

Renergen

ASX IPO

Execution of Virginia stage one development

Oil & gas

Renergen is fully funded for stage one development of its flagship Virginia Gas Project in South Africa. This initial phase of development will produce c 19k tons of LNG and c 112 tons of helium per year. We estimate cash flow from operations of c ZAR91.0m, after first production in FY22. We value Renergen based on the monetisation of the company's audited 2P reserve base, on the basis of staged development as set out in the company's ASX IPO prospectus. Key investment considerations include the pace of LNG adoption in the South African trucking market and realisable LNG prices. Our risked valuation, inclusive of the company's entire 2P reserve base (net 138.3bcf of methane and 3.3bcf of helium), is ZAR20.5/share.

Year-end	Revenue (ZARm)	Adj. EBITDA* (ZARm)	Reported net income (ZARm)	Net (debt)/cash (ZARm)	Cash from operations (ZARm)	Capex (ZARm)
02/18	2.9	(26.9)	(40.6)	(31.1)	(18.4)	(13.9)
02/19	3.0	(43.2)	(45.0)	48.3	(36.9)	(13.3)
02/20e	0.0	(52.0)	(62.6)	(49.2)	(59.6)	(143.5)
02/21e	0.0	(52.0)	(71.9)	(439.0)	(68.9)	(321.0)

Note: *EBITDA normalised, excluding amortisation of acquired intangibles, exceptional items and share-based payments.

Stage one funding in place

Edison estimates that with a post ASX IPO fund-raise cash balance of US\$19m, combined with OPIC debt of up to US\$40m, funding has been secured for the progression of stage one development of the Virginia gas project. Shareholders now have line of sight to a material step-up in cash flow from LNG and helium sales.

LNG adoption rates and pricing key drivers

Renergen currently sells small volumes of CNG to Megabus under a diesel linked price structure, and in the short term we expected similar realisations to be achievable in the evolving South African LNG trucking sector. Renergen's current CNG volumes are priced at c US\$15–20/mcf. In the longer term (beyond 2025), we expect competition from imported LNG and development of southern coast gas discoveries to cap prices. From 2025, we therefore use an oil-indexed price plus a transport and distribution premium of US\$2/mcf, a total price of US\$11.8/mcf at our base case Brent 2025 US\$75/bbl forecast. We assume LNG truck adoption supports demand for the entirety of Renergen's produced volumes equating to 1.1% of the total medium-term South African LNG truck market (projected by Lungiswa Energy) for stage one.

Valuation: ZAR20.5/share risked 2P valuation

Our base case valuation, based on net methane 2P reserves of c 138.3bcf and net helium 2P reserves of 3.3bcf, generates a NAV of ZAR20.5/share. This includes adjustments for commercial and development risk, potentially conservative long-term LNG price assumptions and a discount rate of 12.5%. Limiting our valuation only to stage one results in a valuation of ZAR6.2/share (A\$0.63/share). Successful delivery of stage one should, in our view, de-risk further phases of development.

26 June 2019

Price **ZAR11.0**
Market cap **ZAR1,239m**

ZAR14.2/US\$

Net debt (ZARm) February 2019 48.3

Shares in issue 112.6m

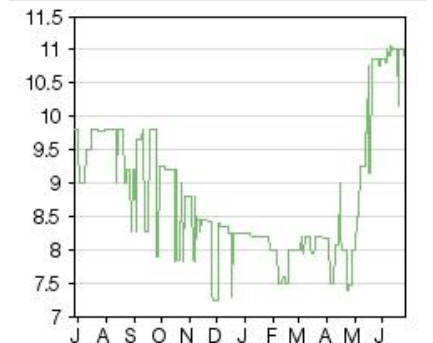
Free float 24%

Code RENJ

Primary exchange JSE

Secondary exchange ASX

Share price performance



% 1m 3m 12m

Abs 0.4 33.1 13.3

Rel (local) (6.4) 26.3 8.6

52-week high/low ZAR11.05 ZAR7.25

Business description

Renergen is an emerging producer of helium and liquefied natural gas (LNG), with existing production and sales of compressed natural gas.

Next events

H119 results October 2019

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**Renergen is a research client
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Research Limited**

Investment summary

Company description: Integrated value chain

Reenergy is a South African energy firm developing the Virginia gas project in the Free State. Building off a well inventory drilled for the gold mining industry, the company expects to ramp-up production from 2019 as it moves to LNG production, in turn opening an opportunity to capture and sell high-purity helium into a potentially tightening, illiquid market. LNG is primarily being targeted towards substituting diesel for long-range, heavy-duty trucks in South Africa, as well as replacing LPG in the industrial sector and potentially the power sector in the medium term.

Valuation: Significant upside with ZAR20.5/share risked NAV

Our base case valuation, based on net methane 2P reserves of c 138.3bcf and net helium 2P reserves of 3.3bcf, generates a risked NAV of ZAR20.5/share (A\$2.06/share). This includes adjustments for commercial and development risk, a potentially conservative long-term LNG price assumption and a discount rate of 12.5%. Limiting our valuation to stage one development of Virginia would bring this down to ZAR6.2/share (A\$0.63/share).

Financials: Stage one development funded

Reenergy intends to invest c ZAR590m over the next two years on the stage one development of the Virginia gas project, as well as drilling of new development wells and exploration/appraisal of the 'White Sand' high-concentration helium play. This investment cycle is to be funded through equity raised in November 2018 through a rights issue totalling ZAR125m, and Reenergy's June 2019 ASX IPO secondary placing of gross c ZAR105m (net c ZAR94m) as well as debt (US\$40m or ZAR566.5m available from the Overseas Private Investment Corporation (OPIC), a US government agency). We forecast FY22 EBITDA of ZAR162m.

Sensitivities: A number of key uncertainties

Key valuation uncertainties include the price at which Reenergy can sell domestically produced LNG and the adoption of LNG as a diesel alternative in the trucking sector, as well as the interdependency between these two factors.

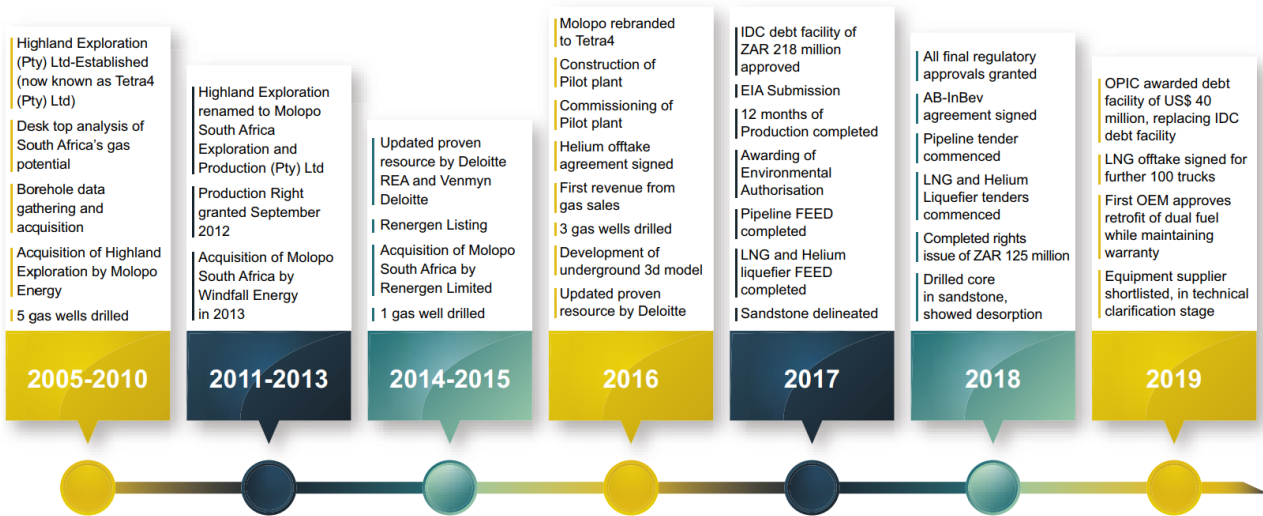
- **LNG macro outlook:** Pricing of LNG for the South African long-haul truck market is likely to mirror CNG pricing in the short term. However, in the longer term we build price de-escalation into our models to reflect potential for competition from LNG imports and/or offshore deep-water gas development.
- **LNG trucking market adoption rates:** Edison's base-case valuation assumes all LNG produced by Reenergy is consumed within the domestic LNG trucking market. The LNG truck market is adopting LNG as a lower-cost and cleaner alternative to diesel. A market report produced by Lungiswa Energy estimates c 53,831 trucks could potentially convert to LNG over the next seven to 10 years, which would be enough to consume over 10x our modelled peak LNG production.
- **Technical issues:** Drilling success will rely on intersecting gas-bearing faults, but while a number of the most recent wells failed to achieve this, subsequent studies indicate that inclined wells will increase the chance of success. Uncertainty remains around the decline rates of the wells and this will require longer-term production history to refine. At this stage, it is not clear at what rate Virginia bio-genic gas is recharged. Our models are only based on current reserves.

