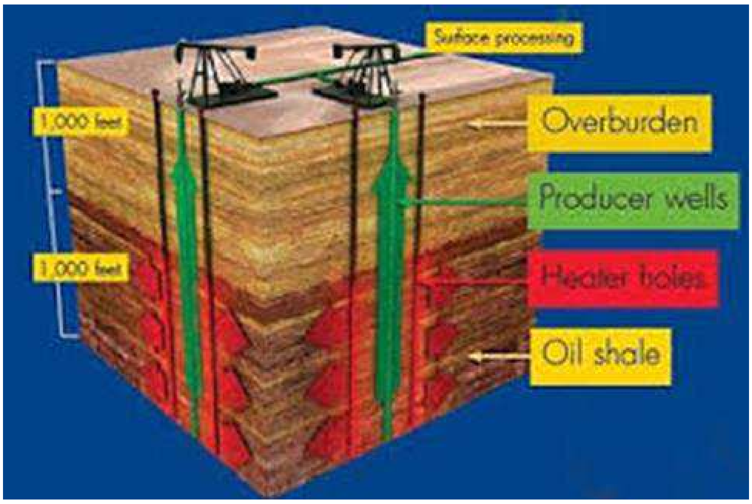
Shell ICP

The Shell in situ conversion process (ICP) was developed by Shell in the early 1980s. The process involves the heating of sections of an oil shale body in situ and releasing the hydrocarbons and associated gas from the rock so that it can be pumped to the surface and refined into fuel.

When the process is commenced, a freeze wall is constructed to isolate the processing area from surrounding groundwater. To maximize the efficacy of the freeze walls, targeted working zones are developed in succession and 2,000 feet deep wells eight feet apart are drilled and filled with a circulating super-chilled liquid to cool the ground to −50°C. Water is then removed from the working zone.

When this is completed, heating and oil recovery wells are drilled at 40 feet intervals within the working zone and electrical heating elements are lowered into the heating wells. These are then used to heat the oil shale to 340°C - 370°C over a period of approximately four years. The kerogen in the oil shale is slowly converted into shale oil and gas which are then flowed to the surface through the recovery wells and collected.

Diagram of the isolated production area in the Shell ICP process



Source: Shell Oil

Evaluation of the Shell ICP process

A small scale 30 by 40 feet test site in Colorado was piloted in 2004 and to date 1,700 bopd have been recovered by this process. As indicated by this early data, this does not appear to be a rapid process so it is likely that it would only be commercially viable on a very large scale.

A RAND study in 2005 estimated that substantial production of 100,000 bopd would require a dedicated power supply of 1.2 gigawatts assuming an oil shale content of 25 gallons per tonne at 100% extraction of oil shale products. This would require five million tonnes of coal to feed the power station annually. In response, Shell has argued that over the project life cycle, it would produce at least three units of energy for every one consumed.

This is a potentially acceptable return on what would need to be a large investment as scale is clearly paramount if this technology were to be commercialised. However, other concerns include the likely size of the surface footprint of such a project which is estimated to be one square kilometre for every 50,000 bopd of production. Extensive use of groundwater in the process is also a major environmental concern, particularly in regions with scarce water resources.

Environmental issues associated with oil shale

Active Chinese and Estonian plants may have been demonstrated as commercial but in common with many industrial processes in emerging countries, these processes have been designed to meet local standards but not acceptable environmental or industrial practise in OECD countries such as Australia and the US. In general this is the result of a large carbon footprint, potentially toxic emissions and high water usage.

One of the major impediments to new processes and the adoption of extractive technologies is government support or the lack thereof on the basis of these environmental concerns. This has been a core issue in Australia until recently. However, this appears to have been resolved successfully as new technologies demonstrate cleaner, more efficient processes particularly in Queensland which is our immediate region of interest.

Below, we have outlined several of the key environmental concerns that are required for the industry to contend with if oil shale production is to be adopted as a standard method of hydrocarbon production on a global scale and in particular, those countries in the OECD.

Mining and extraction

Oil shale extraction involves several different environmental impacts that vary with process technologies. Depending on the geological conditions and mining techniques, the impact of mining may include:

- acid drainage induced by the sudden rapid exposure and subsequent oxidation of formerly buried materials
- the introduction of metals into surface water and groundwater
- increased erosion
- sulphur gas emissions
- Air pollution caused by the production of particulates during processing, transport and support activities

Surface activities for both ex situ and in situ processing require extensive land use and ex situ thermal processing generates significant volumes of waste that require disposal. In particular, spent oil shale waste and its treatment require land to be withdrawn from alternative uses. Nevertheless, it is important to note that operations would not have been permitted to commence in the first place had these issues not been resolved beforehand.

Waste materials may contain pollutants including sulphates, heavy metals and other potentially toxic and carcinogenic materials. In situ conversion processes may reduce some of these impacts but the impact on groundwater from such processes is yet to be fully assessed.

QER satisfies environmental concerns

Greenvale's joint venture partner, QER, has been granted both mining and petroleum Environmental Authorities by the Queensland Department of Environment and Heritage Protection for its 100% owned Stuart oil shale deposit located 50km from Nagoorin. This illustrates that these stringent conditions covering emissions from the mining operation and processing plant and conditions which ensure the protection of other aspects of the local environment: for example, surface water, groundwater, noise amenity and land can be successfully complied with.

