



Jordan Energy and Mining Limited

Annual Review 2011/2012



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Jordan Energy and Mining Limited (JEML) is a UK company that specialises in the mining and processing of oil shale, with a first project in the Hashemite Kingdom of Jordan and plans to extend into other countries where oil shale resources, energy needs and political will coincide.

JEML operating company Karak International Oil PSC (KIO) is employing leading edge technology and specialist expertise to unlock the potential of Jordan's oil shale reserves, the 4th largest in the world. This untapped natural resource will help Jordan meet its domestic energy requirements and reduce its dependence on oil imports.

“Oil shale, in light of the current hike in oil prices, has become a viable energy resource”

Abdullah Ensour, Prime Minister of the Kingdom of Jordan
- December 2012

الشركة الاردنية الطاقة والتعدين المحدودة (JEML) وهي شركة مسجلة في المملكة المتحدة و متخصصة في التعدين ومعالجة الصخر الزيتي، بدأت مشروعها الأول في المملكة الأردنية الهاشمية وتخطط لتمتد إلى بلدان أخرى يتواجد فيها الصخر الزيتي، و يتزامن ذلك مع الحاجة الى الطاقة ومع وجود توظيف الإرادة السياسية لتطوير هذه الخامات.

شركة الكرك الدولية للبترول م.خ.م شركة تشغيل اردنية مملوكة بالكامل للشركة الاردنية الطاقة والتعدين المحدودة (JEML) و توظف أحدث التقنيات والخبرات المتخصصة لاطلاق طاقة الأردن من احتياطات الصخر الزيتي و هي رابع أكبر احتياطات على مستوى العالم.

هذا المورد الطبيعي غير المستغلة سوف تساعد المملكة على تلبية احتياجاتها المحلية من الطاقة وتقلل اعتمادها على واردات النفط اذا ما تم استغلالها.

وبحسب دولة د. عبد الله النسور، رئيس وزراء المملكة الأردنية الهاشمية - ديسمبر 2012 " في ضوء الارتفاع الحالي في أسعار النفط، أصبحت موارد الطاقة من الصخر الزيتي موارد حيوية"

Highlights

“Global energy demand grows by more than one-third over the period to 2035...with China, India and the Middle East accounting for 60% of the increase.”

International Energy Agency -
World Economic Outlook 2012

Energy dilemma

The world faces an energy dilemma: demand for energy, driven by developing economies, is rising relentlessly but readily accessible global oil supplies are running out. While renewable energies such as wind and solar power could in the future make up some of the shortfall, trucks and aeroplanes still need the high energy density and large volumes provided by carbon-based fuels such as diesel.

Alternative energy source

Oil shale is an alternative liquid hydrocarbon energy source that could extend the world's energy supply. There are 2.5 to 3 trillion barrels of verified extractable oil shale resources globally – more than double the world's recoverable conventional crude oil reserves.

Abundant supply

Jordan's proven oil shale deposits are, in total, the fourth largest in the world.

Energy security

Jordan Energy & Mining is helping the Jordanian government take a step towards energy self-sufficiency by transforming two of its oil shale deposits – at Al Lajjun and Na'diyya – into much-needed liquid products and electrical power.

Foundations laid

Having invested \$35m to date, the project is well underway. A small-scale commercial plant is scheduled to come on-stream in 2016, initially producing 4,000 barrels per day. In 2020, the second phase of the plant is set to come online, bringing production up to 22,000 barrels per day. Finally, by 2026, the full-scale plant is expected to produce up to 38,000 barrels of shale oil per day in the Al Lajjun area. The project will also contribute power to Jordan's grid, generating 15MW at 4,000bpd, rising to 150MW as production expands.

Attractive investment returns

Feasibility studies show that phase 1 of the project will generate a positive cash flow with oil prices of US \$50 per barrel, and generate acceptable investment returns when prices exceed US \$65 per barrel and following the phase 2 expansion the breakeven point will be US \$40 per barrel.

Technically and commercially viable

Oil upgrading tests have demonstrated that it is technically feasible and commercially viable to produce either high-grade synthetic crude oil during Phase I or a range of profitable finished products for a modest incremental cost during Phases II and III, the latter making the project's economics even more attractive.

Replicable in any country

Once demonstrated, Jordan Energy & Mining's approach to the extraction and conversion process means that it is repeatable in any country with significant oil shale resources and the right geographic, economic and political profile.

Best practice in Corporate Social Responsibility (CSR)

Jordan Energy & Mining is following best practice in the area of corporate social responsibility and has embraced the IFC's Equator Principles, UN Global Compact and the ILO Declaration of Fundamental Principles and Rights at Work as a starting point.

Energy: A global dilemma

6:1

The world consumes six barrels of oil for every new barrel discovered

Increasing dependence on the world's reducing oil supplies at a time when production is being challenged to meet demand has led to volatile oil prices. It is a sobering fact that we consume six barrels of oil for every new barrel we discover. Long-term, the projected sustained shortfall between supply and demand means that oil prices are under upward pressure and that the current level of supplies cannot be sustained indefinitely.

“Conventional oil production has peaked and is now on a terminal, long-run global decline”¹

Deborah Gordon, Carnegie Endowment for International Peace

As easily accessible oil fields become depleted, oil exploration companies inevitably turn to offshore and arctic drilling. However, pushing the boundaries always entails not only higher costs but also increased risk of accidents and environmental impact, as illustrated all too clearly by the Deepwater Horizon oil spill. The mining and treatment of oil shale is inherently safer and uses conventional mining and materials processing technology. Consequently, such an ecological disaster could never occur.

With world demand for oil growing at the rate of almost one billion barrels a year, there is a clear requirement to find long-term solutions for viable, alternative hydrocarbon sources.

¹ 'Understanding Unconventional Oil' by Deborah Gordon of the Carnegie Endowment for International Peace: May 2012 http://www.carnegieendowment.org/files/unconventional_oil.pdf



“With non OPEC conventional oil likely to peak soon and with the world set to become more and more dependent on OPEC oil production, unconventional oil sources could make an important contribution to enhancing the world’s energy security.”

International Energy Agency, 25 May 2010

Oil shale

A fuel lifeline

40%

projected increase in global demand for liquid hydrocarbons by 2030

What is oil shale?

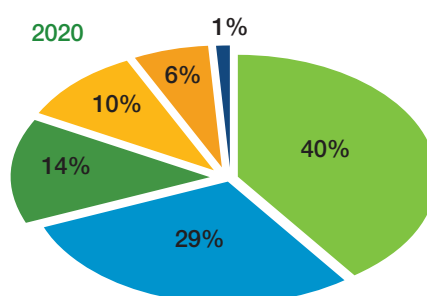
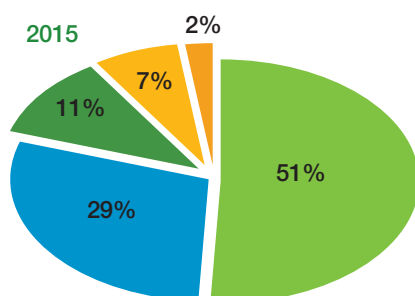
Oil shale is an alternative hydrocarbon energy source that, unlike crude oil, is in abundant supply. The US geological survey estimates that there are 2.5 to 3 trillion barrels of proven oil shale resources worldwide² - more than double the world's recoverable crude oil reserves.

Oil shale is sedimentary rock that contains a waxy organic material called kerogen. This can be heated, converted into hydrocarbon vapours, condensed, processed and turned into liquid shale oil. It can then be treated and refined into diesel, petrol and jet fuels, as well as gas products for generating electrical power.

Oil shale mining and processing, either for electrical power generation or oil production, has a proven track record, with successful commercial ventures in Estonia, Brazil, Australia and China and on a smaller scale in other countries. Where Jordan Energy & Mining leads, others follow and many 'Big Oil' companies such as Shell, Total, BP and Petrobras are also actively exploring potential oil shale mining opportunities in Jordan.

Why Jordan?

- Despite the upheaval of the Arab Spring and volatility across the Middle East, Jordan remains a beacon of relative stability in the region. A fourth generation monarchy and democratically elected parliament mean the Kingdom is ranked as one of the top countries for security worldwide. It also enjoys transparent governance, ranking highly among Arab countries in the 2010 Corruption Perception Index and third in the Middle East for freedom of expression and choice.
- Jordan's economy has enjoyed an annual growth rate of 6% for the past decade.
- Jordan is actively seeking ways to reduce its dependence on foreign energy imports, which account for up to 20% of its Gross National Product (GNP). The Kingdom aims to increase self-provision from 4% to 25% by 2015 and to 39% by 2020. As its only indigenous energy resource, oil shale is a fundamental part of that strategy.
- Jordan has the 4th largest oil shale reserves and estimated resources in the world.
- Jordan Energy & Mining's founders established strong relationships with the Jordanian government, having advised it on mining, oil and gas policy from 2000 to 2005.