Corporate strategy and project evolution

Renergen is focused on the commercialisation of the Virginia gas project through its investment in 90% owned subsidiary Tetra4. Tetra4 holds the first and only onshore production right in South Africa. Discovered gas is located in an area of energy scarcity, growing demand and limited gas supply. In addition, gas at the Virginia project has some of the highest helium concentrations globally (averaging 3.4% in some areas), making it a very valuable by-product.

A timeline of key events that have enabled Renergen to progress the initial discovery of gas in 2014 to a government-approved and funded development are highlighted in Exhibit 1.

Exhibit 1: Major milestones of Renergen and the Virginia gas project



Source: Renergen

CNG plant operational

A compressed natural gas (CNG) plant was installed and commissioned at the Virginia gas project in 2016, producing 200GJ per day of gas from one well. The pilot CNG plant includes a compression station, mobile storage units and a dispensing station at the site of Tetra4's customer Megabus. Megabus has trialled 10 buses operating on CNG with over 1.6m kilometres travelled without incident. In May 2018, Tetra4 entered into a gas sales agreement with Anheuser-Busch for the supply of CNG for 15 trucks in Johannesburg. Supply is expected to commence in H219, and supply of LNG for 50 trucks (circa one-sixth of Virginia stage one initial production) is expected to commence once Virginia gas project stage one is operational. Tetra4 has also entered into an agreement with Black Knight Logistics for the supply of LNG to 100 trucks. Once stage one is operational, CNG sales will cease and be replaced by LNG.

Virginia gas project stage one development

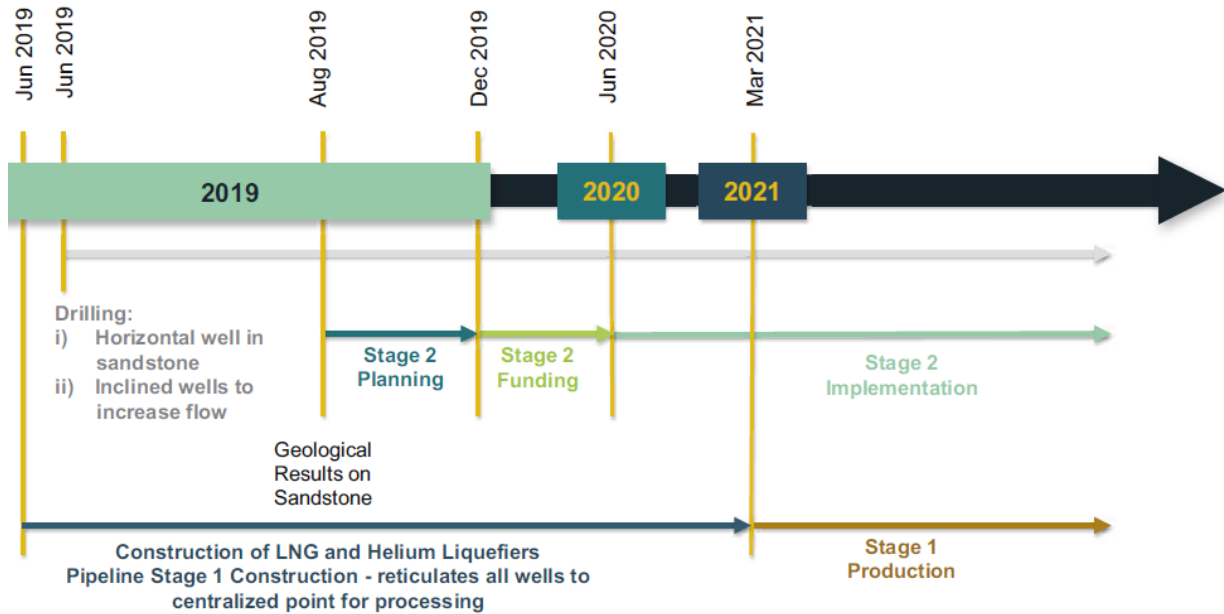
Stage one development of the Virginia gas project involves the connection of 12 existing gas wells to a new gas pipeline and processing plant for the production of both helium and LNG. Renergen intends to award the contract for the new plant in June 2019, with completion and commissioning within 21 months of award. Stage one development key metrics are:

- maximum daily production capacity of 74.6mcf (c 350kg) of liquid helium;
- maximum daily production capacity of 2,700GJ (50 tons) of LNG;
- scalability to allow production expansion to support anticipated growth in domestic LNG demand; and

- the total capital cost of stage one is estimated by Renergen at c US\$35m and is to be funded through Renergen’s November 2018 rights issue (A\$11.8m) and committed debt funding of US\$40m from OPIC.

Net proceeds from Renergen’s June 2019 IPO on the ASX are intended to be used to fund the drilling of additional production wells in Tetra4’s proven gas reserves and to fund a feasibility study for the commercialisation of high-concentration helium reserves contained in the Virginia gas project’s prospective sandstone deposit.

Exhibit 2: Indicative timeline for the Virginia gas project*



Source: Renergen. Note: *Listing on the ASX was completed in June 2019 and given the delay we now expect geological results on sandstone towards the end of 2019.

Virginia gas project stage two development – high-concentration helium production

Stage two will involve the drilling and connection of horizontal wells to a high-pressure pipeline at the Virginia gas project where a far larger helium and LNG facility will be built. Funding remains to be secured for stage two and development is expected to be undertaken over the next three to four years.

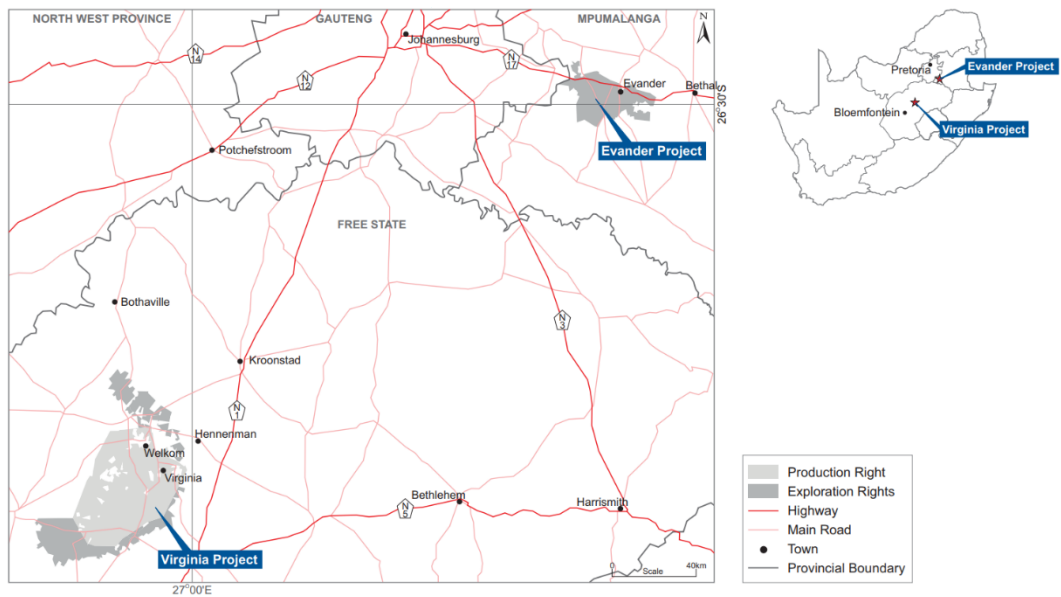
Virginia project subsurface review

Renergen’s principal asset is Tetra4, which it acquired in December 2015 as Molopo South Africa Exploration and Production Proprietary. The company holds a 90% interest in the first and only onshore petroleum production right in South Africa, located in the Virginia area of the Free State and around 150km north of Bloemfontein. It also holds seven exploration rights across the area, with five located in the Virginia gas project and the remaining two in the early stage Evander exploration project in Mpumalanga (Exhibit 3).

The region is known for the presence of gold, uranium and coal, and in particular has been extensively mined for gold, which was discovered in the Welkom Goldfield in 1932. Gas was originally encountered in the Virginia gas project area in a number of holes drilled as part of the gold mining process at Welkom, with 12 of these historical wells still blowing, ie capable of producing, today. The gas is predominantly methane but also has a high helium content of c 2%. The methane is believed to be biogenic in origin, while the helium is either mantle-derived or from

the decay of radioactive minerals within the crust, which moves up through large faults and mixes with the methane in the deep subsurface.