Emissions

The processing of oil shale must achieve environmental performances of the standard of Paraho II™ and Ecoshale® and be acceptable to OECD standards, whereby the only emissions are the carbon dioxide based carbon foot print greenhouse gas emissions. However, carbon capture technology is developing rapidly and several carbon capture and storage technologies may reduce the processes' carbon footprint.

Water usage

There are significant concerns over the oil shale sector’s use of use of water, particularly in arid regions where water consumption must be limited. On average, ex situ retorting can consume between one and five barrels of water per barrel of produced shale oil, depending on the technology implemented.

In 2008 the US Bureau of Land Management stated that surface mining and retort operations produce 2 to 10 US gallons of waste water per 1 short ton (0.91 metric tonne) of processed oil shale. Water is usually used for spent oil shale cooling and oil shale ash disposal. As such, it is likely that in situ processing may use as little as 10% of the water in ex situ processes. In some regions, water must be pumped out of oil shale mines and the resultant fall in the water table may have consequences for neighbouring vegetation and economic activities.

It should be noted that the Paraho II™ and EcoShale® technologies differ entirely from the existing ex-situ technologies in the water usage context as they are both water generative (water positive) during the respective processing phases.

Greenvale's core assets

History of asset acquisition

Greenvale's core assets are its interests in three tenements located within the huge Queensland Basin. Two of these tenements; known as Nagoorin and Lowmead were acquired from Southern Pacific Petroleum NL in 2003 in partnership with Esperance Minerals Ltd (ESM) and Greenvale's current joint venture partner, QER. The Alpha project was subsequently acquired in partnership with ESM although Greenvale acquired ESM's interests in all three assets in 2012.

Greenvale's asset base summary

Deposit	Tenements	GRV interest	Partner
Nagoorin	EMP 7721 & MDL 234	66.67%	Queensland Energy Resources (QER) (33.33%)
Lowmead	MDL 188	50%	Queensland Energy Resources (QER) (50%)
Alpha	MDL 330	99.95%*	-

Source: Greenvale. *The remaining 0.05% interest in Alpha is held by Alpha Healthcare Pty, a subsidiary of Ramsey Healthcare Limited. Greenvale is in negotiations to acquire the remaining interest.

Of Greenvale's three assets, the more advanced assets, Nagoorin and Lowmead are located in the east of the Queensland Basin and Alpha is located more centrally in the Basin.

Location of Greenvale's assets in Queensland

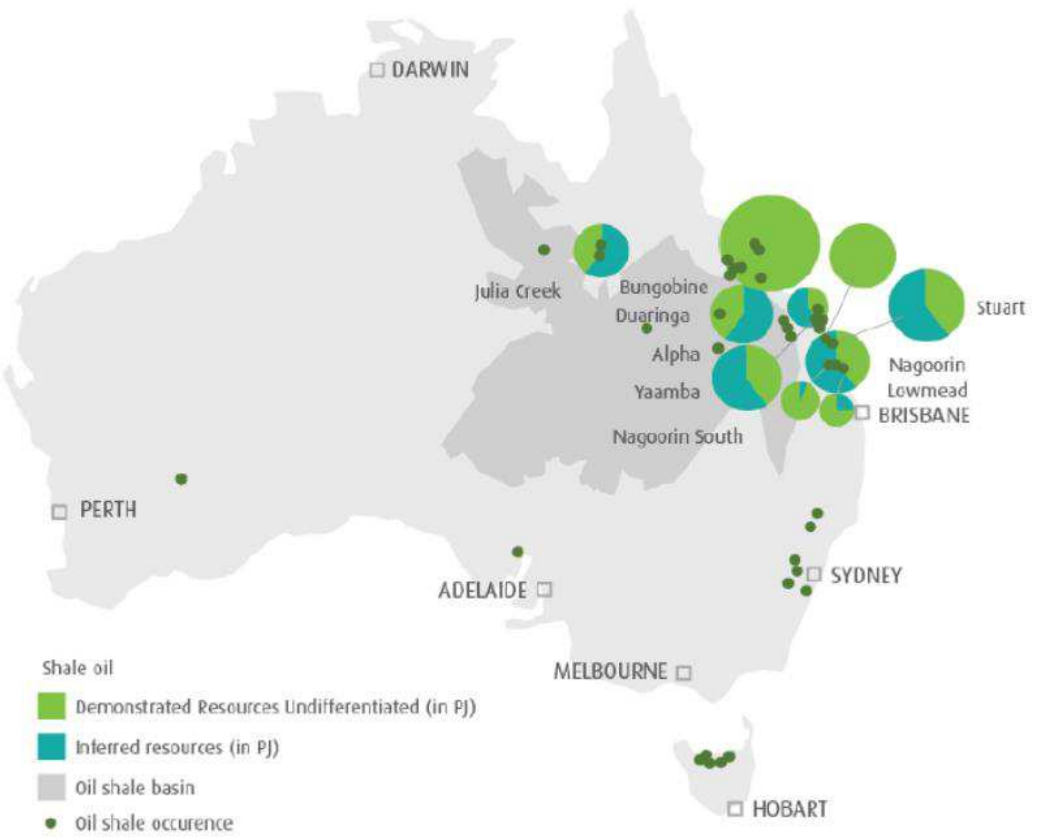


Figure 1: Distribution of Australian indicated shale oil resources (200PJ = 34Mbbl oil)
Source: Australian Government Geoscience Australia

Source: Greenvale

Current status of the assets

As stated previously, Greenvale is continuing to identify and assess the appropriate technologies in order to maximise the potential of each of its assets and is progressing this in the context of the practises and preferences of its peer group.