- Oil Products
- Natural Gas
- Oil Shale
- Renewable Energy
- Nuclear Energy
- Imported Electricity

Source: Ministry of Energy and Mineral Resources/Jordan Investment Board

² "Source: US Geological Survey 2005 - Geology & resources of some world oil shale deposits"

Test drilling leads to internationally recognised rating

Exploration drilling in 2007 and 2008 confirms the thickness and quality of Al Lajjun oil shale. Based on the test drilling results, respected mining consultants Marston certify that JEML's resources meet the NI 43-101 standard - the Canadian government's mineral resources classification scheme. Block A of the project has also been independently assessed for reserves totalling 159 million barrels under Canada's NI 51-101 Standards of Disclosure for Oil and Gas Activities



4

Jordan has the 4th largest oil shale resources in the world

Source: Bloomberg - September 2012

Jordan's energy strategy

Jordan intends to maximise the use of oil shale through a three phased plan:

- Power generation (600-900MW) by an Estonian company (Enefit) burning oil shale under a joint venture with the Government
- Surface mining and treatment of oil shale with selected companies including JEML subsidiary Karak International Oil
- In situ treatment of oil shale in the longer term (after 2025) utilising the In situ Conversion Process (ICP) method adopted by the Royal Dutch Shell Group.

However, while JEML is focusing on Jordan today, its proven approach to the extraction and conversion process means the mining and processing concept developed in Jordan is **repeatable in any country** with significant oil shale resources and the right geographic, economic and political profile.

Jordan facts:³

Population:	6.2 million and growing at 2.2% a year
Religion:	Sunni Muslim 92%, Christian 6%, Other 2% (Shia Muslim and Druze)
Languages:	Arabic, English
Currency:	Jordanian Dinar (JOD)
GDP per capita:	2,979 JOD (US \$4,203)
Inflation:	5% (2010)
GDP Growth:	5.6%
Capital:	Amman
Main imports:	Crude oil, textiles and garments, transport equipment, machinery and vegetable products
Main exports:	Garments and textiles, pharmaceutical products, jewellery, electrical appliances, machinery and equipment, furniture, chemicals, minerals and plastic products

“Rising transport demand and upstream costs reconfirm the end of cheap oil.”

International Energy Agency's 2011 World Energy Outlook

“Kerogen has the potential to be one of the largest unconventional hydrocarbon sources in the world.”

Carnegie Endowment for International Peace

Source: 'Understanding Unconventional Oil' by Deborah Gordon of the Carnegie Endowment for International Peace: May 12
http://www.carnegieendowment.org/files/unconventional_oil.pdf

Our vision

Jordan Energy & Mining and Karak International Oil are committed to helping the Jordanian government reach its goal of energy self-sufficiency by transforming its commercial oil shale deposits into liquid products and electrical power.

Our mission

Jordan Energy & Mining and Karak International Oil will further the interests of their shareholders and stakeholders by bringing together specialist expertise, industry experience, state-of-the-art technology and international investment, while building good relationships with suppliers and governments. The companies set exemplary standards in the areas of environmental responsibility, safety and the welfare of their people.

Our strategy

Jordan Energy & Mining puts experience and expertise at the centre of its business, recruiting high calibre staff with extensive knowledge and experience of the mining and oil processing sectors. It has assembled a board of executive and non-executive directors with strong experience gained in senior management positions with blue chip companies. On the ground, Karak International Oil aims to recruit local people wherever practical.

Both companies believe their goals are best achieved through close liaison with the Jordanian government, which is very supportive of their activities in the country.

Jordan Energy & Mining has invested \$35m to date, demonstrating its commitment to the project. Its experienced team is actively working to hit key project milestones and achievements to date include:

- Four highly successful pilot plant test runs
- Successful oil upgrading tests with proven technology
- An extremely positive Bankable Feasibility Study and Addendum Report
- Fruitful negotiations with the Jordanian government leading to the signing of a Concession Agreement
- Signing a Memorandum of Understanding for a further oil shale area, Na'diyya, adding further value to the company
- Managing the risk profile and the amount of capital investment required in a global downturn by adopting a phased approach

Jordan Energy & Mining intends to raise equity and debt finance from private investors and banking institutions before considering making an Initial Public Offering (IPO) on a major stock exchange such as the London Stock Exchange once commercial production is approaching or underway.

38,000

KIO's potential production capacity: up to 38,000 barrels per day by 2020

Our values

The core values of Jordan Energy & Mining and Karak International Oil are:

- Accountability
- Ambition
- Efficiency
- Practicality
- Responsibility

KIO is transparent about the risks involved in any mining and processing venture and manages those risks through employing experienced management and working to international standards. KIO acknowledges its responsibilities as a global corporate citizen and is eager to minimise environmental damage, working towards reducing any environmental effects through technological advances and carbon offsetting.

The company believes that a sustainable business requires a sustainable working environment and acts responsibly towards its workers and the communities in which it operates.

KIO operates in accordance with the IFC's Equator Principles - a financial industry benchmark for determining, assessing and managing social and environmental risk in project financing.

Our objectives

Construction of an initial commercial plant of 4,000bpd is scheduled to start in 2014 and come into production 2015/16. Once the processing methods and yields are stable, JEML will ramp up progressively, largely using internally generated cash flow, to 22,000bpd. KIO's potential production capacity at Al Lajjun is up to 38,000bpd.

In the long-term, JEML expects to employ similar methods and technology at other suitable sites. The company has already had positive exploratory discussions with government representatives in Egypt, which faces a huge increase in its power requirements from a growing population.

Achievements and expectations

“This major new oil shale venture will make a significant contribution to the government’s declared energy strategy to increase energy from indigenous oil shale resources from zero to 14% of the country’s energy requirements by 2020; and thereby reduce our reliance on imported oil and gas products from our neighbours.”

His Excellency Dr Khaled Toukan, former Minister of Energy & Mineral Resources, Jordan - 2011

2000 to 2005

JEML founders advise Jordanian government on its mining/natural resources policy.

2006

JEML awarded an area of Al Lajjun oil shale following competitive bidding.

Memorandum of Understanding (MOU) signed with the government of Jordan.

Successful 86-ton pilot plant run of the Alberta Taciuk Process (ATP) technology conducted in Calgary.

2007

Representatives from Jordan’s Natural Resources Authority (NRA) and Ministry of Energy & Mineral Resources (MEMR) visit Canada to view the ATP pilot plant and large-scale tar sands operations near Fort McMurray.

Initial JEML exploration drilling to confirm thickness and quality of Al Lajjun’s oil shale.

Pre-Feasibility Study (PFS) completed.

Independent Competent Person’s Report produced supporting the findings of the Pre-Feasibility Study.

Public hearing in Amman as part of the Environment and Social Impact Assessment (ESIA).

2008

Commissioned Environmental & Social Impact Assessment (ESIA).

Consulting engineers Hatch appointed to lead the Bankable Feasibility Study (BFS).

Trial mining exercise and bulk sampling for further test work in Calgary.

Further exploration drilling at Al Lajjun (25 holes).

Second successful pilot plant test run in Calgary.

Helping Jordan meet domestic energy demand

By unlocking the potential of Jordan's oil shale reserves JEML will help the Kingdom towards its goal of energy self-sufficiency. The project will benefit Jordan in many ways, attracting inward investment, increasing national wealth, creating employment opportunities, transferring skills and positioning Jordan as a world leader in oil shale development.

KIO director Munther Akroush (l) and His Excellency Alaa Al-Batayneh, Minister of Energy & Mineral Resources, sign the Memorandum of Understanding for a new area at Wadi Al Na'diyya in December 2012.



2009

Commissioned R&D work in Australia, UK and Germany.

Benchmark studies on carbon emissions and water usage commissioned.

Third pilot plant test run to analyse liquids generated by the ATP process.

Fourth pilot plant test run to analyse gases produced in the retorting process.

Bankable Feasibility Study and Environmental Impact Assessment (EIA) submitted to Jordanian government.

Authoritative industry guide to oil shale published.

Sponsored three-year research programme at Durham University's Energy Institute into the use of spent shale to reduce the carbon footprint created by mining and oil shale processing activities.

Bankable Feasibility Study accepted by the Jordanian government.

Commissioned oil upgrading test work in New York in Chicago.

Environmental Impact Assessment formally accepted by the Jordanian government.

High level delegation from major shareholders visits Jordanian sites.

2010

Series of factsheets published on various aspects of the Al Lajjun project.

Oil upgrading tests show the technical and commercial viability of manufacturing high grade synthetic crude oil (SCO) and a range of finished products.

Jordan Energy & Mining presentation on Al Lajjun sparks regional interest at MENA conference on energy security, showing the potential for further projects.

Published oil shale reserves statement that meets Canadian NI 43-101 requirements.

ThyssenKrupp Group formally appointed as technical partner on the Al Lajjun project.

Formal statement meeting 'NI 51-101 Standards of Disclosure for Oil and Gas Activities' giving '2C' Best Estimate at 159 million barrels.

Top level delegation from technical partners ThyssenKrupp Group and lead debt financing partner KfW Bank visit Jordan in support of JEML and meet with the Minister of Energy and Mineral Resources, the Director General of Jordan's Natural Resources Authority, Chairman of the Jordan Investment Board and Chairman of the Social Security Investment Unit, as well as the Executive Board of the German Jordanian University in Amman.