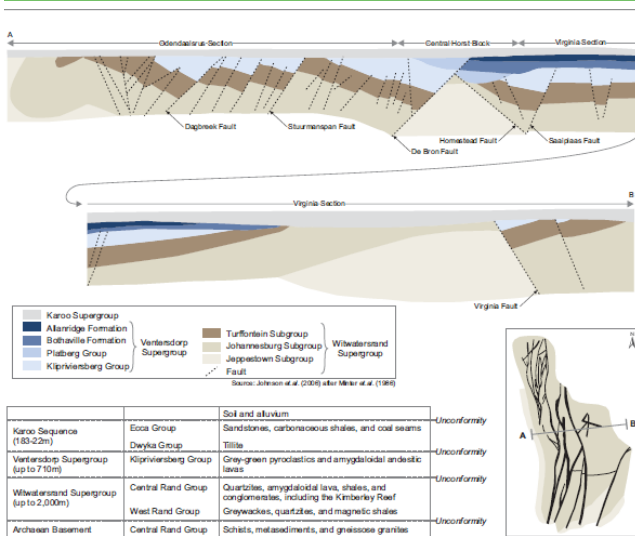
Exhibit 3: Assets map



Source: Renegen/Deloitte CPR

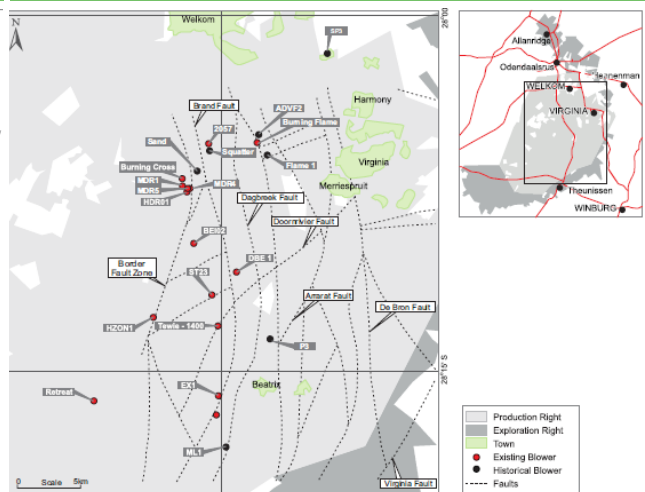
The source of the gas is the Witwatersrand Supergroup, a very hard rock consisting of quartzites, lava, shales and conglomerates, which is usually deeply buried at depths of around 1.8–2.0km. Outcrops do however occur and one of these covers a 60km stretch across the Tetra4 assets where the Witwatersrand sits at a depth of only 300m, making it more accessible at this location. The Witwatersrand is overlain by the volcanic Ventersdorp Supergroup, which contains major faults together with fractures and fissures that provide natural pathways for the gas to flow. A 1–2m thick Doleritic plate and the Karoo Supergroup deposited on top of the Ventersdorp post faulting both act as a seal.

Exhibit 4: Virginia project – stratigraphic cross-section



Source: Renegen/Deloitte CPR

Exhibit 5: Virginia project – map with faults



Source: Renegen/Deloitte CPR

The understanding of the geological structure in the Virginia project is based on 3,000 logs and a lithological database gathered during the drilling of wells, the majority of which were drilled by miners. The structure is north-south trending and is characterised by the presence of faults created

during the tectonically active Ventersdorp period. These faults act as conduits that facilitate gas flow and so are actively targeted when drilling for gas production purposes. The faults tend to have a north-south orientation and are complemented by a series of dykes that run in an east-west direction. These dykes have formed almost vertical fractures that provide continuous connections between the Witwatersrand and the Ventersdorp.

Methane isotope studies indicate that the methane is biogenic in origin and is, therefore, an ongoing renewable resource. The rate at which this is renewed, known as the recharge rate, is uncertain at this stage. However, this should not affect the Virginia project since the planned development is not expected to deplete the volume in the reserves area.

Exhibit 6: Summary of Virginia project wells drilled targeting gas		
Year	Well name	Results
2009	HADV1	Low gas rate
2009	HADV2	Low gas rate
2009	HDR1	Significant gas rate
2010	HPAL1	No gas
2010	HZON1	Significant gas rate
2016	MDR1	Produced gas for short time
2016	MDR4	Produced gas for short time
2016	2057	Significant gas rate
2016	MDR5	Significant gas rate

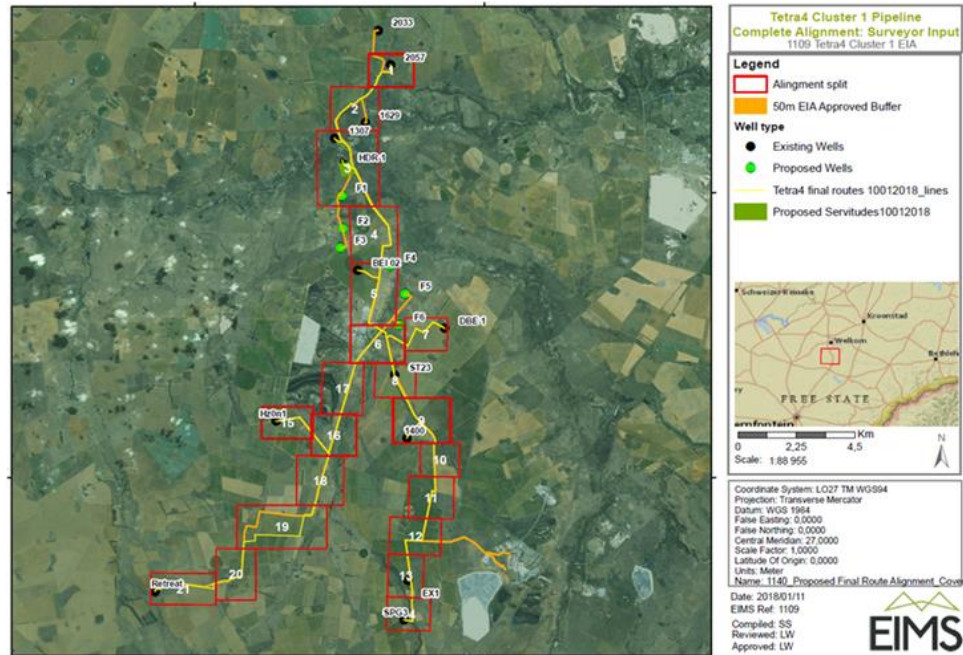
Source: Edison Investment Research, Renergen

Drilling in the region is simple, with a low-pressure environment and shallow target depths of between 400m and 750m. Nine exploration wells targeting gas have been drilled since 2009 with varying results depending on the success with which the wellbore intersected gas-bearing faults. Based on the results of these wells, we have assumed a success rate of 60% for additional new wells. Historically, all wells were drilled vertically, but in the future they will be drilled as inclined wells in order to maximise the chance of intersecting the gas-bearing fractures. A 2016 study, carried out for Tetra4 by Shango Solutions, recommended that wells should be drilled at an angle of 55° and inclined to the south-east in order to optimise the intersection of steep east-west and westerly dipping north-south structures.

Rates from the wells vary; for example, HDR1 originally produced at over 200mscfd and 2057 at up to 400mscfd, while some older wells produce closer to 30–40mscfd. Importantly, data from all wells have shown no decline in flow rates as a result of production. There is also scope for these rates to be higher in future inclined wells and for existing wells with the use of compressors. The low rate and low pressures in the wells mean that friction between the gas and the wellbore restricts the flow. The use of compressors results in negative pressures at the wellhead, which can increase flow from the well. In HDR1, the use of a compressor saw an increase in flow from 200mscfd to 250mscfd.

There are 18 existing wells, of which 12 are considered suitable for use initially, with the remaining wells either located too far from the planned pipeline location or with lower flow rates. Additional production wells will be drilled as part of stage one of the development, and these will target proven reserves along the main north-south fault line.

Exhibit 7: Virginia project Cluster 1 well locations and pipeline



Source: Renergen

‘White Sand’ play

The ‘White Sand’ play is a Permian Karoo age sandstone that was initially identified in the 2016 well 2057, where gas was encountered at a depth of 290m. Gas flows from the shallow white sandstone were also identified in the 2089 and HAK4 wells, and a 3D model of the sandstone was developed based on data from these wells. This model was tested with drilling the T4 WN 01 well towards the eastern edge of the licence in 2018, which encountered 73 metres of gas-bearing Karoo sandstone and siltstone. The well did not test gas at commercial rates; however, the potential for this play, as a conventional, low-pressure gas resource, to add to the future resource base has now been established by four wells penetrating the sandstone over a wide area, each with good gas content (well 2057 is a sandstone well producing at almost 11% helium). A feasibility study is now planned during stage one of the development project to determine if this prospective resource can be commercialised as part of stage two. It is envisaged that horizontal wells will be used to exploit this reservoir.