Nagoorin

The core assets, Nagoorin and Lowmead are currently on care and maintenance. The Nagoorin EPM (Exploration Permit for Minerals) 7721 tenement which also encompasses MDL (Mineral Development Licence) 234 is current until 21 March 2015. The company has stated that it will review the value of retaining sub-blocks of EPM 7721 outside the MDL 234 boundary in the near future.

The MDL 234 tenement was granted in October 2012 for a five year period commencing from November 2012. The tenement contains the Nagoorin resource with its boundaries. Under the terms of the Queensland Government policy on oil shale development, the development of an oil shale deposit by a “proposed oil shale technology unproven in Queensland will be assessed through a trial phase to ascertain whether the technology is meeting with environmental standards.” The government went on to quote that “if this trial is successful, a staged approach towards commercialisation will be adopted.”

Lowmead

Although Lowmead MDL 188 is current to 30 September 2011 and has technically expired, a renewal request was lodged with the Queensland Government Department of Mines for an additional five year term on 22 March 2011. As this application is still with the Department, the MDL remains in force until the application is finalised.

Recent work conducted

After a two year hiatus as a result of access problems due to wet weather and administrative issues, Greenvale recently commenced groundwater surveys at both Nagoorin and Lowmead. A total of eight bores at Lowmead and 20 at Nagoorin were surveyed in May and June 2014.

Drill site inspection was also undertaken to monitor site rehabilitation and the ongoing care and maintenance programme is required to ensure that the bore hole sites and access points remain in good condition.

Alpha

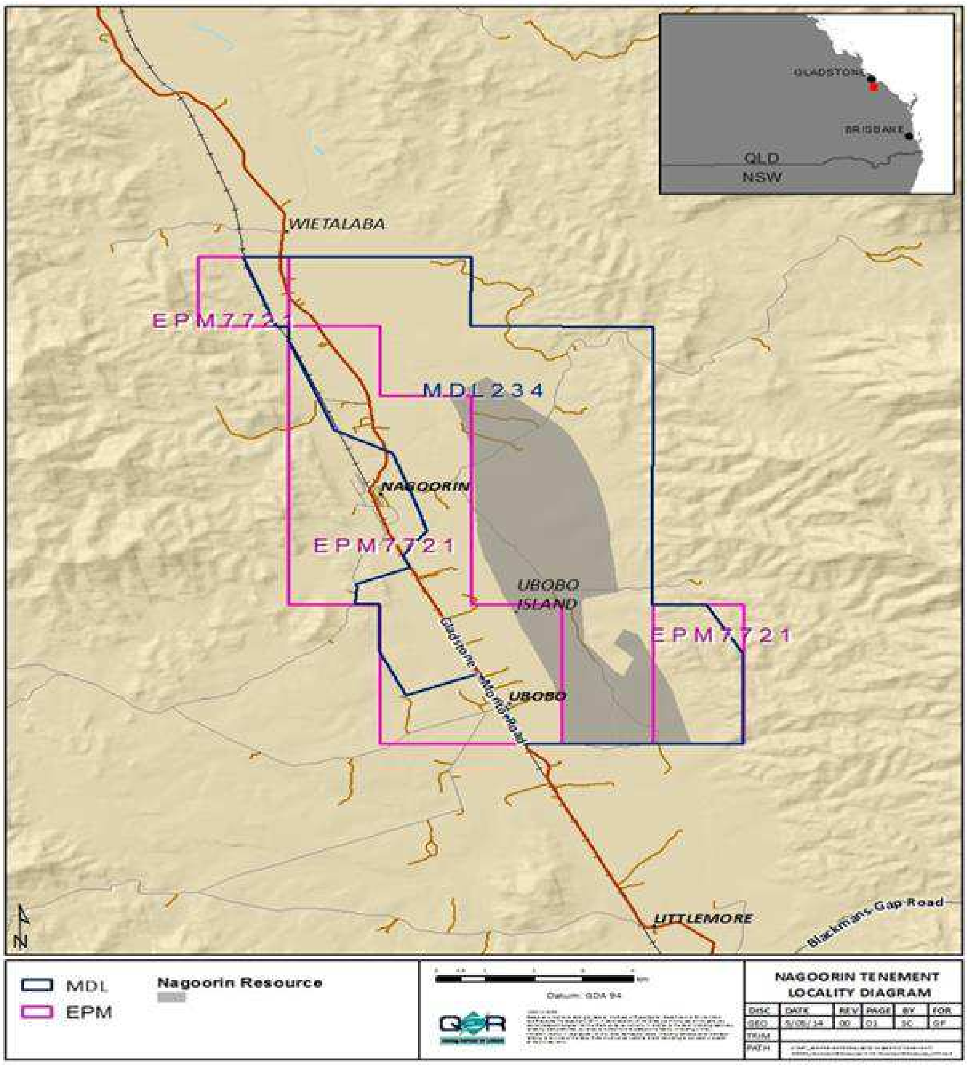
Alpha is a less advanced deposit compared to Nagoorin and Lowmead in some respects. Greenvale commissioned a Geological Report in respect of the Alpha deposit with a view to developing a strategy for appraisal. This has been submitted to the Department of Natural Resources and Mines and underpins the renewal application for the MDL 330 tenement currently under review by the Department.