Signing ceremony and reception hosted by Peter Millett, the British Ambassador to Jordan, and attended by 150 dignitaries including Dr Khaled Toukan, Jordan's Minister of Energy & Mineral Resources and HE Dr Maher Hijazin, Director of the Kingdom's Natural Resources Authority.

2011

50-year Concession Agreement passed by Jordanian Parliament and Royal Decree issued.

Promising Jordan Energy & Mining-sponsored research at Australia's Monash University into the influence of different air and gas reaction environments on oil shale processing continues.

2012

Co-operation agreement signed with the University of Jordan in Amman to offer work experience to gifted engineering students who have completed internships in Germany giving Karak International Oil access to a pool of local talent.

Karak International Oil invests US \$40,000 in a powerful new computer facility at Mu'tah University in the Karak Governorate as part of a sustainable development project to develop IT skills among Jordan's native workforce.

Further exploration and assessment of additional blocks in the Al Lajjun area at Na'diyya to the south east – three trial holes already provide promising results.

Report commissioned from consulting engineers Hatch confirming the revised Capex and Opex costs, together with the projected returns, of the phased approach Al Lajjun project.

Memorandum of Understanding signed for 32 sq km area at Na'diyya estimated to contain at least 800 million barrels.

Outlook

2013

Fundraising.

Staff build up and training
Revise Environmental Impact Analysis (EIA)
for additional Na'diyya block.

Additional exploration drilling at Na'diyya to
confirm test drilling findings.

2014

Completion of Front End Engineering
Design (FEED) process.

Finalisation of project financing (debt and
equity) from investors including export
credit institutions.

Formal appointment of Engineering,
Procurement & Contract (EPC) partner.

Construction of 4,000bpd plant begins.

Explore opportunities for new ventures in
Egypt, Turkey and Morocco.

2015

Build up and training of operational staff.

Construction activities and initial
commissioning of supporting infrastructure.

2016

Finalise construction and conduct test runs
of mine and plant.


First commercial production at Al Lajjun as
phase 1 plant comes fully on stream and
ramp up to 38,000bpd production
commences.

2020

Phase 2 plant goes live bringing production
to 22,000bpd.

2026

Phase 3: Full-scale production at Al Lajjun
plant with production at 38,000bpd.



“It is becoming increasingly clear that global conventional oil production will never exceed 100Mbpd, and may in fact have peaked already, whilst growing demand will continue to support prices at the current level or even higher. Alternative sources of liquid hydrocarbons must therefore be found and we believe oil shale, which is in plentiful supply around the globe, is an attractive and viable solution.”

Richard Savage, Head of Energy Research, Mirabaud Securities

The story so far

“Oil shale is the saviour of Jordan's economy. The cost of extracting oil shale in Jordan would be around \$1 billion, which is only 22% of the Kingdom's \$4.8 billion oil imports bill.”

Mamdouh Salameh,
International Oil Economist and
Consultant on Oil and Energy,
World Bank - May 2012

Two of the JEML founders, Christopher Morgan and Chris Nurse, have been heavily involved in the Jordanian energy sector from 2000 to the present day, providing consulting services to the mining and oil and gas sectors. Consequently, they know the country well, understand how it operates and, importantly, have forged strong relationships with key industry figures.

When the oil price broke through the \$50 a barrel barrier in 2005, the Ministry of Energy and Mineral Resources (MEMR) asked Christopher Morgan to suggest how Jordan's significant oil shale resources could be developed.

The partners' recommendations led to the MEMR developing a strategy, supported by the Government of Jordan and the Natural Resources Authority (NRA), of open bidding for oil shale bearing ground, which came into effect in 2006.

David Pedley, Munther Akroush and Eike von der Linden joined Christopher Morgan and Chris Nurse in establishing Jordan Energy & Mining in 2006. It was invited by the NRA to bid for oil shale concession areas along with 12 other organisations.

A successful bid

JEML's tender was accepted and the company signed a Memorandum of Understanding for Al Lajjun on 5 November 2006.

From the start, JEML was determined to work with only the leading names in their fields – such as the renowned engineering firms AECOM/UMATAC, ThyssenKrupp Polysius and Lahmeyer - to ensure the best outcome for its stakeholders.

Seed financing was secured from RAB Capital plc funds, an investment management company with a reputation for spotting winners among early stage junior natural resources ventures.

The story so far

Tests bear fruit

JEML has exclusive use of the modern and energy efficient ATP technology for its operations in Jordan. In the period 2006 to 2009 Jordan Energy & Mining conducted pilot plant test runs for a total of 300 tons of oil shale, which produced some 200 barrels of shale oil. The shale was treated in partner UMATAC's ATP test plant.

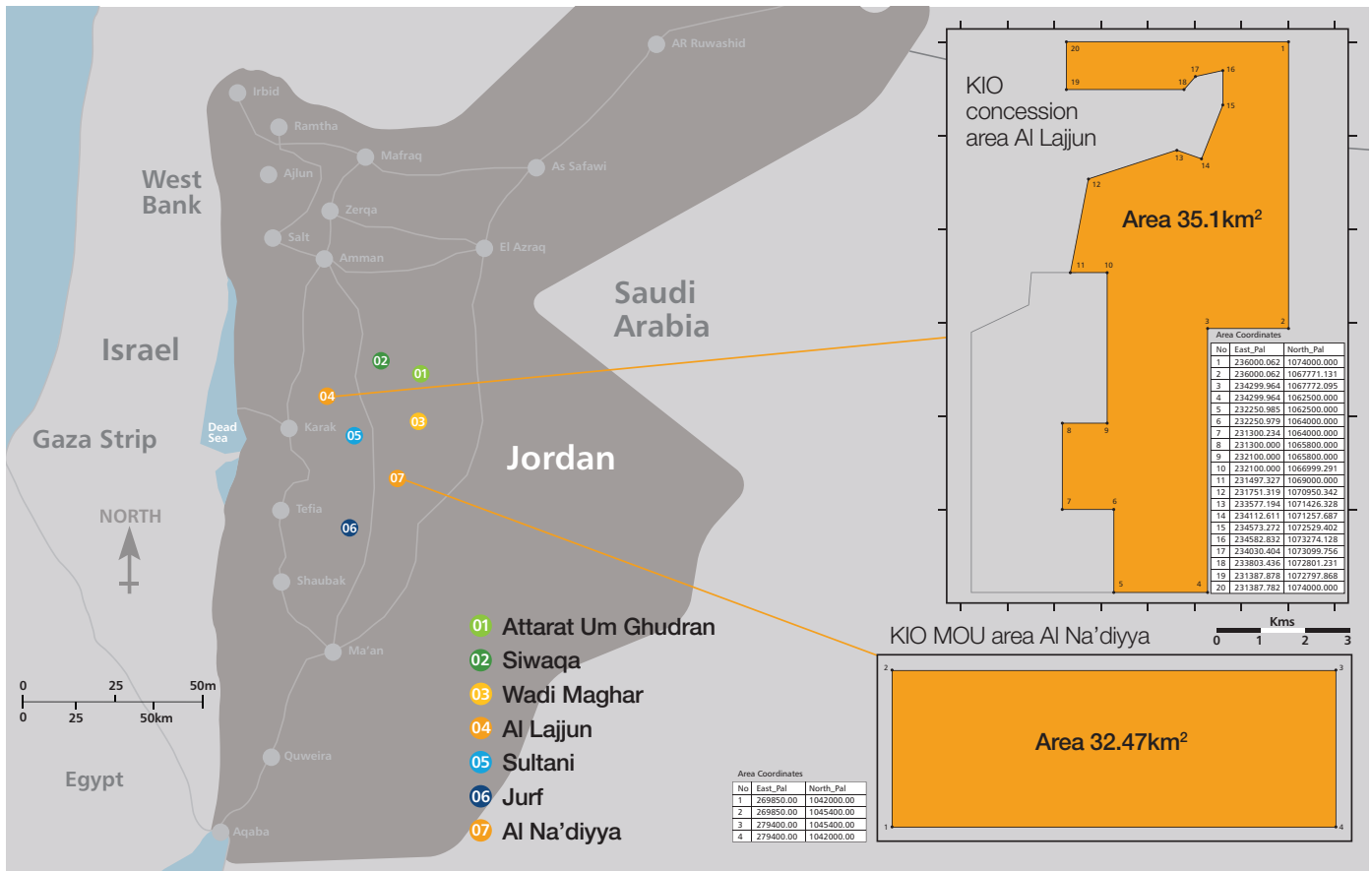
The test results were extremely positive in terms of capturing the oil and other energy products such as fuel gas and steam. The spent shale left after oil extraction demonstrated excellent properties in being able to neutralise the sulphur dioxide and other acidic products discharged during the process.

A comprehensive Pre-Feasibility Study (PFS) was presented to the MEMR and NRA in May 2007. This clearly showed that the combination of Al Lajjun oil shale and ATP technology made the project technically feasible and economically viable with breakeven of full costs when oil prices hit around \$40 to \$50 per barrel and good returns when prices exceed \$60 to \$70 per barrel.

In September 2007 the Jordanian government, impressed with progress, guaranteed vital water resources of 2.5Mm³ per year from a brackish aquifer for the JEML Lajjun resource.