Reserves and resources

Four independent reserves reports have been prepared on the Virginia project, the first two from Venmyn Deloitte with effective dates of 31 May 2015 and 31 July 2016. Based on work carried out in the interim period, Deloitte was able to increase its 2P reserves estimate by 18% from 87.9bcf to 103.5bcf.

Exhibit 8: Reserves evolution (bcf) of Virginia project (gross)

Reserves	Natural gas			Helium		
	1P	2P	3P	1P	2P	3P
Deloitte 2015	27.1	87.9	245	-	-	-
Deloitte 2016	35.2	103.5	276.4	-	-	-
MHA 2018	40.4	141.6	299.0	0.91	3.16	6.56
MHA 2019	45.3	154.4	315.8	1.1	3.60	7.24
Contingent resources	1C	2C	3C	1C	2C	3C
MHA 2018	286	548	847	9.09	17.2	25.9
MHA 2019	263	483	719	8.4	15.2	22.0

Source: Venmyn Deloitte, MHA Petroleum Consultants

In late 2017, Renergen engaged MHA Petroleum Consultants to independently assess the Virginia gas project. MHA estimated 2P gas reserves of 141.6bcf of natural gas (an increase of 57%), along with 2C contingent resources of 548bcf and best estimate prospective resources of 1,278bcf. For the first time, MHA also assessed the helium reserves (these had not been considered in the previous Venmyn Deloitte reports), awarding 2P helium resources of 3.16bcf.

MHA prepared an update to the 2018 report in March 2019. The material changes seen since the 2018 report included the addition of the HDR-1 well as a proved developing producing (PDP) well on the basis that sufficient production data had become available. In addition, two wells, I BN 56120A (Dumidi) and 2190 (Big Flame), were moved from contingent resources into reserves following a review of the available data. This has increased 2P reserves to 154.4bcf, while 2C resources have decreased from 548bcf to 483bcf. Prospective resources remain unchanged. Helium 2P resources have increased slightly to 3.6bcf.

Helium: A high-value commodity

Alongside its LNG facilities, Renergen plans to build a plant to extract and sell helium at 300kg/day by Q122 and has signed a gas sales agreement (GSA) with Linde Global Helium (Linde) for the sale of helium gas.

Based on the historical analysis of both blowers and legacy 2009/10 wells, Renergen has known for some time that the gas produced from the Virginia gas project contains a significant quantity of helium. However, historical helium concentration data has been inconsistent, mainly because helium can diffuse out of inappropriate containers, such as steel canisters, and gas analyses need to be carried out as soon as possible after collection.

Renergen carried out fresh helium analyses of the wells it intends to use as producers (under strict sampling and testing criteria), returning results that range from a minimum Helium content of 1.4% to a maximum of over 10% for the 2057 well. MHA's 2019 update has assumed a 3–4% concentration in the centre of the production licence and assigns 2P helium reserves of 3.60bcf on this basis (ie 2.33% helium 2P but reaching c 3.3% average for the contingent resource). The gas composition is ideal for separating out helium as it contains no H₂S (hydrogen sulfide), minimal H₂ (hydrogen) or Ne (neon) and low levels of CO₂ (carbon dioxide). Renergen's ability to remove H₂S processing from the stage one facility design has the material benefit of reducing plant capital cost.'

Edison recently published a [macro note](#) on the global helium market.

Extracting helium from produced biogenic gas

Helium is typically extracted from natural gas in three processing steps:

1. The removal of impurities.
2. The extraction of high-molecular weight hydrocarbons.
3. Cryogenic processing to remove residual nitrogen and liquefy the helium.

In the case of the Virginia gas project, the gas resource is of high purity, with an average methane content of over 90% and almost no higher alkanes, so that the complexity of the liquefaction process can be minimised.

Gas to be treated will initially be filtered to remove any particles, before CO₂ is removed with an amine wash. This will be followed by further filtering to remove hydrogen, neon and smaller particles. The flow stream is then cooled to below -161°C in a mixed refrigerant cycle cooler, which liquefies the methane to produce LNG. The remaining gas is boosted in a low temperature compressor to feed a helium cold box, which uses the helium as the refrigerant to super cool the gas to liquefaction point at -269°C. During this process, the residual nitrogen in the gas liquefies at -196°C, and is removed from the system and used for cooling and re-compression of helium. This cycle continues until the helium is liquid.

South Africa gas supply and LNG demand

All commercially available natural gas in South Africa is imported via pipeline from Mozambique by Sasol, and most gas traders engage in the on-selling of gas originating from Sasol. Renergen will be South Africa's first LNG producer and will represent an important early step into the uptake of LNG in the country. The country is dominated by coal and is seeking to move away from this, both through the development of indigenous sources of gas and through LNG imports, with three potential, and important, LNG projects being considered. Richards Bay in KwaZulu-Natal Province is reported to be the likely first project.¹ Imported LNG requires an anchor gas-to-power (GTP) project, and progress has been slow in developing an integrated LNG import/power project.

In May 2018, South Africa's energy minister, Jeff Radebe, spoke about resurrecting an initial gas-to-power programme with two port-based LNG import terminals at Richards Bay and Coega, alongside gas-fired power plants of 2,000MW and 1,000MW, respectively. The integrated development anticipates the use of FSRUs (floating, storage and regasification units) to receive, convert and store imported LNG with an estimated initial project cost of US\$3.7bn. Renergen is focused on delivering small-scale but scalable, domestically produced LNG, which has fewer barriers to entry.

The offshore F-A field and South Coast Complex fields have supplied indigenous natural gas to PetroSA's gas-to-liquid (GTL) plant in Mossel Bay, but these are now depleted. Ibhubesi, off the coast of the Northern Cape and operated by Sunbird Energy, is South Africa's largest proven natural gas field with an estimated 540bcf of recoverable reserves, and is expected to start producing gas commercially by 2020.

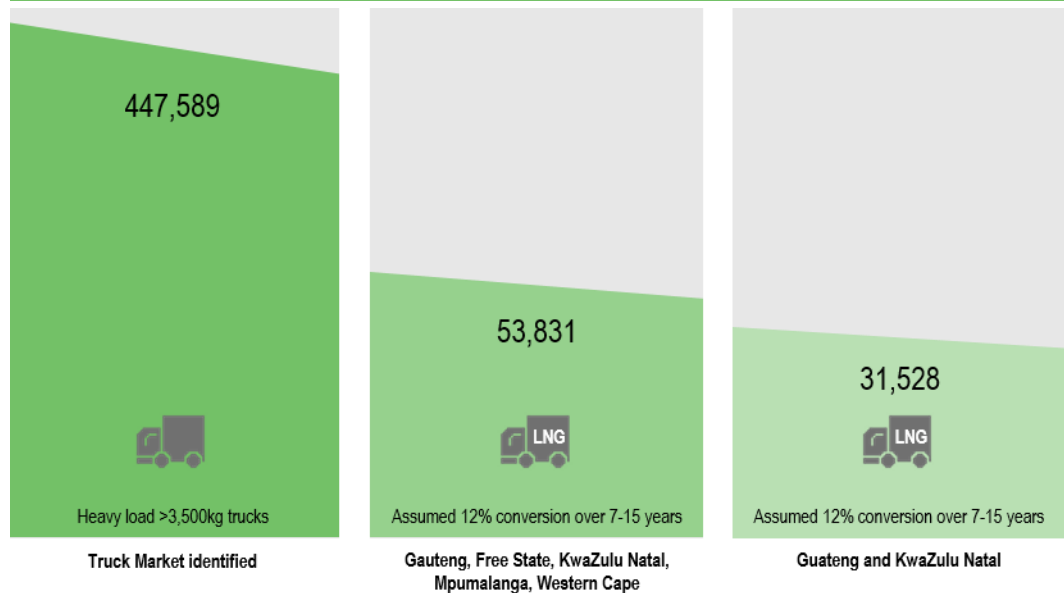
In 2019, Total opened up a new play in the Outeniqua basin with the discovery of gas condensate and light oil in the Brulpadda 1AX well, in over 1,400m of water in Block 11B/12B. Total has stated that it believes the discovery could hold between 500mmboe and 1bnboe in an Aptian/Albian fan system. The company has subsequently undertaken a 3D seismic survey across the acreage and is expected to drill up to four exploration wells across four further prospects identified on 2D, with the first well expected from early 2020. Offshore drilling in the region is complicated by the difficult metocean conditions in the region (Brulpadda was a re-entry of a well abandoned by Total in 2014 due to challenging conditions) and wells are expensive, with Brulpadda 1AX estimated to have cost around US\$154m. We do not expect to see material gas volumes from recent discoveries until the middle of next decade.