Nagoorin

Located approximately 50km south of the town of Gladstone, the Nagoorin deposit is covered by the tenements EPM 7721 and MDL 234 covering a total of 8,427 hectares (84.3 km^2). Within the licences, the deposit covers an area of approximately 18.9 km^2 to a maximum depth of 502 metres below the surface of the ground.

The oil shale has been identified as a lamosite and lignite based shale and estimated in situ resources are estimated to be 946 mmbbls with 634 mmbbls attributable to Greenvale's 66.67% interest (outlined in the table on the following page). This resource is based on a cut-off parameter of 50 litres per tonne of oil shale on a moisture free basis (LT0M). This cut off has been applied to the oil yield from drill samples assayed by Modified Fischer Assay* in order to estimate the resource within the deposit. For the basis of Greenvale's resources assessments, one barrel of oil is equivalent to 159 litres. This implies that slightly more than three tonnes of shale will produce one barrel of oil.

Location map of the Nagoorin deposit



Source: QER

*The Fischer Assay is a standardised laboratory test for determining the oil yield from oil shale to be expected from a conventional shale oil extraction. A 100 gramme oil shale sample is crushed to less than 2.38 mm and heated in a small aluminium retort to 500°C at a rate of 12°C/min and held at that temperature for 40 minutes. The distilled vapours of oil, gas, and water are passed through a condenser and cooled with ice water into a graduated centrifuge tube. The oil yields achieved by other technologies are often reported as a percentage of the Fischer Assay oil yield.

Source: John R. Dyni (2006). Geology and resources of some world oil shale deposits. Scientific Investigations Report 2005–5294 (PDF).US Department of the Interior; US Geological Survey.

Nagoorin resource estimates

The Nagoorin resource estimate is based on the discovered Petroleum Initially in Place estimated using polygonal blocks. This is derived from the JORC 2012 guideline levels of resource categorisation: Measured, Indicated and Inferred, which quantify the range of confidence or uncertainty for the deposit.

The contingent resource estimate was generated from the data acquired from 53 cored drill holes from an aggregate 10,567 metres. The holes were drilled to a maximum depth of 687 metres but the maximum depth for the resource estimate is 502 metres.

As stated previously, the in situ grade cut off is 50 litres per tonne and a recovery factor of 95% has been applied to the estimates based on recovery data from conventional retort technologies currently operating or under development.

SPE-PRMS* Petroleum Resource Estimate for the Nagoorin deposit

Total resources (mmbbls)	Interest	1C	2C	3C
Greenvale	66.67%	221	634	1,497
QER	33.33%	104	312	737
Total	**100%**	**325**	**946**	**2,234**

Source: Greenvale, *Society of Petroleum Engineers – Petroleum Resources Management System

Contingent resource estimates

These contingent resource estimates as of 28 March 2014 represent the quantity of petroleum estimated to be recoverable from known accumulations using established technology or processes under development. The basis of this classification is that commercial recovery of oil from the Nagoorin shale has not been established yet and these resources cannot yet be classified as reserves. Other impediments and risks ensuring that the Nagoorin deposit remains classified as a resource rather than a commercial reserve include:

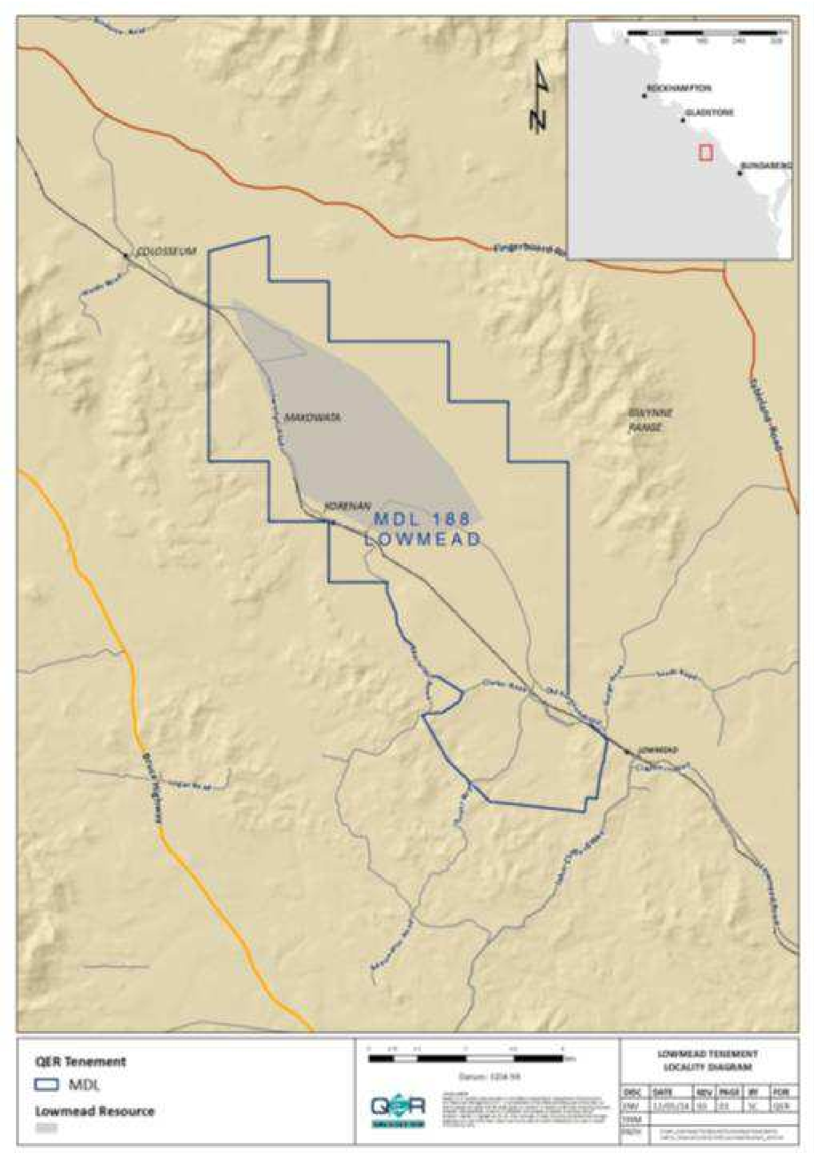
- A future development requires the application and grant of a mining lease and environment approvals from the Queensland government
- Legal, environmental and social factors have not yet been approved or established
- A commercial mine development has not been assessed in the context of forecasted economic conditions
- Commercial recovery of the deposit is dependent on the suitability for the Nagoorin shale to be processed using current retorting technology or other technology under development