In July 2009 lead consulting engineers Hatch completed a Bankable Feasibility Study (BFS), which demonstrated the technical and economic viability of the project.

Upgrading work conducted by international oil processing groups UOP and Chevron Lummus demonstrated the technical and commercial viability of manufacturing both high grade synthetic crude oil (SCO) and, for a modest incremental cost, a range of finished products from Al Lajjun shale oil. This gives Karak International Oil the flexibility to bypass refineries and sell higher value finished products such as kerosene, diesel and gasoline more profitably into the wholesale market in Jordan and internationally.

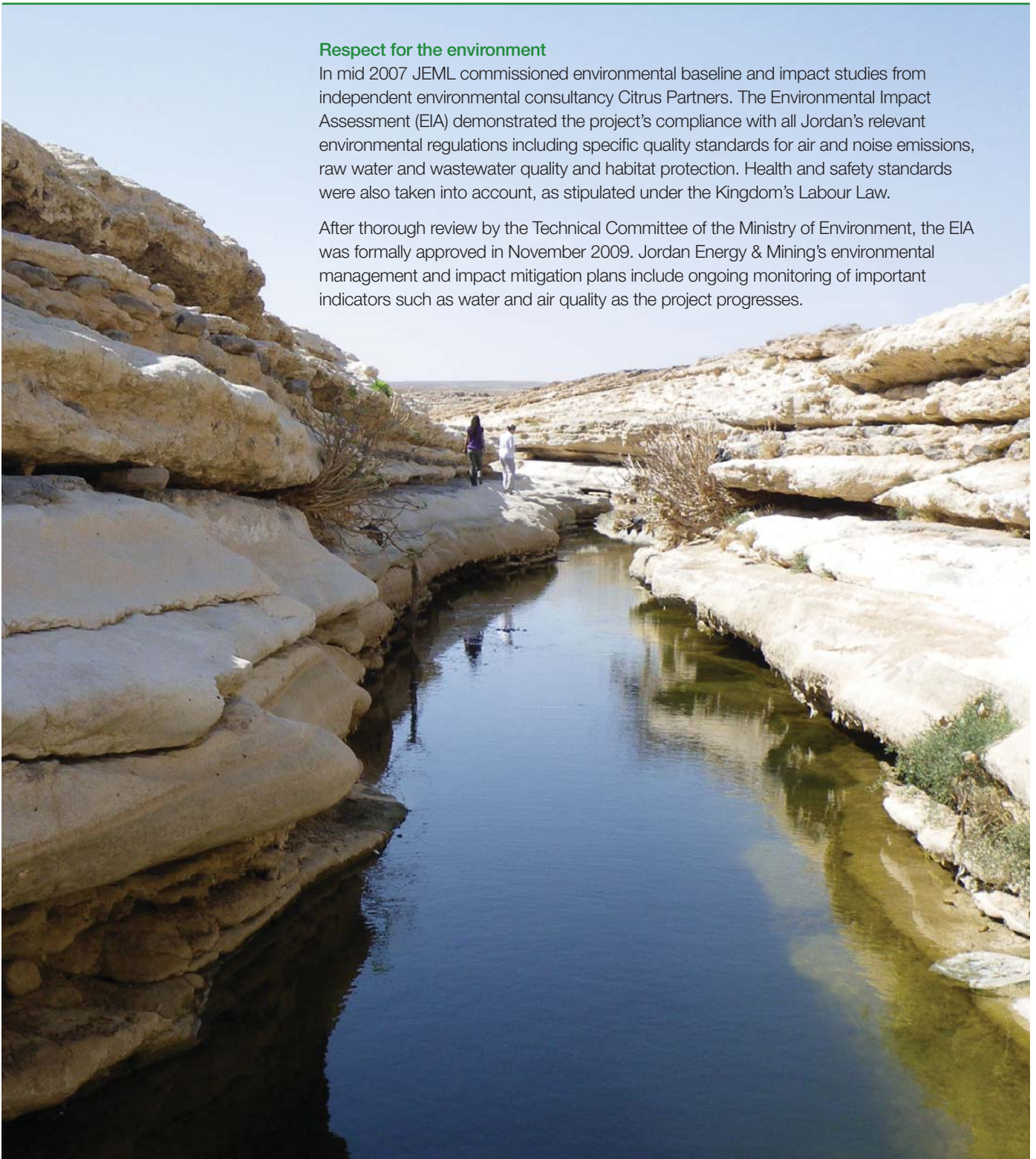


The story so far

Respect for the environment

In mid 2007 JEML commissioned environmental baseline and impact studies from independent environmental consultancy Citrus Partners. The Environmental Impact Assessment (EIA) demonstrated the project's compliance with all Jordan's relevant environmental regulations including specific quality standards for air and noise emissions, raw water and wastewater quality and habitat protection. Health and safety standards were also taken into account, as stipulated under the Kingdom's Labour Law.

After thorough review by the Technical Committee of the Ministry of Environment, the EIA was formally approved in November 2009. Jordan Energy & Mining's environmental management and impact mitigation plans include ongoing monitoring of important indicators such as water and air quality as the project progresses.



From rock to oil

\$19

Global finding and development cost per barrel of conventional oil

Source: BMO Oil & Gas Study - July 2011

\$8

KIO finding and development cost per barrel for initial 4,000bpd plant.

Source: Hatch update study - 2012

Transformation

Oil shale is an organic-rich rock that, when heated to 550°C, yields oil. The rock was formed around 50 million years ago when algae-rich sediments collected in swamps and lakes and solidified. Over time the organic matter in the sediments has been transformed into kerogen, a waxy organic material. When oil shale is heated the kerogen vaporises and can be cooled or distilled to produce a range of liquid oil products.

Proven extraction methods

Shale rock is extracted by conventional open cast mining using front-loading shovels and trucks and transported to the production facility. The stripping ratio (the relationship between waste removed and oil shale mined) at Al Lajjun is particularly favourable at about 1:1.

Processing technology

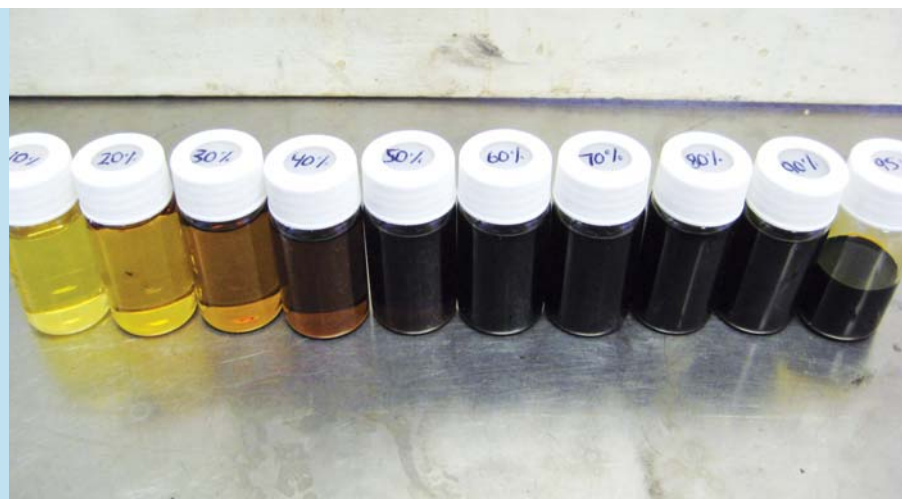
There are more than 60 oil shale processing technologies but JEML opted to employ the Alberta Taciuk Process (ATP), which has a 35-year track record and, as a recent study confirms, is the best available technology for Jordanian oil shale. This features a unique thermal process and hydrocarbon cracking system for separating and extracting water and organic substances from host solids.

Under the current ramping up scenario to 38,000bpd plant, the initial plant will be a single 250tons/hr ATP retort that will simultaneously extract and primary upgrade the oil recovered from the oil shale. The retort is a multi-compartmented rotating process that achieves:

- Heat exchange to preheat and dry incoming feed
- Thermal reactions to recover light hydrocarbons (shale oil)
- Combustion of by-product carbon (coke) as the primary heat source, which means it is extremely energy-efficient.

Successful pilot plant test runs

JEML has exclusive rights to the use of the proven Alberta Taciuk Process (ATP) oil shale extraction technology at its sites in Jordan. The effectiveness of this method, which has a 35-year track record, was demonstrated in three highly successful pilot plant test runs between December 2008 and July 2009 at manufacturer UMATAC's test plant in Calgary, Canada. Some 150 barrels of shale oil were produced and the liquids, oil and gases produced by the process thoroughly analysed.



From rock to oil

There are many aspects of ATP that make it a superior technology:

Proven

The Stuart Oil Shale Project in Queensland, Australia deployed an ATP retort to successfully produce over 1.5m barrels of shale oil between 2000 and 2004.

Versatile

The retort's simple horizontal design enables it to handle both fine and large material.

Potential for energy self-sufficiency

No external power or heat required.

Environmentally-responsible

Minimal water required for the treatment process.

Effective

The process delivers high kerogen oil yields.

Reliable

The retort's simple, robust design and lack of moving parts for the mechanical transfer of solids minimises the risk of breakdown.