¹ www.icis.com/resources/news/2017/11/09/10162122/south-africa-delays-decision-on-lng-imports-to-next-year/

Heavy-duty truck market

As part of Renergen’s 2019 ASX IPO prospectus, the company engaged Lungiswa Energy to produce an independent market report on the natural gas sector in South Africa specifically addressing LNG for heavy-duty vehicle or truck usage. Lungiswa Energy estimates a potential market opportunity accessible to Renergen of 40,000 to 67,000 trucks in five of the nine provinces of South Africa. This estimate is based on e-Natis data on vehicle numbers and an assumed conversion rate to LNG of 9–15% for trucks. Conversion is expected to be gradual over the medium term, which the report defines as the next seven to 15 years. We note that conversion rates have been made on the basis of LNG being available at US\$7–8/mcf, which is materially below MHA and Edison short-term price expectations (see Exhibit 11), which are based on a discount to diesel. It also assumes that fuel duties applicable to current liquid fuels are not applied to LNG. Higher gas price assumptions and the inclusion of a fuel duty are likely to have a negative impact on adoption rates.

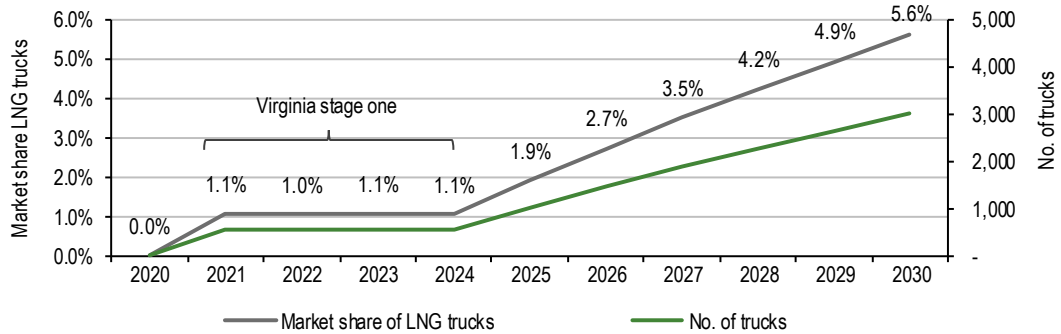
Exhibit 9: South Africa LNG truck adoption forecasts



Source: Edison Investment Research, Lungiswa Energy data

We take these adoption forecasts and compare them to the ramp-up profile we use for the Virginia gas project in Exhibit 10. As such, we do not feel that our projected ramp-up is likely to be demand constrained (unless LNG adoption is materially below Lungiswa Energy forecasts); at peak we forecast only c 5% of the medium-term accessible LNG market forecast to be supplied by Renergen.

Exhibit 10: Production ramp-up vs South Africa market share



Source: Edison Investment Research

Wellhead to truck delivery and pricing

Regeren has a GSA in place to sell CNG to Unitrans Passenger (Megabus) at a price indexed to sulphur free diesel with a fixed percentage discount. Based on this formula the company will be able to realise attractive prices of around US\$20/mcf.

Fuel efficiency improvements are also likely to be driving the global uptake of CNG/LNG for trucks. Iveco has reported 15% fuel efficiency savings vs diesel for its most recent fleet of single-fuel trucks with double LNG tanks while extending its autonomy range to 1,600km.² Regeren's own trials (Autolytix, 13 October 2017) on dual fuel trucks (diesel-CNG) showed a 13–14% improvement in consumption and 25–26% reduction in direct fuel costs over diesel-only vehicles.

Distribution of LNG

Tetra4 plans to distribute its LNG via modular refuelling facilities, which Tetra4 plans to locate on vacant land to be leased on existing trucking routes. Storage and distribution technology is readily available off-the-shelf and Tetra4 has the benefit of being able to select from a number of suppliers in the country.

Tetra4 proposes to locate refuelling facilities along South Africa's major motorways and several truck manufacturers have commenced marketing dedicated LNG trucks to customers in anticipation of the Virginia gas project.

Industrial/power markets

In addition to trucks, Regeren is offering its current CNG production to industrial users to replace liquefied petroleum gas (LPG). LPG is currently being sold in South Africa at c US\$24/mcf, so again, CNG/LNG at sub-US\$20/mcf is attractive.

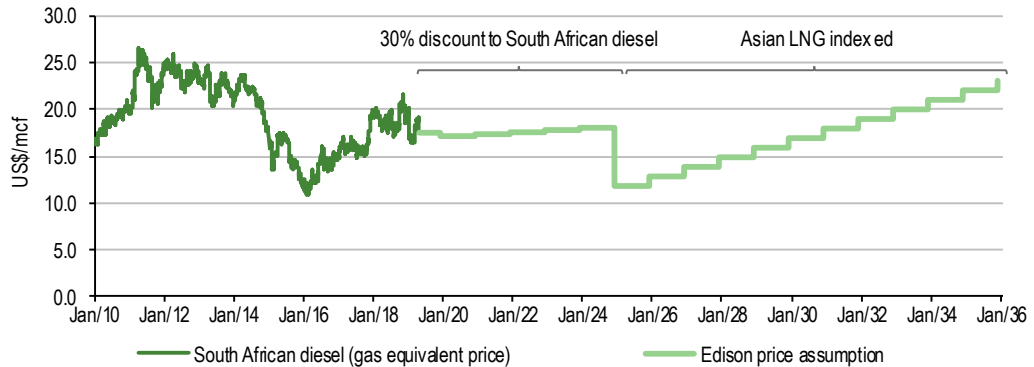
In the longer term, Regeren may also target the power sector as a market for its LNG. Eskom (South Africa's state electricity company) needs to continue to push through price hikes to support its weak balance sheet (electricity prices have more than doubled in real terms over the five-year period between 2008 and 2013).³ Regeren management has indicated that at current electricity prices plus increases of c CPI + 4%, the company could get a better return from the power sector in as little as three to four years' time as it could get from the truck market. The key for entry into the power sector will be Regeren's ability to prove enough gas volume to support long-term offtake from a medium-sized gas power station.

² www.iveco.com/en-us/press-room/release/Documents/2017/NewStralisNP460.pdf

³ www.eskom.co.za/Documents/EcoOverviewElectricitySA-2017.pdf

Edison LNG price assumptions

Exhibit 11: Gas equivalent price for South African wholesale diesel (US\$/mcf)



Source: Bloomberg, Edison Investment Research. Note: Assumes a 30% discount to the diesel equivalent price, consistent with our modelling assumptions.

As indicated previously, Renergen already has a GSA in place with Unitrans to sell its CNG at the equivalent of diesel less a 22.5% discount. Given that there may be some pricing pressure to build sales in the truck sector we have subjectively increased the discount in our models to 30% out to 2025.

Gas prices as charged by Sasol Gas for imported natural gas or locally produced synthetic gas are capped at a maximum price of US\$11.24/GJ (c US\$11.9/mcf; source National Energy regulator of South Africa (NESRA)) prior to compression and distribution. This price cap is before the addition of transmission and distribution costs and margin, which Lungiswa estimate at c US\$2/GJ depending of the location of the customer. Gas traders currently sell gas (CNG) at much higher prices in order to cover compression, transmission and distribution costs in addition to trading profits.

At present CNG is not subject to the same fuel levy as diesel and petrol; this could change if LNG adoption was to increase, reducing the price at which gas can be sold in order to be competitive with liquid fuels.

Beyond this, we see potential for competition from LNG imports, assuming planned import projects are progressed. For the period beyond 2025 we assume prices are capped at Edison's oil-indexed LNG contract price plus a US\$2/mcf premium for transport and distribution. We recognise that our long-term price assumption (beyond 2025) could prove to be conservative in the absence of competition from other sources of gas and, should competition increase, power substitution should become effective. We expect Renergen to announce further GSAs for its LNG product and will update our price assumptions as appropriate.

Modelling the Virginia project's development

We model a number of scenarios, taking the most recent CPR as the basis for volumes, along with the following assumptions:

- Well capex: c US\$105k drilling expenditure plus c US\$70k connection.
- Initial production (IP) for vertical well: 135mcf/d (methane only), or 120GJ/d, which assumes each vertical produces from one structure, with a 60% chance of commercial success with each well.
- Well decline rate: 5% in line with MHA assumptions (albeit this could be conservative as some of Renergen's wells currently show no decline).

- Production period: all reserves are produced within the current production rights, valid until 2044 (although Renergen can elect to extend this at its own discretion).
- Helium plant modules capex: initial module US\$3.7m (module can process up to 350kg/day).
- LNG plant initial module capex: US\$16.2m (module can process up to 2,700GJ/day (c 2.85mmcf/day)).
- Variable opex costs of US\$2.1/mcf with fixed costs below US\$0.5m pa.
- Helium price of US\$280/mcf, based on September 2018 US Bureau of Land Management (BLM) auction pricing.
- LNG price is based on a 30% discount to the gas equivalent price of wholesale diesel price in South Africa until 2025. For the period beyond 2025 we assume prices are capped at Edison's oil-indexed LNG contract price plus a US\$2/mcf premium for transport and distribution. This is a potentially conservative assumption given existing offtake agreements. We assume wholesale diesel prices move with Brent prices on a percentage basis.
- All costs and prices are dollar denominated and inflate at 2.5% (note that we assume any South African rand depreciation is built into our discount rates).