Lowmead

Lowmead is covered by the MDL 188 tenement located some 75 km south east of the town of Gladstone. The licence is 9,330 hectares (93.3 km^2) in area and the resource extends over 23.4 km^2 to a maximum depth of 400 metres below the surface. Like Nagoorin, the deposit is comprised of Lamosite and Lignite shales.

The estimated in situ resource is estimated to be 201 mmbbls of which approximately 100% is attributable to Greenvale's interest. Like Nagoorin, the economic cut-off has been determined at 50 LT0M.

Location map of the Lowmead deposit



Source: QER

Lowmead resource estimates

The Lowmead resource estimate is based on the discovered Petroleum Initially in Place estimate also using polygonal blocks similar to Nagoorin. This is derived from the JORC 2012 guideline levels of resource categorisation: Measured, Indicated and Inferred which quantify the range of confidence or uncertainty for the deposit.

The resource estimate was generated from the data acquired from 23 cored drill holes from an aggregate 4,500 metres. The holes were drilled to a maximum depth of 520 metres but the maximum depth for the resource estimate is 400 metres.

As with Nagoorin, the in situ grade cut off is 50 litres per tonne and a recovery factor of 95% has been applied to the estimates based on recovery data from conventional retort technologies currently operating or under development.

SPE-PRMS Petroleum Resource Estimate for the Lowmead deposit

Total resources (mmbbls)	Interest	1C	2C	3C
Greenvale	50%	0	100	335
QER	50%	0	100	335
Total	**100%**	**0**	**200**	**670**

Source: Greenvale

It should be noted that the level of investigation at Lowmead is at the stage where the lower density of drill holes does not support the estimation of 1C contingent resources at this stage. As with Nagoorin, the contingent resources caveats outlined in the previous section also apply to the deposit at Lowmead.

Alpha

The Alpha deposit is covered by the MDL 330 tenement. This is a smaller licence area covering 1,905 hectares (19.05 km^2) and is located some 500 km west of the town of Rockhampton.

Although considerably more remote that Greenvale’s larger assets, Alpha contains a very rich shale deposit consisting of two seams: an upper seam of cannel coal (a type of oil shale derived from preserved plant remains with abundant spores and resin) and a lower composite seam of Torbanite (a variety oil shale derived almost exclusively from algal remains) enclosed in cannel coal shale. Torbanite oil shale is the highest yielding oil shale in the world.

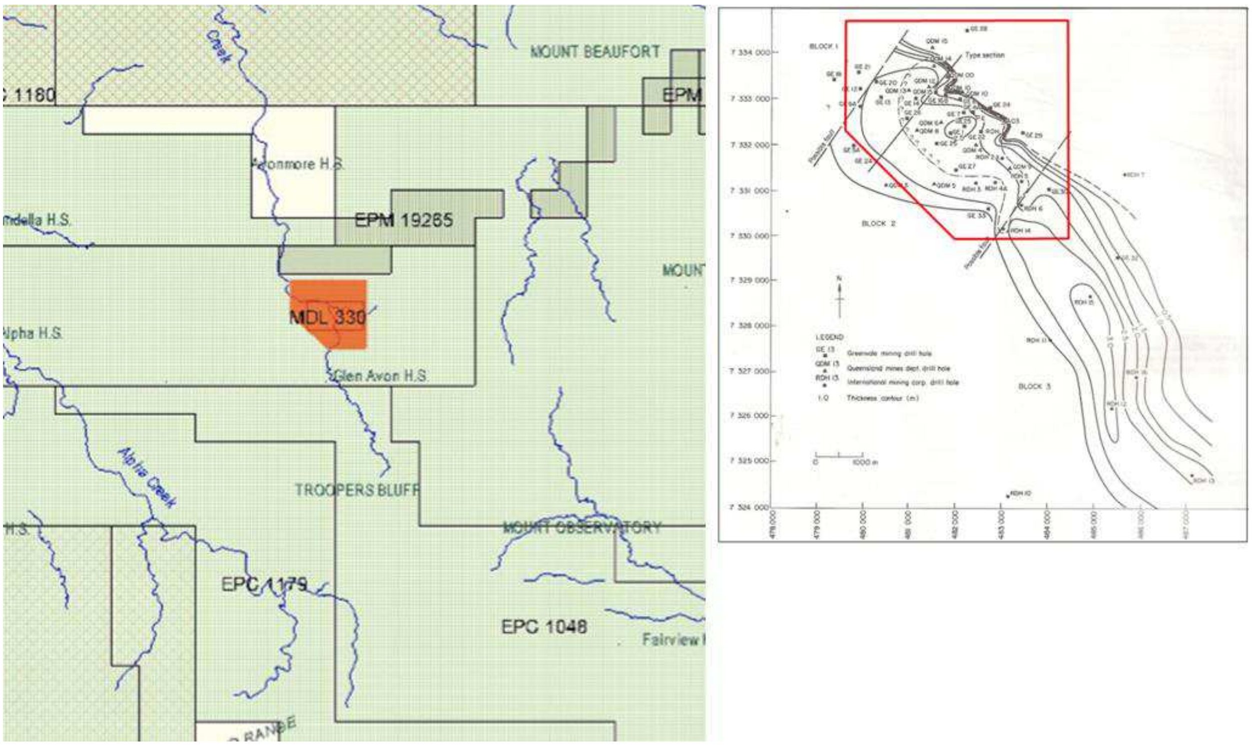
NB: Cannel coal is a type of bituminous coal which is also classified as an oil shale because of its high oil yield.