Efficient

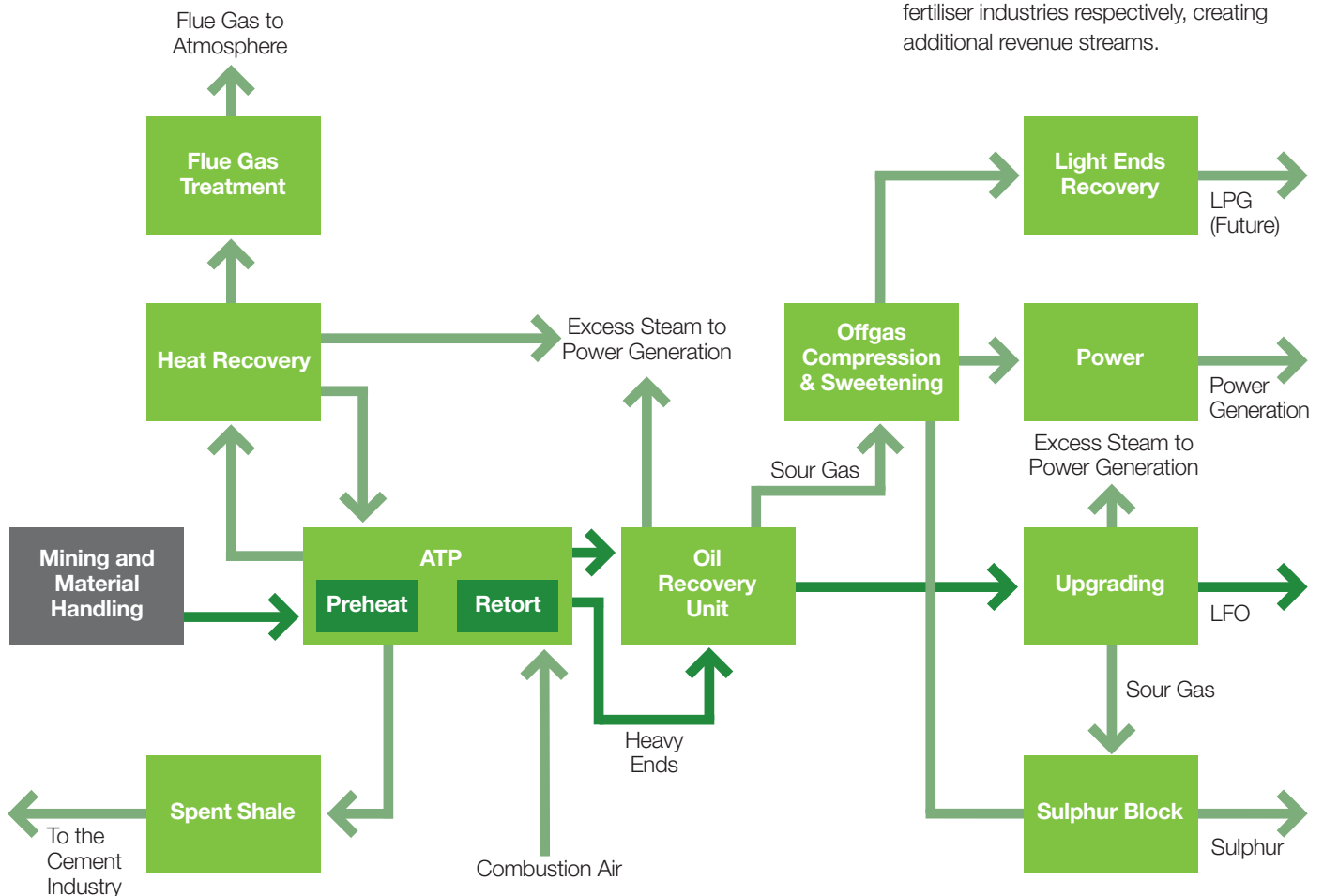
Solid-to-solid heat transfer optimises energy use.

Clean

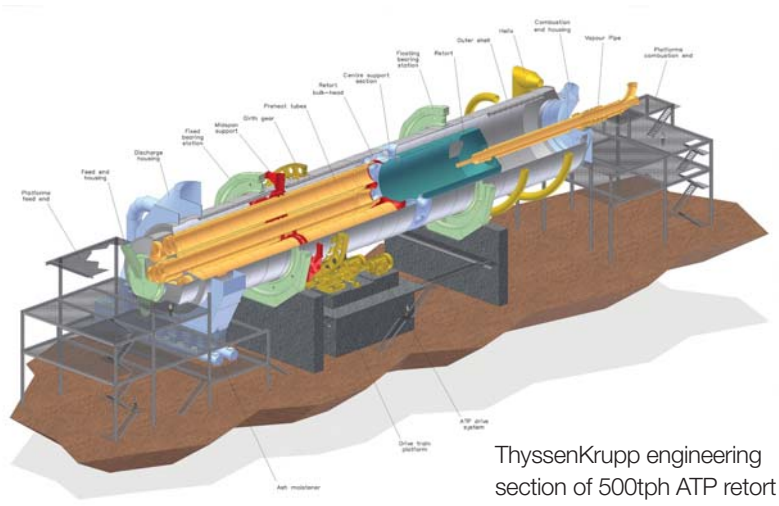
Emissions meet strict environmental standards.

Profitable

By-products of ash and sulphur generated for use in Jordan's construction and fertiliser industries respectively, creating additional revenue streams.



From rock to oil



ThyssenKrupp engineering section of 500tph ATP retort

How the ATP process works:

In preparation for the ATP process the shale is first crushed to $\leq 10\text{mm}$ pellets.

1 The Preheat Zone

The prepared shale is then fed into a pre-heating portion of the retort and the temperature increased to approximately 250°C .

2 The Retort Zone

Shale is transferred to the reaction zone of the retort, heated to $500 - 550^\circ\text{C}$. At this temperature the kerogen in the shale decomposes into gas, hydrocarbon vapour and coke.

3 The Combustion Zone

The spent retorted shale is then heated further to 750°C by the injection of air to assist in burning the residual carbon. This hot combusted shale is then used to pre-heat the incoming feed shale.

Finishing

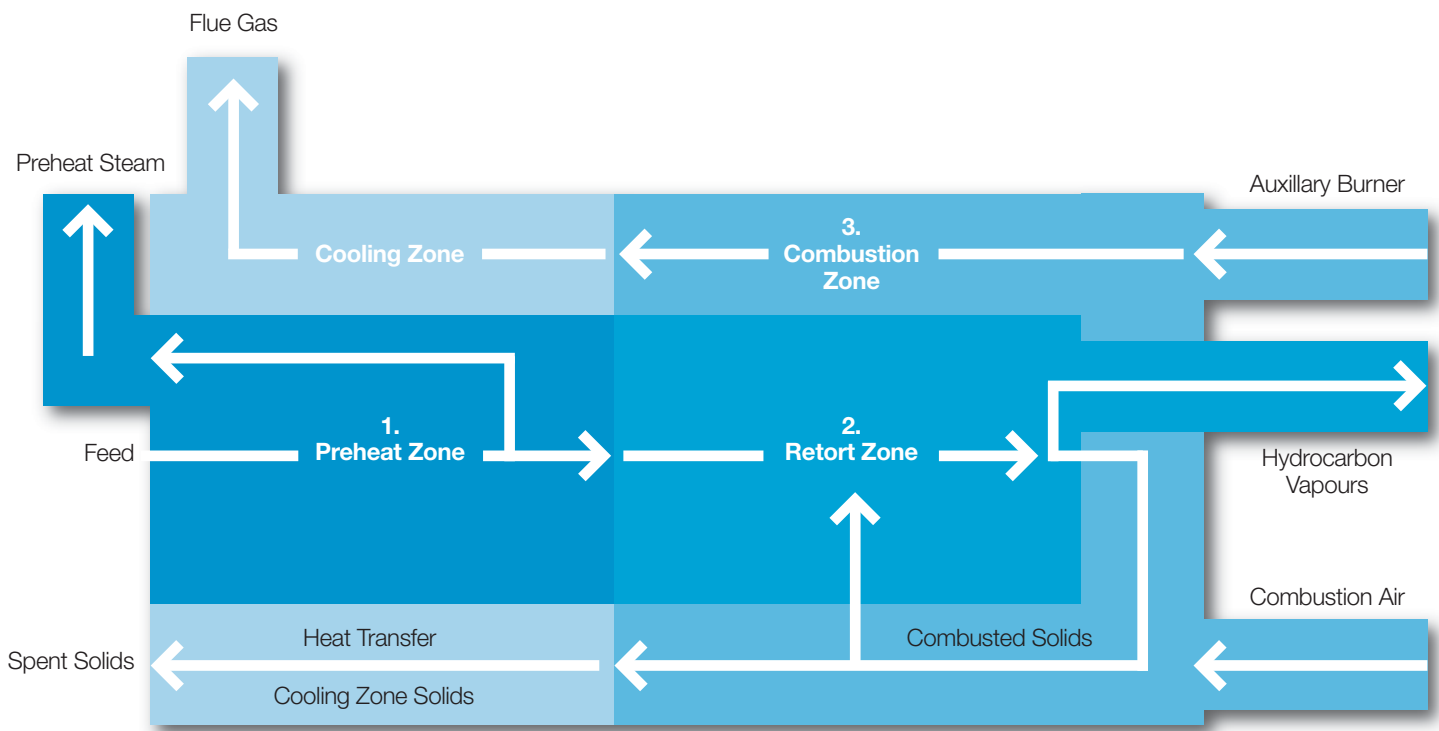
Gas and hydrocarbon vapour is condensed and distilled into raw naphtha and medium shale oil, as well as a heavy oil product that is re-treated to feed into the medium oil product. Produced oil is transferred to storage tanks prior to transportation to a refinery for further processing into fuel products.