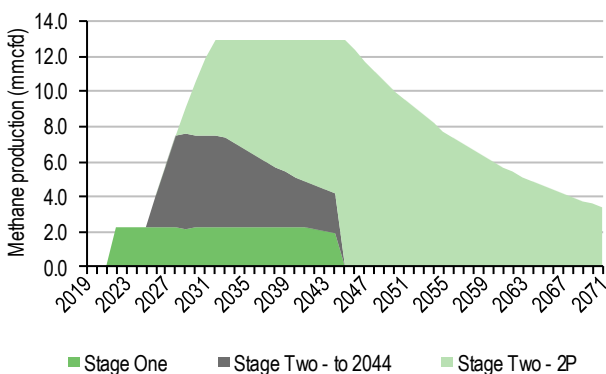
Our base case model is based on vertical wells only at this stage, although we would expect to update this for deviated wells once Renergen has sufficient well data to support an updated development plan.

Virginia project staged development

Renergen plans to develop the Virginia resource base in stages, and we base our valuation and forecasts around a two-stage initial development, followed by full-field development targeting the remainder of the company's 2P reserves.

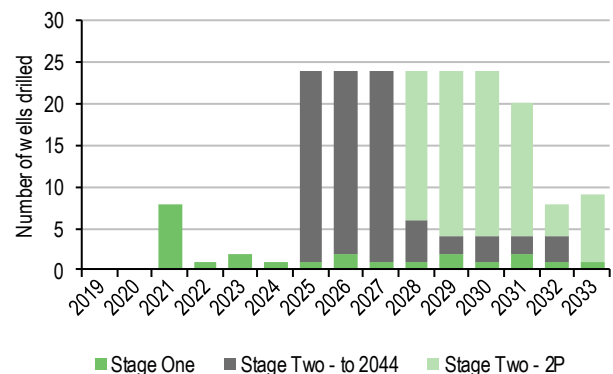
Renergen has indicated that drilling of new wells will commence in June 2019, with additional wells looking to fill stage one gas processing capacity. Edison forecasts methane production profiles for the stage one development case, a stage two development and then expansion, modelled to recover the company's 2P reserve base. The associated drilling schedules are shown in Exhibit 12.

Exhibit 12: Virginia gross production assumptions



Source: Edison Investment Research

Exhibit 13: Virginia drilling assumptions (new wells)



Source: Edison Investment Research. Note: Assumes a 60% success rate of drilling.

Management

Stefano Marani (CEO) was part of the team that acquired Tetra4 Proprietary Limited from its previous owners (Molopo Energy Limited) and has been involved with the company in a management role since April 2013. Stefano has significant experience in the areas of structured

finance and advisory. He was charged with building Morgan Stanley's sub-Saharan African fixed income capital markets business and previously worked at Deutsche Bank. He holds degrees in actuarial science and advanced mathematics of finance.

Nick Mitchell (COO) was instrumental in the acquisition of Tetra4 and subsequently developed and implemented Tetra4's vertically integrated business plan. He has extensive experience in infrastructure projects across Africa supported by a network in territories including Cote d'Ivoire, the Democratic Republic of Congo and Mozambique. Nick is also currently serving as the chairman of the Onshore Petroleum Association of South Africa (ONPASA), which represents the upstream onshore petroleum industry in South Africa.

Fulufhedzani (Fulu) Ravele (CFO) obtained her CA (SA) qualification with Deloitte South Africa in 2012. She has experience in financial accounting, internal and external audit. After qualifying as a chartered accountant (SA), she was seconded to Deloitte LLP's Los Angeles office as an audit senior. Fulu was appointed as a management accountant at Barclays Capital South Africa in June 2013, where she focused on reporting financial results for corporate and investment banking (CIB) South Africa and rest of Africa. Fulu joined Molopo South Africa as financial director in July 2015. She holds a bachelor's degree of commerce in financial accounting, a postgraduate diploma in accounting and CA (SA).

Risks and sensitivities

Funding: Renergen has secured funding for stage one development of the Virginia gas project through a combination of OPIC debt and equity (2018 rights issue). In addition, Renergen's June 2019 ASX fund-raise provides additional capital for expansion and further exploration/appraisal. Funding for stage two development will depend on timing and underlying realised methane and helium prices. In our base case, stage two development would be funded organically using existing debt facilities.

Price risk: Renergen's economics will be heavily influenced by the price it can realise for its LNG. We assume a 30% discount to diesel equivalent for our short-term projections, although this is more conservative than the current GSA it has with Unitrans. In the medium term, there is an opportunity for Renergen to target the power sector (reflecting continued increases in electricity prices in South Africa) as well as the industrial sector. Beyond 2025, we assume the potential for competition for alternate gas sources, such as imported LNG. Further, GSAs will help give investors comfort around the prices and volumes it will be able to secure as it ramps production. Exhibit 18 shows the effect the LNG price has on our valuation.

Fiscal regime change: South African energy policy is in need of finalisation, with severe bureaucratic delays compromising promising hydrocarbon exploration and permits taking years to be agreed. Despite this difficult environment, Renergen is in prime position as it already has a production licence with agreed fiscal terms (that it can elect to extend on equivalent terms if required) and positive authorisation on its Environmental Impact Assessment (EIA). While we do not expect any future legislation to affect Renergen's existing terms, investors should be aware of the uncertain wider regulatory environment.

Reservoir risk: As with any E&P company, the production of the reservoir is critical to cash flow generation. Although a number of wells have been open for decades and still flow, large-scale development of the reservoir requiring over 500 vertical wells (including contingency) could easily produce well results very different from expected. Possible deviated wells should help increase flow rates per well and reduce well count (and capex), but results of deviated wells are not yet known.

Overhang: At present, 76% of Renergen's shares are held by the top six shareholders.

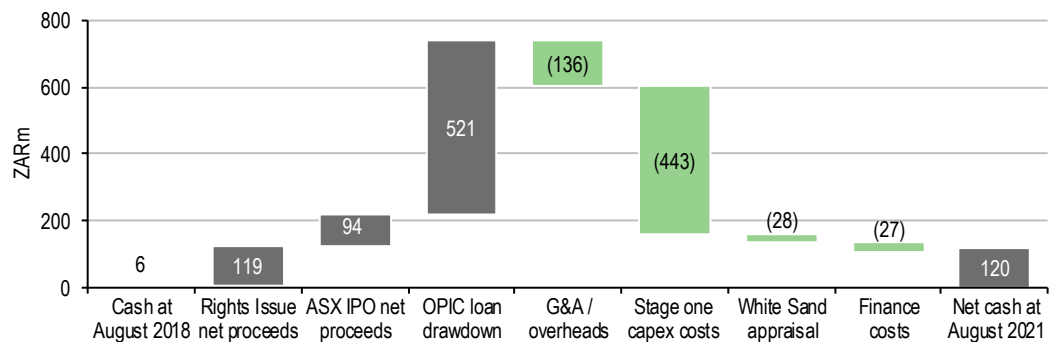
Financials

Regergen's financial year runs from 1 March, hence it is already in FY20.

As of 28 February 2019, Regergen held ZAR98m in cash and a ZAR50m loan agreement with Molopo Energy Limited (interest free and maturing in December 2022). Below we look at sources and uses of funds from August 2018 and during the stage one development of the Virginia project.

- Regergen raised ZAR118.8m in November 2018 through a rights issue.
- In December 2018, convertible debt of ZAR5.3m was issued with a coupon rate of 15% per annum. 5% of interest accruing to the notes per annum is to be paid in cash and 10% capitalised.
- In February 2019, OPIC committed to providing Tetra4 with a debt funding facility of up to US\$40m (principal of US\$35m and a US\$5m overrun contingency) over a 12-year period. OPIC will gain security over the shares in Tetra4 as well as its assets. On or before 30 September 2019, Regergen will enter into a formal agreement with OPIC to document the terms of the loan, on completion of OPIC due diligence. The applicable interest rate will be 4% plus the rate necessary to fund the loan through OPIC's certificates of participation, which are marketed to third-party investors. We model an OPIC debt cost of 10% for the purpose of financial forecasting, however we note that recent OPIC loans to companies operating in the energy sector have secured lower rates (eg Ormat Technologies 7.02%).
- In June 2019, Regergen completed its listing on the ASX, raising new equity capital of ZAR105m gross (ZAR94m net).