As a result of their high oil yields, Torbanite and cannel coal are potentially marketable in their raw form as a chemical reductant (replacing fuel oil) in certain industrial processes or as a source of bitumen for road construction.

Early monetisation potential

Greenvale has identified Alpha as an early cash flow opportunity and the management will examine the possibility of farming the asset out to a larger entity which can mine the resource and pay Greenvale an overriding royalty on the output for example. Given that the company's interest in Alpha is held by Greenvale's subsidiary company, Alpha Resources Pty Ltd, with this purpose in mind, this would be a relatively straightforward process.

Location map of MDL 330 and the Alpha deposit within



Source: Greenvale

Indicative valuation for Greenvale

Greenvale is listed on the ASX, although the company's market cap is very modest by dint of being comparatively inactive on both the operational and corporate fronts over the last two years. As such, the company is trading at a market valuation considerably lower than its global peers and comparators on a per barrel valuation basis.

With most of the company's direct peer group such as QER, Global Oil Shale PLC and Red Leaf privately owned, acquiring a benchmark valuation is highly indicative at this early stage. However, we have sought to provide a valuation marker through our methodology as outlined in this section of the report. Of particular note, we have utilised the considerably more conservative JORC standards for Greenvale's resources base and critically, we are basing our valuation upon only one asset at this stage being Nagoorin.

Using more conservative JORC Measured Resources for Greenvale

On the basis of the SPE estimates of Greenvale's resource base, we could use a combined 2C resource of 734 mmbbls for the company's interests in Nagoorin and Lowmead combined and apply a notional value per barrel in the ground based on the likely NPV per barrel in the ground. However, we believe that this is unfeasible at this early stage given that the parameters of a development project including start up capex, operating costs, taxation and royalties are unknown to us as is the likely technology process to be utilised, the timing of all regulatory approvals, potential equity partners and new funding initiatives.

Therefore, we have elected to use the more conservative JORC Measured Resource estimate of 262 mmbbls for the company's asset base for several reasons. Primarily, this is a more conservative assessment of the group's asset base derived from the JORC oil shale tonnage numbers for the licences. Additionally, this method excludes the Lowmead and Alpha deposits from our preliminary numbers as they are less advanced than the Nagoorin deposit and have no Measured Resources attributable. Finally and importantly, this measurement enables us to make a 'pound for pound' comparison with companies such as Tomco which has published its resource numbers on the same basis.

Deposit Resources (JORC basis)

Asset	Interest	Grade Mean	Moisture Weight	Tonnes Measured	Indicated	Inferred	Shale oil Measured	Indicated	Inferred
	%	LT0M	%	JORC	JORC	JORC	mmbbls	mmbbls	mmbbls
Nagoorin	100%	93	26%	942	1,739	2,972	391	719	1,335
GRV	67%	93	26%	631	1,165	1,991	262	482	894
Lowmead	100%	85	24%	0	497	1,227	0	212	494
GRV	50%	85	24%	0	249	614	0	106	247
Alpha	100%	155	15%	0	0	0	0	26	46

Source: Greenvale

Establishing a valuation benchmark

We have attempted to establish a discounted valuation benchmark for Greenvale using a variety of reference points.

Baker Steel takes interest in Global Oil Shale

Firstly, we note that in July 2014, London listed Baker Steel Resources Trust Limited (BSRT.L), issued 3.3 million new shares in order to secure a 5.8% interest in private company Global Oil Shale PLC (GOS) which has interests in Morocco and crucially the Julia Creek oil shale in Queensland. At the Baker Steel share price of 53p, this implied a valuation of £1.75m for the 5.8% interest and therefore a total valuation of £30.2m (c.A$54.9m) for 100% of GOS.

GOS is currently undertaking a £15m pre-IPO fundraising in which Baker Steel is subscribing for £585,000 at 70p although the final subscription price has yet to be determined. However, as this fund raising is yet to close, we will reference the deal in July as our more conservative benchmark.

At this point, it becomes a little more tenuous given that GOS only has JORC defined Indicated and Inferred Resources of 2.18 billion barrels for Julia Creek rather than a Measured Resource as Greenvale has for Nagoorin. Nevertheless, on a per barrel basis, this values GOS at A$0.025 per barrel (Indicated and Inferred). Consequently, if we apply this metric to Greenvale's Indicated and Inferred Resources of 1.8 billion barrels for its three properties (excluding Measured Resources on Nagoorin to get a direct comparison), we arrive at an indicative valuation of A$45.3m for Greenvale. If we then apply this valuation to the company's Measured Resource of 262 mmbbls, we arrive at an indicative valuation of A$0.17 per barrel which we have factored into our table.