The shale lifecycle

Spent shale has a variety of uses such as the production of asphalt and cement, which adds value to mining projects.

Waste disposal

To minimise environmental impact, unwanted spent shale will be returned to the mine, covered with the original, stored overburden and landscaped to blend in with its desert setting. A clay lining in the mine will guard against any leakage into the ground water supply.



Jordan

A kingdom rich in resources



100

billion barrels of oil contained in oil shales in Jordan (conservative estimate)

Energy-related imports currently account for up to 20% of Jordan's GNP. Difficulties with supply could put it at a disadvantage, economically and strategically. Yet Jordan sits on the world's 4th largest supply of oil shale, which has been proven to be a technically and commercially viable energy source.

Oil shale will play a major role in the kingdom's future. If its abundant reserves are developed, the country could transform from an importer to an exporter of oil and energy.

The world's conventional easy-to-access liquid oil reservoirs are declining and are not being replaced fast enough by alternative oil energy sources. Despite this, demand for oil continues to increase and will soon exceed conventional oil production on a regular basis. But plentiful global oil shale resources – the world's largest untapped liquid hydrocarbon resource - can extend the world's oil supply.

Oil shale in Jordan

With proven and projected reserves and resources in Jordan in excess of 100 billion barrels of oil, JEM's focus within the region represents an exciting, yet low risk, long-term investment opportunity.

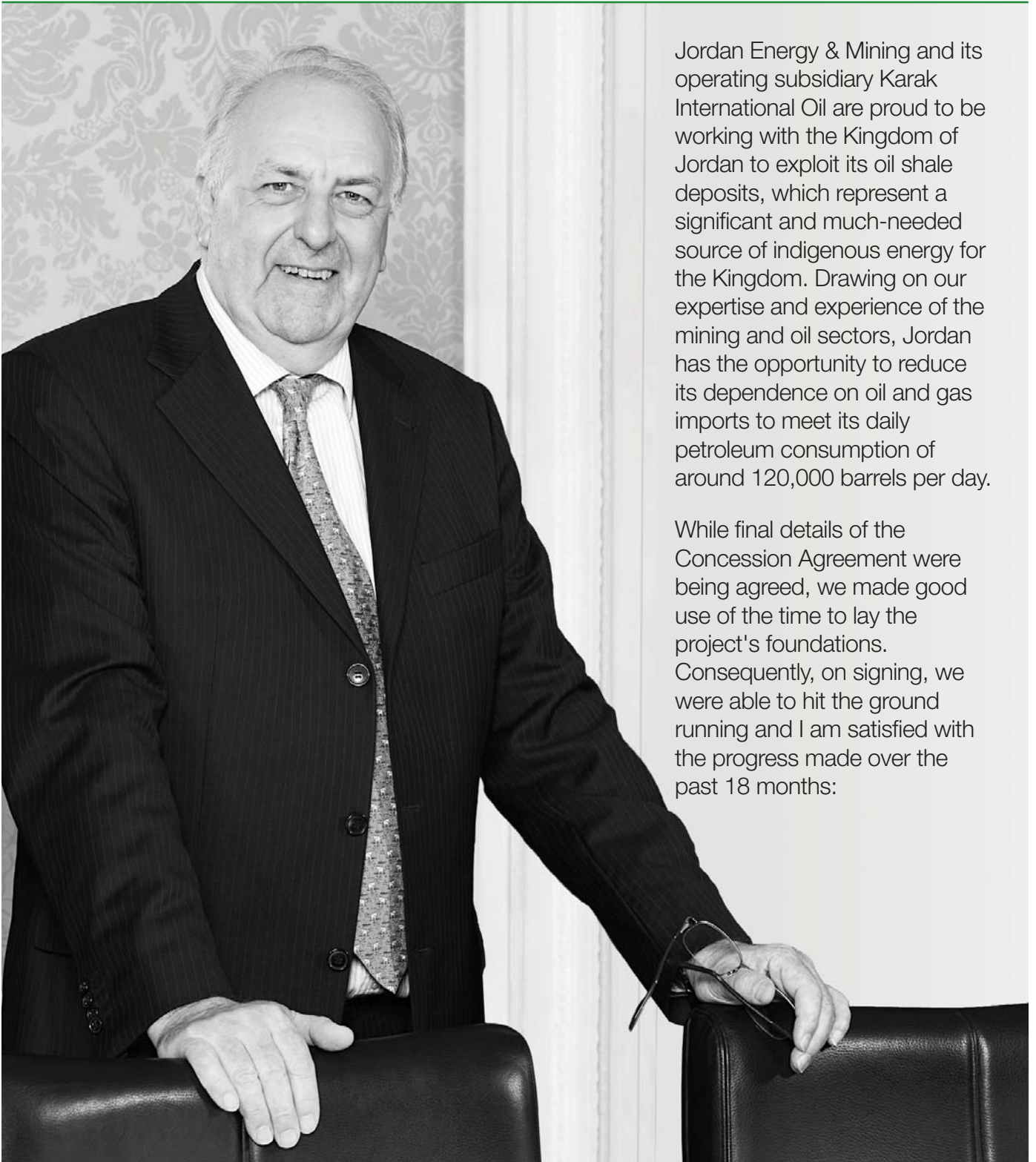
Licence areas

Al Lajjun is located in a desert region that receives 300 to 400mm of rainfall a year. The site has good access to infrastructure including water supplies. Shale from the Al Lajjun deposit has excellent characteristics:

- Near the surface (<30m waste covering around 30m of oil shale)
- High oil content (>10%)
- Low moisture levels (2-3%)
- Containing high level of total organic material (>20%)
- Thick seam with consistent quality (~30m)
- A low stripping ratio (1:1)



Managing Director's review



Jordan Energy & Mining and its operating subsidiary Karak International Oil are proud to be working with the Kingdom of Jordan to exploit its oil shale deposits, which represent a significant and much-needed source of indigenous energy for the Kingdom. Drawing on our expertise and experience of the mining and oil sectors, Jordan has the opportunity to reduce its dependence on oil and gas imports to meet its daily petroleum consumption of around 120,000 barrels per day.

While final details of the Concession Agreement were being agreed, we made good use of the time to lay the project's foundations. Consequently, on signing, we were able to hit the ground running and I am satisfied with the progress made over the past 18 months:

Concession Agreement signed – September 2011

Following extensive consultations and negotiations with the Natural Resources Authority (NRA) over two years, JEML's Concession Agreement (CA) was signed into law by the Jordanian Parliament and thereafter received a Royal decree.



“We have been very happy with the commitment and quality of work by Jordan Energy & Mining/Karak International Oil over the past five years and look forward to working closely with them to develop this important new venture to the benefit of all parties.”

Dr Maher Hijazin, former Director General of the Natural Resources Authority, Jordan – September 2011

Patience rewarded

The highlight of 2011 was undoubtedly the long-awaited signing of the Concession Agreement for Al Lajjun in March and its ratification by the Jordanian parliament in July of that year. Until this point, we did not have the right to develop or exploit the area. Consequently, this was welcome news indeed for our shareholders who had been patiently waiting for several years for their investment to become a valuable asset.

This achievement was marked by a formal signing ceremony attended by around 150 dignitaries representing shareholders, service providers, lawyers and government representatives. Peter Millett, the British Ambassador to Jordan, honoured us by hosting a reception to celebrate the milestone.

The Jordan Energy & Mining team had been working hard behind the scenes planning for this moment, which meant we were well advanced on several key fronts such as the selection of a bank to seek financing, project planning and staffing.

However, our efforts to secure financing to fund the next stage of development were hindered somewhat by the upheaval of the Arab Spring. While the unrest has not directly affected Jordan, which remains relatively stable, the influx of refugees from Iraq and, most recently, Syria has strained the Kingdom's economy and coloured potential investors' perceptions of the region.

Against this backdrop, we acted on our advisers' advice to re-phase the project and thereby reduce financial risk to make the project a more appealing proposition for cautious investors. We commissioned Hatch to update our business case starting with the ATP 250 plant and it was gratifying that their report validates our approach and confirms our own calculations.

Board restructure

Since our last Review, we have changed the profile of the Jordan Energy & Mining board. Dr Peter Klaus and Peter Cassidy stood down and, on behalf of my fellow directors and shareholders, I would like to thank them both for their valuable input. We were delighted to welcome three new non-executive directors to join Sentient's appointed representative Ben McKeown and bring fresh impetus to the board:

- Paul Ellis has over 35 years' experience in the areas of exploration, production, development and management of international oil and gas ventures, recently serving as CEO of Serica.
- Dynamic minerals/energy geologist Toby Pierce brings a wealth of international financial contacts.
- Well-known industry figure Richard Cottey has a formidable reputation in Australia and the Far East and will bring considerable creative flair to the Board.