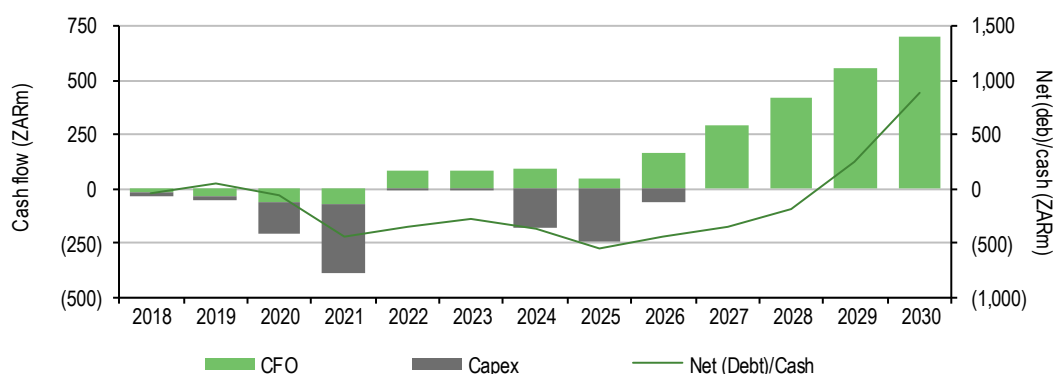
Exhibit 14: Stage one development sources and uses of capital



Source: Edison Investment Research

Based on current projections, the stage one development of the Virginia project is fully funded and we expect further stages to be funded through operational cash flow and project debt. Key areas of uncertainty in our projections include the pace of growth in the LNG trucking sector and the achievable pricing.

We model remaining Virginia stage one capex/overhead of ZAR465m ahead of first gas, covering initial LNG and helium processing modules, pipeline costs and production wells. Based on our forecasts, Regergen will have sufficient funds for stage two development, assuming the bulk of expansion capex in FY25. Net debt remains within that available under Regergen's OPIC facility.

Exhibit 15: Cash flow and net debt evolution


Source: Edison Investment Research. Note: Years are financial years ending February.

Valuation

Our base case valuation for Renergen is ZAR20.5/share as shown in Exhibit 16. This is based on current estimated 2P methane reserves of 154.4bcf gross and 2P helium reserves of 3.6bcf (implying a helium concentration of 2.33%). We assume a 12.5% cost of capital, reflecting Renergen's capital structure and associated country risk.

Exhibit 16: Renergen valuation

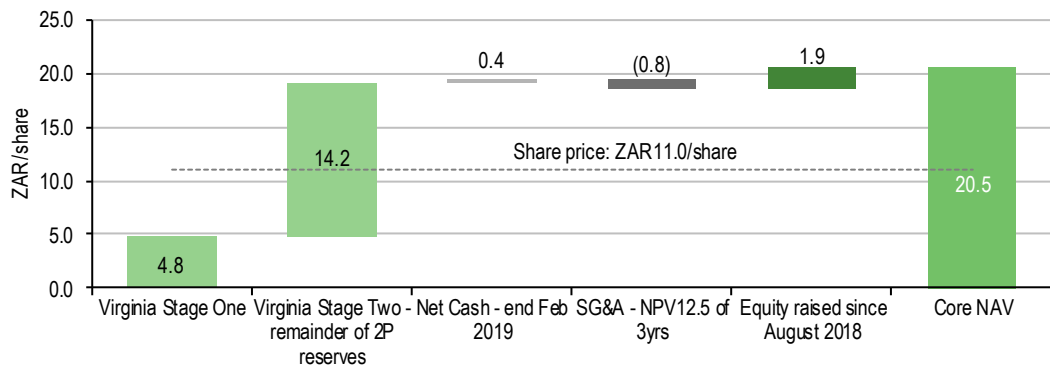
Asset	Country	Diluted WI %	CoS* %	Recoverable reserves		Risky		Value per share (risky)		
				Gross	Net	NPV _{12.5}	NAV	ZAR/share		
				bcf	bcf	US\$/mcf	US\$m	12.5%	15.0%	10.0%
Net debt – end Feb 2019							3	0.4	0.4	0.4
SG&A – NPV _{12.5} of 3 years							(7)	(0.8)	(0.8)	(0.8)
Equity raised since August 2018							16	1.9	1.9	1.9
Production / Development										
Virginia stage one	South Africa	90%	90%	19.1	17.2	2.6	40	4.8	3.4	6.7
Virginia stage two / remainder of 2P reserves	South Africa	90%	70%	138.2	124.4	1.4	119	14.2	10.2	20.0
Core NAV				157.3	141.5		172	20.5	15.1	28.2

Source: Edison Investment Research. Note: Fully diluted share capital (post equity raises): 118.7m. *Chance of Success (CoS) only reflects development risk. NPV models assume that only 60% of drilled wells will be economic, reflecting geological risk.

We have risked our model for development uncertainty by applying a 90% development/commercial chance of success for stage one and 70% for stage two and recovery of remaining 2P reserves. Geological risk is accounted for in our DCF calculations based on the assumption that only 60% of wells drilled will be commercial (and connected to pipe).

Running our models just based on the development of stage one, our core NAV for the project would be ZAR6.2/share, ie the current share price is pricing an element of upside associated with stage two development of the Virginia gas project. We currently do not ascribe any additional value for Renergen's substantial contingent resources.

Exhibit 17: Valuation waterfall (ZAR/share)



Source: Edison Investment Research

Differences with the recent MHA reserves report

The MHA 'Independent reserve and resource evaluation report' published by Renegen has different valuations to Edison's valuation above, ie NPV₁₅ in the MHA report for 2P reserves is ZAR9,788m (c US\$693m) vs our model of only US\$180m. It is important to understand the differences with our base case valuation, which we lay out below:

- MHA run its economics on a pre-tax basis.
- MHA applies a consistent 22.5% discount to diesel on gas prices vs Edison's lower gas price assumptions
- MHA assumes a rapid escalation of gas prices (9% pa), but restricts costs to 2% pa increases – this generates significant margin expansion over time compared with our models.
- MHA includes a rapid increase in production relative to Edison estimates (a production profile is not available in MHA's last published assessment).
- We apply a 70–90% commercial chance of success to reflect development risk in our model.
- Edison's base case valuation utilises a 12.5% WACC.

Commodity price sensitivities

At this juncture there remains a lot of uncertainty around the commercial exploitation of the Virginia gas project. For example, as described earlier, helium concentrations could be substantially different to the 2.33% calculated in the certified reserves (given issues with sampling and gas leakage). We present in Exhibit 18 the sensitivity of helium price and concentration on our 2P core NAV valuation.

Exhibit 18: Helium and LNG price sensitivities on valuation (ZAR/share)

% helium	Helium price (US\$/mcf)							Asian LNG indexed (US\$/mcf)	Discount to South African diesel (%)						
	160	200	240	280	320	360	400		5%	10%	20%	30%	40%	50%	60%
1.00%	13.0	13.6	14.3	14.9	15.5	16.2	16.8	8.00	19.0	18.4	17.4	16.4	15.3	14.3	13.3
2.00%	15.4	16.6	17.9	19.1	20.4	21.6	22.8	10.00	20.7	20.2	19.1	18.1	17.1	16.0	15.0
2.33%	16.2	17.6	19.0	20.5	21.9	23.4	24.8	12.80	23.1	22.5	21.5	20.5	19.5	18.4	17.4
3.00%	17.7	19.6	21.4	23.2	25.1	26.9	28.8	14.00	24.1	23.6	22.5	21.5	20.5	19.5	18.4
4.00%	16.7	19.1	21.5	24.0	26.4	28.8	31.3	16.00	25.8	25.3	24.3	23.2	22.2	21.2	20.1

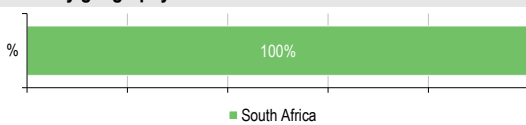
Source: Edison Investment Research

The largest impact on our valuation, however, is likely to be the long-term LNG price that can be realised. Our assumed LNG realised price is currently based on a 30% discount to diesel vs the 22.5% discount the company has in its agreements with Megabus. However, this may come under some pressure in the medium term with the evolution of the LNG industry in South Africa.