Tomco Energy – a pound for pound comparison

Tomco is a good comparison for Greenvale at this point as, although its activities are in the US, it has a Measured Resource of 126 mmbbls and is currently quoted on AIM. Based on Tomco's current market cap which has fallen back somewhat in recent weeks on the back of a fund raising, Tomco is trading on A$0.14 per barrel.

Questerre takes an interest in Red Leaf Resources

In a similar manner to Baker Steel, TSX listed Questerre Energy Corporation invested US$40m to acquire a 6% interest in Red Leaf in 2012. This implied an impressive valuation of US$667m for 100% of Red Leaf. On the basis that Red Leaf has almost 600 mmbbls of resources it believes are recoverable using its EcoShale™ technology, this provides an indicative valuation of US$1.11 per barrel for Red Leaf. In relation to Greenvale, we have discounted this valuation by 50% to reflect the fact that Red Leaf has a significant proprietary technology asset in EcoShale™ which must be accorded due recognition.

Unconventional resources peer group

Finally, we have recognised the North American (primarily Canadian) unconventional oil peer group as outlined by Tomco and referenced by Greenvale its own literature. This group includes Blackpearl Resources, Southern Pacific Resource Corp, Connacher Oil & Gas, Sunshine Oilsands and Ivanhoe Energy which are all primarily involved in heavy oil and oil sands exploitation in North America.

Elements of the extraction technology for oil sands bear comparison with oil shale. However, several of these companies are considerably more advanced in their operations than Greenvale, Tomco and GOS and as such; we have applied a heavy discount to this group's per barrel valuation to reflect this group's progress in relation to Greenvale.

Peer group valuation benchmark for Greenvale comparison

Metric	Value/bbl Local currency	Value/bbl AUD	Discount %	Value/bbl AUD
Baker Steel/GOS	0.17	0.17	0%	0.17
Tomco Energy	0.19	0.19	0%	0.19
Questerre/Red Leaf	1.11	1.11	50%	0.51
North American unconventional peers	1.58	1.58	75%	0.39
Average				**0.32**

Source: Various

Establishing a preliminary valuation for Greenvale on ASX

Based on the current shares in issue of 93.3 million and a Measured Resource of 262 mmbbls, Greenvale is trading at A$0.028 per barrel based on a share price of A$0.08 and a market cap of A$7.5m (correct as of 27 October 2014). On a fully diluted basis based on total dilution of a further 44.6 million options and convertibles outstanding, this valuation increases to A$0.042 per barrel, still a significant discount to the peer group average.

At this stage, further assessment of an appropriate preliminary valuation for Greenvale is highly subjective and based on perceptions of comparative risk. However, in order to arrive at an indicative valuation for Greenvale whilst on the ASX, we believe it appropriate to apply further risk metrics.

Establishing an ASX valuation for Greenvale

Variable	Discount		Metric	
Benchmark valuation		**A$/bbl**	**0.32**	
GRV share price		A$	0.08	
Shares in issue		**m**	**93.3**	
Options @ A$0.10		m	29.8	
Options @ A$0.20		m	4.0	
Performance rights shares		m	8.0	
Convertible shares (estimated)		m	2.8	
Total equity		**m**	**137.9**	
Market Cap		A$m	7.5	
Measured Resource		mmbbls	262	
Market cap per barrel		A$/bbl	0.028	
Fully diluted market cap		A$m	11.0	
Total cap per barrel		A$/bbl	0.042	
				A$/bbl
Implied valuation of GRV @A$0.32/bbl		A$m	83.0	0.32
Discount for AIM listing	25%	A$m	62.3	0.24
Discount for Tech licence	25%	A$m	46.7	0.18
Discount for funding status	10%	A$m	42.0	0.16
Fully discounted valuation for Greenvale		**A$m**	**42.0**	

Source: OPL estimates, Greenvale, Various

Methodology

If we apply our benchmark valuation to Greenvale, we start with an initial value of A$83.0m for the company based on our peer group discounted average valuation. This is clearly incongruous therefore it is necessary to discount it back further to a more realistic and readily comparable level noting additional risk factors.

Primarily, Greenvale is seeking to list on the AIM in order to significantly raise its profile. Given that Greenvale is required to satisfy the AIM criteria and direct comparator Tomco is already quoted, we have applied a 25% discount to Greenvale's starting valuation reducing the indicative valuation from A$83.0m to A$62.3m.

We believe that this is harsh on the company given that Greenvale is already quoted on a comparable and recognised exchange. However, the company lacks profile in Australia despite the location of its assets and the AIM listing represents the commencement of a programme to re-establish the group's profile in London.

Secondly, Greenvale is currently "technology agnostic" and comparators such as Tomco and Red Leaf have confirmed the preferred use of the EcoShale® process to develop their assets in the Green River Formation in the US. At present, Greenvale has not developed its asset base sufficiently to assess which technology would be appropriate for its ends. As such, we are applying a further 25% discount to our valuation reducing it to A$46.7m. Again, we believe this to be conservative given that Greenvale is partnered with QER in its core asset, Nagoorin and it is likely that the partners will utilise the Paraho II™ technology as the basis of a long term project.