Managing Director's review

Continued government support

The upheaval caused by the Arab Spring means energy independence has emerged as an issue of national security for Jordan. Energy officials have prioritised oil shale as key to weaning the country off energy imports, which cost Jordan more than a quarter of its gross domestic product annually.

Demonstrating its confidence in our ability to develop oil shale, the Jordanian government has awarded us an additional block at Na'diyya that, when fully drilled, will give us an asset base of over 1 billion barrels compared with our current 300m capacity. Comparable oil sands transactions regularly change hands for up to US \$2 per barrel in the ground so our venture has an exciting future once funding is in place to get the next stage underway.

In the last quarter of 2012 we appointed Investec, which has strong oil and gas teams, as our lead broker. The bank was impressed by the project's potential and with this seal of approval from an independent third party, we are confident about the outcome of this latest funding round. This will allow us to make substantial progress in 2013 towards bringing the Al Lajjun project to fruition.



Christopher Morgan
Managing Director
Jordan Energy & Mining Limited

1.1 billion

Estimated barrels in awarded areas)

“Sustained high oil prices allow unconventional resources to become economically competitive, particularly when geopolitical or other ‘above ground’ constraints limit access to prospective conventional resources”

EIA World Energy Outlook 2009

Corporate social responsibility



Jordan Energy & Mining believes that in order to meet its corporate objectives a successful company must accept its responsibilities as an international corporate citizen, even where these responsibilities have not yet been made law.

Accordingly, JEML is dedicated to following best practice in the areas of corporate governance, professional behaviour, labour relations, health and safety, community relations and the protection of the environment. That's why it has embraced both the IFC's Equator Principles and the UN Global Compact.

For JEML, this is a matter not only of good corporate governance but also of long-term viability as a company. Its directors believe that only by treating fairly its shareholders, employees, community stakeholders and the environment can the company achieve sustainability.

Sustainable development

KIO allocates US \$75,000 annually to be spent on projects for sustainable development in Jordan.

Community

Good relations between the company and the communities in which it operates at national, regional and local level are important to us at JEML. We are determined to contribute economically and socially to our host country, providing not only employment opportunities but also expertise and advice.

Rather than make people dependent on us, we will give them the tools and resources to help themselves. We will consult with the local community and regional and national government to ensure we meet real needs.

Environment

Concern for the environment before, during and after our operations, is an integral part of JEML's approach. We aim to develop projects that can become carbon-neutral and employ methods that result in the least possible damage to the environment. Each employee and contractor will be held accountable for managing the equipment, people, facilities and resources within their control to minimise environmental impact.

Before we begin any project we ensure we have a comprehensive rehabilitation programme for our sites to return them to their original condition wherever possible and, at the very least, to leave them safe, non-polluting and useable.

We wholeheartedly support the creation of a mining site certification scheme and will seek accreditation once a scheme emerges that has broad industry support.

Governance and ethics

Jordan Energy and Mining believes its responsibilities to its shareholders can only be met through a culture of honesty, transparency and accountability. It is committed to achieving high standards of governance and has chosen to implement the guidelines of the Financial Services Authority's (FSA) Combined Code on Corporate Governance, as far as is

reasonably practical for a company of its size and stage of development.

JEML demands the strictest standards of integrity and professionalism from its employees and has procedures in place to protect individuals who report unethical behaviour.

Health and safety

JEML and KIO are committed to protecting their workforce and the wider community. They will demand high safety standards at work, conduct risk assessments and provide all necessary resources, training and safety equipment to ensure a safe working environment based on international standards of best practice.

The directors' concern for workers' health goes beyond preventing physical injury and for this reason KIO will provide health checks and medical services designed to ensure workers' health is monitored and maintained as appropriate during their time with the company.

Labour

At JEML and KIO we believe that if a company expects its employees to act with decency and fairness, the company must treat them the same way. It regards compliance with the ILO Declaration of Fundamental Principles and Rights at Work as the starting point of its policies.

Recognising that fair employment must begin with fair recruitment, KIO applies strong principles of equality in selecting workers – a commitment that is maintained throughout their employment.

Lastly, KIO invests in its workforce by not only enhancing their work skills through training programmes but also cultivating skills and knowledge that can be applied outside their current jobs. This way JEML and KIO are creating a bank of expertise that will benefit local communities after they have left.

Meet the team

The Board

\$66

global breakeven cost per barrel of conventional oil from new field developments

Source: BMO Capital Markets Research - Oil & Gas Global Costs Study - July 2011

\$29

cash operating costs per barrel for initial 4,000bpd plant

Source: Hatch update study - 2012



Christopher Morgan
Managing Director

Christopher Morgan has over 40 years' experience in the mining, energy and environmental sectors. This includes 20 years with Billiton International Metals (previously the metals arm of Shell) to operating company Managing Director level where he was involved in the management of large, open pit mine operations in South America, Africa and latterly in Central Asia with Western Mining Corporation.

From 1984 to 1988 he headed Shell's Oil Shale and Tar Sands group globally. During this time he completed worldwide ranking studies of oil shale resources, a Bankable Feasibility Study on the Tarfaya oil shale resource in Morocco and plans for a large European oil shale processing unit in The Netherlands.

Having held a succession of senior corporate and project management roles in coal, metals, environment and oil and gas, Christopher Morgan set up his own successful consultancy group specialising in the natural resources and energy sectors.

Christopher is a Chartered Engineer, a Fellow of the Institution of Materials, Minerals and Mining and holds an Honours degree in Mining Engineering and a Master's in Mineral Production Management.



Chris Nurse
Director and Company Secretary

Chris Nurse studied law at Oxford University prior to joining the London practice of accountants Price Waterhouse where he specialised in natural resources industries.

In 1989 Chris set up his own independent consultancy practice advising clients on mining law policy and the legal and financial aspects of due diligence for investment. A lawyer and chartered accountant, he has worked on a large number of major corporate restructures, mining law reform projects, legal and privatisation studies and lent his technical expertise to strengthen legislative controls.

He is a Fellow of the Institute of Chartered Accountants in England and Wales and a Member of the Energy Institute.

Meet the team

The Board



Ben McKeown

Non-Executive Director

A partner with Sentient, the private equity group, Ben McKeown has spent his entire career in the natural resources sectors, working in a variety of technical and commercial roles in both the mining and oil & gas industries. A Chartered Engineer, Ben holds a Bachelor of Engineering (Mining Engineering) from the Royal School of Mines, Imperial College, London and an MBA from IESE Business School in Barcelona, Spain.



Paul Ellis

Non-Executive Director

A highly experienced international petroleum engineer, Paul Ellis has over 35 years' experience in the areas of exploration, production, development and management of international oil and gas ventures for companies such as BP, Elf, Charterhouse Petroleum, British Gas and Emerald Energy.

He has held senior appointments with several major upstream oil and gas companies and with independent exploration companies, recently serving as CEO of Serica. Paul has held technical and financial responsibility for new ventures and projects in more than 20 countries.

He holds an MA Engineering Science (Oxon) and is a member of the Society of Petroleum Engineers.



Richard Cottee

Non-Executive Director

Well-known industry figure Richard Cottee has more than 20 years' broad experience in commercial and management roles in the resource and energy sector. He has an enviable track record of growing smaller companies, notably Queensland Gas Company, for which he is acclaimed for developing from a \$20 million to a \$5.7 billion concern during his six-year stint as managing director.

A lawyer by background, Richard holds an LLB (Hons) degree from the University of Queensland and has strong connections throughout Australia and the Far East.



Toby Pierce

Non-Executive Director

Toby Pierce worked as a metals/energy geologist with Hunter Dickinson and Kennecott Exploration before joining Tristone Capital in Calgary as director of oil and gas research.

Toby relocated to the UK two years ago to open a London office for GMP Securities then set up his own consultancy in February this year. During this period he developed a wealth of international financial contacts in both the mining and oil & gas sectors. Toby holds an MBA from the University of Toronto.

Meet the team

The management team



Munther Akrouh

KIO Director, Jordan

Munther Akrouh has more than 24 years' diversified experience of the mechanical, petroleum, construction and energy sectors. Following a successful commercial career, Munther spent 15 years as Assistant Director General of Jordan's Natural Resources Authority (NRA) in Amman.

A qualified Mechanical Engineer, Munther also holds a Master's degree in Economics from Cal Poly.



Dr Eike von der Linden

Technical Director

Dr von der Linden has been involved in the global mining industry for more than 35 years. He has considerable experience in the technical and financial management of mining projects and has worked as lead in project development, independent adviser to financial institutions and been involved in project financing in the natural resources industry. He has also acted as technical and financial adviser to several national and international companies.