Exhibit 19: Financial summary

Accounts: IFRS; year-end February; ZAR000s	2016	2017	2018	2019	2020e	2021e	2022e	2023e	2024e
INCOME STATEMENT									
Total revenues	0	1,722	2,885	2,987	0	0	243,692	243,908	253,256
Cost of sales	0	(2,127)	(3,483)	(3,197)	0	0	(26,215)	(26,527)	(27,736)
Gross profit	0	(405)	(598)	(210)	0	0	217,477	217,382	225,520
SG&A (expenses)	(17,889)	(21,589)	(31,050)	(43,010)	(52,012)	(52,012)	(52,012)	(52,012)	(52,012)
R&D costs	0	0	0	0	0	0	0	0	0
Other income/(expense)	0	0	4,708	0	0	0	0	0	0
Exceptionals and adjustments	(1,518)	0	(12,359)	(1,629)	(3,000)	(3,000)	(3,000)	(3,000)	(3,000)
Depreciation and amortisation	(88)	(1,025)	(803)	(1,165)	0	0	(25,722)	(25,354)	(25,924)
Reported EBIT	(19,495)	(23,019)	(40,102)	(46,014)	(55,012)	(55,012)	136,744	137,016	144,584
Finance income/(expense)	2,942	1,279	597	(2,534)	(7,561)	(16,842)	(20,021)	(19,676)	(19,330)
Other income/(expense)	0	0	0	0	0	0	0	0	0
Exceptionals and adjustments	(2,946)	(3,156)	(3,532)	0	0	0	0	0	0
Reported PBT	(19,499)	(24,896)	(43,037)	(48,548)	(62,573)	(71,854)	116,723	117,340	125,253
Income tax expense (includes exceptionals)	0	6,234	2,436	3,572	0	0	(54,412)	(54,478)	(56,613)
Reported net income	(19,499)	(18,662)	(40,601)	(44,976)	(62,573)	(71,854)	62,311	62,862	68,641
Basic average number of shares, m	53	78	80	85	110	113	113	113	113
Basic EPS (ZAR/share)	(0.4)	(0.2)	(0.5)	(0.5)	(0.6)	(0.6)	0.6	0.6	0.6
Adjusted EBITDA	(17,889)	(21,994)	(26,940)	(43,220)	(52,012)	(52,012)	165,465	165,370	173,508
Adjusted EBIT	(17,977)	(23,019)	(27,743)	(44,385)	(52,012)	(52,012)	139,744	140,016	147,584
Adjusted PBT	(15,035)	(21,740)	(27,146)	(46,919)	(59,573)	(68,854)	119,723	120,340	128,253
Adjusted EPS	(0.3)	(0.2)	(0.3)	(0.5)	(0.5)	(0.6)	0.6	0.6	0.6
Adjusted diluted EPS (ZAR/share)	(0.3)	(0.2)	(0.3)	(0.5)	(0.5)	(0.6)	0.6	0.6	0.6
BALANCE SHEET									
Property, plant and equipment	7,145	21,756	32,615	37,757	160,157	481,112	457,754	437,246	413,806
Goodwill	0	0	0	0	0	0	0	0	0
Intangible assets	61,504	75,453	65,838	70,494	91,613	91,613	91,613	91,613	91,613
Other non-current assets	0	6,234	10,303	14,421	14,421	14,421	14,421	14,421	14,421
Total non-current assets	68,649	103,443	108,756	122,672	266,191	587,146	563,788	543,280	519,840
Cash and equivalents	41,721	12,401	3,037	97,956	509,729	119,920	208,589	294,959	390,040
Inventories	0	0	0	0	0	0	0	0	0
Trade and other receivables	4,134	8,933	2,459	4,482	4,482	4,482	4,482	4,482	4,482
Other current assets	6,503	0	0	0	0	0	0	0	0
Total current assets	52,358	21,334	5,496	102,438	514,211	124,402	213,071	299,441	394,522
Non-current loans and borrowings	26,612	30,113	34,156	49,684	558,952	558,952	558,952	558,952	558,952
Other non-current liabilities	0	0	0	0	0	0	0	0	0
Total non-current liabilities	26,612	30,113	34,156	49,684	558,952	558,952	558,952	558,952	558,952
Trade and other payables	3,490	5,503	11,433	11,193	11,193	11,193	11,193	11,193	11,193
Current loans and borrowings	0	0	0	0	0	0	0	0	0
Other current liabilities	0	0	0	0	0	0	0	0	0
Total current liabilities	3,490	5,503	11,433	11,193	11,193	11,193	11,193	11,193	11,193
Equity attributable to company	98,828	98,423	80,948	180,634	226,658	157,804	223,115	288,978	360,619
Non-controlling interest	(7,923)	(9,262)	(12,285)	(16,401)	(16,401)	(16,401)	(16,401)	(16,401)	(16,401)
CASH FLOW STATEMENT									
Profit before tax	(19,499)	(24,896)	(43,037)	(48,548)	(62,573)	(71,854)	116,723	117,340	125,253
Net finance expenses	(2,942)	(1,279)	(597)	2,534	7,561	16,842	20,021	19,676	19,330
Depreciation and amortisation	88	1,841	2,822	3,150	0	0	25,722	25,354	25,924
Share based payments	1,518	0	114	334	3,000	3,000	3,000	3,000	3,000
Other adjustments	5,921	4,453	10,169	7,988	(7,561)	(16,842)	(20,021)	(19,676)	(19,330)
Movements in working capital	(6,266)	(3,254)	12,090	(2,327)	0	0	0	0	0
Other items	0	0	0	0	0	0	0	0	0
Income taxes paid	0	0	0	0	0	0	(54,412)	(54,478)	(56,613)
Cash from operations (CFO)	(21,180)	(23,135)	(18,439)	(36,868)	(59,573)	(68,854)	91,033	91,216	97,564
Capex	49,512	(20,714)	(13,861)	(13,343)	(143,519)	(320,955)	(2,364)	(4,846)	(2,484)
Acquisitions & disposals net	0	0	0	0	0	0	0	0	0
Other investing activities	0	0	0	0	0	0	0	0	0
Cash used in investing activities (CFIA)	49,512	(20,714)	(13,861)	(13,343)	(143,519)	(320,955)	(2,364)	(4,846)	(2,484)
Net proceeds from issue of shares	72,957	13,427	23,480	140,212	105,597	0	0	0	0
Movements in debt	0	0	0	5,149	520,547	0	0	0	0
Dividends paid	0	0	0	0	0	0	0	0	0
Other financing activities	(60,186)	1,102	558	(231)	(11,279)	0	0	0	0
Cash from financing activities (CFF)	12,771	14,529	24,038	145,130	614,865	0	0	0	0
Increase/(decrease) in cash and equivalents	41,103	(29,320)	(8,262)	94,919	411,773	(389,809)	88,669	86,370	95,081
Cash and equivalents at end of period	41,721	12,401	3,037	97,956	509,729	119,920	208,589	294,959	390,040
Net (debt) cash	15,109	(17,712)	(31,119)	48,272	(49,223)	(439,032)	(350,363)	(263,993)	(168,912)

Source: Renegeren accounts, Edison Investment Research

Contact details	Revenue by geography
1 Bompas Road, Dunkeld West, 2196 South Africa Renergen.co.za	 <p>A horizontal bar chart with a single green bar representing 100% of the revenue. The y-axis is labeled with a '%' symbol. Below the bar, a legend indicates 'South Africa' with a green square.</p>

Management team	
CEO: Stefano Marani	CFO: Fulufhedzani (Fulu) Ravele
Stefano was part of the team that acquired Tetra4 Proprietary Limited from its previous owners (Molopo Energy Limited) and has been involved with the company in a management role since April 2013. Stefano has significant experience in the areas of structured finance and advisory. After completing his formative training with Deutsche Bank, Stefano was recruited by Morgan Stanley in London, where he was ultimately charged with building its sub-Saharan African fixed income capital markets business. He holds degrees in actuarial science and advanced mathematics of finance.	Fulu obtained her CA (SA) qualification with Deloitte South Africa in 2012. She has experience in financial accounting, internal and external audit. After qualifying as a chartered accountant (SA), she was seconded to Deloitte LLP's Los Angeles office as an audit senior. Fulu was appointed as a management accountant at Barclays Capital South Africa in June 2013, where she focused on reporting financial results for corporate and investment banking (CIB) South Africa and rest of Africa. Fulu joined Molopo South Africa as financial director in July 2015. She holds a bachelor's degree of commerce in financial accounting, a postgraduate diploma in accounting and CA (SA).
COO: Nick Mitchell	

Nick Mitchell was instrumental in the acquisition of Tetra4 and subsequently developed and implemented Tetra4's vertically integrated business plan. He has extensive experience in infrastructure projects across Africa supported by a network in territories including Cote d'Ivoire, the Democratic Republic of Congo and Mozambique. Nick is also currently serving as the chairman for the Onshore Petroleum Association of South Africa (ONPASA), which represents the upstream onshore petroleum industry in South Africa.

Principal shareholders	(%)
Tamryn Investment Holdings (Pty)	30.9
Mazi Capital	26.2
Government Employees Pension Fund	12.4
Mergence Investment Managers	9.0
MATC Investments (Pty) Ltd	7.7
CRT Investments (Pty) Ltd	7.6
Mr Stefano Marani	0.2

Companies named in this report	
Molopo Energy Limited, Linde, Unitrans, BP, Shell, Iveco, Eskom	

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