Finally, Greenvale's funding status is tied into its prospective listing on AIM although the company recently conducted a friends and family raising in Australia raising approximately A$0.45m to augment the A$0.4m that the company held at the end of June 2014 (although this original sum is likely to have been reduced in the intervening period). Given that Tomco has recently completed a placing to raise £1.0m, we have applied a further 10% discount to Greenvale to reflect its comparatively more modest war chest at present.

At this stage, we have arrived at a preliminary valuation of A$42.0m for the company, equivalent to A$0.30 per share on a fully diluted basis ahead of any additional dilution resulting from an AIM quotation. This represents a significant premium to the current share price.

The start of a journey

It should be noted that OPL target prices, when they are initiated, are very much the commencement of a progression as the company meets milestones within its longer term strategy. As with all of our target prices, we aim to reflect accreted value as the company meets targets and develops it programme in an upward target price trajectory.

There are also many external variables at play which influence a company's target price, primarily the actions and progress of peers in relation to technological breakthroughs, farm-ins and acquisitions in the wider sector. In addition, more subtle dynamics such as currency movements and the share price performances of peers also influence our target prices to a more limited extent.

Appendix 1

Directors Biographies

Mr Elias Khouri, Chairman

Mr Khouri has been involved in international financial equity markets since 1987 through his involvement in a wide range of companies listed on the ASX, AIM, TSX, NYSE, NASDAQ and the Frankfurt Stock Exchange.

Through Mr Khouri's extensive experience in the equity markets, he has developed expertise in corporate finance, advisory, capital raisings, joint venture and farm-in negotiations for both listed and unlisted companies.

Mr Khouri has provided advisory services to a number of companies across a breadth of industries ranging from bio-technology, fund management, telecommunications, media and entertainment and the mining industry.

Mr Khouri has not held any directorships with listed companies over the last three years.

Mr Stephen Baird, Executive Director

Mr Baird has over twelve years' experience in energy and heavy industry. He worked for seven years with Heritage Oil Plc where he was VP of Special Projects during a period when the company developed from a microcap into a £500m capitalised company listed on the LSE.

He then spun a deep-water rig concept out of Heritage Oil, creating the UDW drilling contractor, SeaDragon Offshore Ltd, of which he served as Chairman and Chief Executive. The company completed two of the largest drilling units in the world with a total asset value of in excess of $2 billion. Stephen has a proven track record of delivering project finance, technical project delivery and long term commercial contracts for emerging and progressive energy sector technologies.

Stephen is based in the UK and approached Greenvale following an extensive review of global shale oil opportunities. He has a mandate from the Greenvale board to commercialise the company's current oil shale projects and expand the company's oil shale portfolio with a view to transforming Greenvale into a significant oil shale company.

Vince Fayad, Non-Executive Director

Vince is currently a Director of Lawler Corporate Finance Pty Ltd and has had approximately 30 years of experience in Corporate Finance, accounting and other advisory related services. He is also a registered company auditor and tax agent. Over the last 10 years, Vince has spent a significant amount of time advising on various transactions that are related to the mining industry. Vince also served as the Managing Director of Greenvale for the period 31 December 2008 to 6 November 2009.

Mr Kris Knauer, Director

Mr Knauer brings to Greenvale a wealth of experience in project acquisition and evaluation, particularly in the resources sector. He has a Bachelor of Science (Honours) in Geology and spent five years working in the oil and gas industry as a geologist. Mr Knauer also has over 15 years' experience in finance and corporate advisory. He is currently Executive Director Equities at Novus Capital Limited with a key focus on smaller listed companies.

Management Biographies

Matt Thompson – Commercial Officer

Matt has extensive experience in project finance and corporate finance focusing on the oil and gas industry as well as infrastructure and aviation. Previously the Commercial Director of SeaDragon Offshore, the builder of two harsh environment drilling rigs, he also has extensive experience in contract negotiation, project delivery and execution.

Daniel Madre – Independent Competent Person

Dan has over 33 years' experience in exploration of coal and oil shale in Australia and Indonesia. He has a Master of Science degree (Coal Geology) and was a member of the joint venture technical committee (representing the Greenvale Mining group) during the exploration of Nagoorin and Lowmead as well as project manager of the Alpha oil shale deposit exploration from 1980-1988. Since then Dan has worked in Indonesia where his exploration contracting company, PT Danmar Explorindo, has over 100 employees. Dan is supported by associates and staff of more than 30 geologists and geoscientists. Daniel has had a long association with Greenvale and was the pioneering geologist on the company's Alpha deposit.

Mr Winton Willesee, Company Secretary

Mr Willesee is an experienced director and company secretary. Mr Willesee brings a broad range of skills and experience in strategy, company administration, corporate governance, company public listings, merger and acquisition transactions, reconstructions and corporate finance from his background with listed and unlisted public and other companies.

Mr Willesee holds a Master of Commerce, Post-Graduate Diploma in Business (Economics and Finance), a Graduate Diploma of Applied Corporate Governance, a Graduate Diploma in Applied Finance and Investment, a Graduate Diploma in Education and a Bachelor of Business. He is a Fellow of the Financial Services Institute of Australasia, a Graduate of the Institute of Company Directors, a Member of CPA Australia and a Chartered Secretary.

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The recommendation system used for this research is as follows. We expect the indicated target price relative to the FT All Share Index to be achieved within 12 months on the date of this publication. A 'Hold' indicates expected performance relative to this index of +/-10%, a 'Buy' indicates expected outperformance of >10% and a 'Sell' indicates underperformance of >10%.

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