John Fraser

Operations Manager

John Fraser joined Jordan Energy & Mining after a successful 15-year career at Huntsman during which he was responsible for managing process and engineering teams of over 100 people, leading manufacturing activity and driving continuous improvement in plant performance. This was followed by five years' experience in developing new markets for co-products and commercial sales in a commodity pricing environment. Consequently, he brings a wealth of technical knowledge and practical experience of complex industrial processes combined with sound commercial skills.

John is a Chartered Engineer who holds an Honours degree in Chemical Engineering.



Mark Puckett

Manager – Project Finance

Mark Puckett is a seasoned finance professional with a successful track record focused on major energy and metals processing projects in the Middle East. During his 25-year City career he worked for Bank of Tokyo International, Bank of Montreal, Bank of America, KPMG and German mortgage lender Hypo Real Estate.

His role at Jordan Energy & Mining is to co-ordinate and raise equity and debt finance from prospective investors and banking institutions to cover the cost of the FEED process and, ultimately, to put all financing arrangements in place.

Financial information



Samer Al-Makhamreh
Geology & Exploration
Manager

Prior to joining Jordan Energy & Mining's Jordan team, Samer Al-Makhamreh was Manager of Geology and Exploration for Al-Rajhi Cement Co. Before that he held the position of Head of Study Division and Deputy to the Exploration Director for Jordan's Natural Resources Authority.

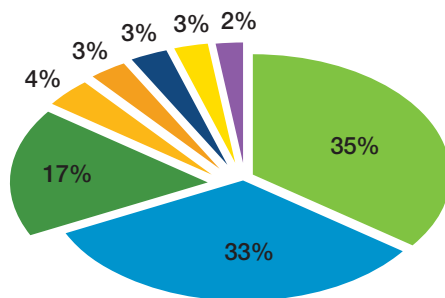
A geological engineer, Samer holds an MSc in Geomaterials from the University of London.

First oil and power in 2016

- 4,000bpd initial average production, rising to 22,000bpd in 2020 and 38,000bpd by 2026
- 30-year mine life
- Total production potential of around 300 million barrels of oil
- Breakeven with oil prices at \$50 per barrel
- Respectable returns with oil prices at >\$65 per barrel
- Opportunity to sell finished products and high quality SCO at a 10% premium

CAPEX by broad category

The initial capital cost of the project is expected to be approximately \$500million, broken down as follows:

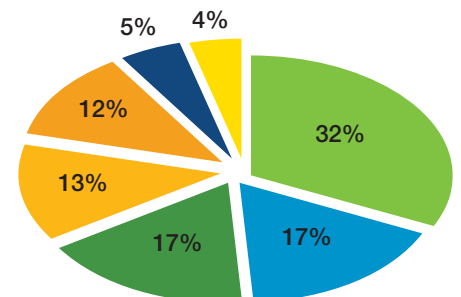


- Balance of plant, utilities, ore prep, freight
- ATP train
- Others (Engineering contingency)
- Power plant
- Hydrogen production plant
- Sulphur recovery unit and storage
- Mine development
- Water treatment plant

The feasibility study financial analysis has been prepared based on a capital structure of 60% debt at 7.5% interest and 40% equity. The project's rates of return below.

OPEX by broad category

The annual operating cost is expected to average US \$38m in the first four years and US \$270m in years 10 to 30, expressed in 2012 dollars. This is equivalent to about US \$29/bbl in the first four years and US \$23/bbl in the remaining years. The pie chart shows the breakdown by component:



- ATP & oil recovery
- Mining
- Upgrading plant
- Site wide common services
- Owners cost
- Power generation
- OPP & material handling

An attractive investment proposition

At 4,000bpd
(phase 1)
NPV₁₀ \$250m
IRR 15.9%

At 22,000bpd
(phases 1 & 2)
NPV₁₀ \$1,774m
IRR 22.8%

At 38,000bpd
(phases 1, 2 and 3)
NPV₁₀ \$2,310m
IRR 23.2%

Figures post tax project economics @ \$90/bbl

Jordan Energy & Mining Group

Summary financial statements

Balance Sheet	March 2008 £000s	March 2009 £000s	March 2010 £000s	Dec 2010 £000s	Dec 2011 £000s
Fixed Assets					
Tangible Fixed Assets at Cost	42.2	76.9	66.5	72.5	77.8
Less: Depreciation	(23.6)	(32.7)	(42.4)	(50.5)	(63.2)
Net	18.6	44.2	24.1	22.0	14.6
Current Assets - Debtors					
Other Debtors	33.3	114.8	64.1	40.5	33.6
Prepayments and accrued income	8.2	183.9	16.1	16.9	18.1
Total Debtors	41.5	298.7	80.2	57.4	51.7
Cash at Bank and in Hand (including deposits)	55.6	10,931.0	2,801.5	1,513.8	446.0
Total Current Assets	97.1	11,229.7	2,881.7	1,571.2	497.7
Current Liabilities - Creditors					
Convertible Loan Notes	1,300.0	-	-	-	-
Trade Creditors	13.6	1,711.3	77.7	51.3	60.6
Taxation	21.7	-	-	-	-
Accruals	86.6	478.0	279.6	373.3	559.5
Other Creditors	26.6	-	4.1	4.2	4.4
Total Creditors	1,448.5	2,189.3	361.4	428.8	624.5
Total Current Liabilities	1,448.5	2,189.3	361.4	428.8	624.5
Net Current Assets / (Liabilities)	(1,351.4)	9,040.4	2,520.3	1,142.4	(126.8)
Net Assets / (Liabilities)	(1,332.8)	9,084.6	2,544.4	1,164.4	(112.2)
Represented By:					
Called-up Share Capital & Premium	1.0	16,482.1	16,482.1	16,482.1	16,482.1
Profit & Loss Account Deficit	(1,333.8)	(7,397.5)	(13,937.7)	(15,317.7)	(16,594.3)
Total Shareholders' Funds / (Deficit)	(1,332.8)	9,084.6	2,544.4	1,164.4	(112.2)

The balance sheet details have been extracted from the audited financial statements. However, this presentation has not been audited. A copy of the audited financial statements is available from the company on request.

Profit & Loss Account

	Total to March 2008 Conceptual Study	April 2008 to March 2010 Bankable Feasibility Study	March 2010 to December 2011 Concession and pre-development	Total to December 2011
	£000s	£000s	£000s	£000s
Project expenditure	1,222	14,127	2,661	18,010
Financial Costs - Bank Charges & Exchange Variances Relative to Sterling	3	(1,211)	29	(1,179)
Depreciation & Profits on Disposal	24	19	21	64
Taxation	(12)	12	-	0
Net Interest Paid / (Received)	97	(343)	(2)	(248)
Net Expenditure	1,334	12,604	2,709	16,647

Shareholdings at December 2012

	Shares	% of Total
Founders and Management		
Munther Akroush	85,794	1.7%
Eike von der Linden	102,242	2.0%
Christopher Morgan	580,867	11.7%
Christopher Nurse	115,594	2.3%
David Pedley	102,242	2.0%
Total Founders & Management	986,739	19.7%
Institutional Shareholders		
RAB Capital (Special Situations (Master) Fund & Octane Fund)	1,183,316	23.6%
Sentient Group (Sentient Executive GPII Ltd and GPIII Ltd)	1,891,547	37.8%
J P Morgan (Two funds)	408,653	8.2%
Institutional and Other Shareholders (each individually holding less than 5%)	539,197	10.7%
Total Shares in Issue	5,009,452	100%

Options have been awarded to founders and personnel over 360,367 shares. The board has been given authority by the shareholders to issue options over a further 140,578 shares to executives or staff. The table above represents the beneficial ownership of shares to the best of the company's knowledge and belief.

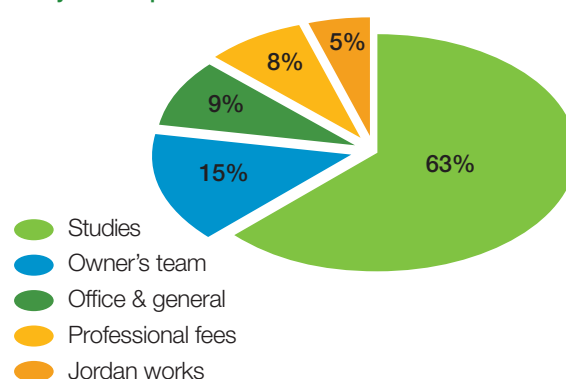
Notes

Audited Profit & Loss figures for the respective years are shown below. The table above provides an analysis of the profit and loss but this analysis has not been audited.

Audited Loss	£000s
for the period to 31st March 2007	619
for the year to 31st March 2008	715
for the year to 31st March 2009	6,064
for the year to 31st March 2010	6,540
for the 9 months to 31st December 2010	1,380
for the year to 31st December 2011	1,329

A copy of the Audited Accounts is available from the company on request.

Project Expenditure





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RG1 1TG

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EC4M 9AF

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100% of the inks used are vegetable oil based 95% of press chemicals are recycled for further use and on average 99% of any waste associated with this production will be recycled.

Whilst this information is given in good faith based on the latest information available to Jordan Energy and Mining Limited (JEMPL) and its Directors, no warranty or representation is given concerning such information, which must not be taken as establishing any contractual or other commitment binding upon JEMPL or any of its Directors