Saudi Arabia's Vision 2030: Black Swans for Saudi Arabia's Power Sector

Francis Patalong - Senior Counsel - Corporate / Mergers and Acquisitions / Commercial / Mediation / Sustainability focused Corporate Governance / Sustainable Finance / Sustainable Business / Sustainable Sourcing / Climate Change & Energy Transition

f.patalong@tamimi.com - Riyadh

October 2016

This article discusses a number of Black Swans which have implications for Saudi Arabia's Vision 2030 (the "Vision"), Saudi Arabia's fifteen year plan to wean itself from its current dependency on oil revenues. Before doing that, it also considers the socio-economic backdrop to Vision 2030.

The Oil Paradox

Saudi Arabia's consumption of its own oil and gas is growing at around 7% per year[1]. Demand for power is especially high during the scorching heat (in some places well over 50C) of the summer months when power consumption increases significantly in order to run air conditioning but with significant regional variance. The very title of the 2011 Chatham House report "Burning Oil to Keep Cool"[2] captures the essence of the problem. However, air conditioning is only a part of the energy challenge faced by the country.

Desalinated water production is also a very significant domestic consumer of hydro-carbons. The Saline Water Conversion Company (the "SWCC") runs its own fleet of coastal IWPP stations which can be called upon by the Saudi Electricity Company (the "SEC") to help meet peak demand – in 2012, 5.3 percent of the total electricity generated by the Saudi power sector (and transmitted and distributed by the SEC) came from SWCC. In that year SEC power purchases from third parties amounted to 23.8 percent of energy generated. Saudi Aramco also has significant power generation capacity and there is a small but well established IPP market.

Heavily subsidized power and water have been part of the social compact in Saudi Arabia for decades. Both cool air and potable water are funded by exporting a resource (oil) which is the Kingdom's primary source of revenue. Those abroad who fill their tanks with Saudi oil have, indirectly, been funding this compact. At the same time, those oil-importing countries have enjoyed the significant benefit of exporting into the Saudi market (everything from consumer goods to military weapons and equipment). The downside of that position is a lack of private sector employment in the Kingdom itself – one of the key challenges which the Vision is intended to address, with a planned 6 million additional jobs by 2030.

Moving to anything approaching cost-reflective tariffs for electricity and water (and the recently promulgated National Transformation Program sets a target of a 100% tariff to actual water cost by 2020) is likely to be a painful, but ultimately necessary adjustment, if the value in the primary asset of the Kingdom is to be realised and invested (and not dissipated in its own domestic market). Achieving that goal will require a gradual shift in pricing and subsidy strategy across many sectors (not just power and water). You cannot invest premium oil revenues to pay for future pensions if you burn the oil at a discount to chill air and desalinate water. Worse still, if the water that is produced is then subject to significant leakage (becoming not only "non-revenue water" but actually "anti-revenue water") then the inefficiency in the system is further exacerbated. The missing element then for SEC (and SWCC, NWC and by extension all other state entities which provide services), is the wherewithal for the end user to actually pay something approaching a market rate.

Achieving that goal will require a gradual shift in pricing and subsidy strategy across many sectors (not just power and water) including, for instance, the soon-to-be realized metro system in Riyadh. Again, this segues into the key element of the Vision, which relates to private sector employment and employability and as a necessary corollary to both, *education*.

It should therefore be no surprise that Saudi Aramco has previously warned (well before the current oil price reduction) that crude *export* capacity would fall by about 3 mb/d to under 7 mb/d by 2028 unless *domestic energy growth demand* was checked. In effect, Saudi Arabia risks consuming just over one quarter of its current oil production by 2028. Mr. Khalid Al-Falih (now Energy Minister, in 2010 Chief Executive of Saudi Aramco) was quoted in the Financial Times[4] saying:

"We estimate that, *through improved efficiency*, while maintaining the same economic growth, the increase in energy demand can be cut in half," Mr Falih also said… "If no efficiency improvements are achieved, and the business is as usual, the oil availability for exports is likely to decline to less than 7m barrels per day by 2028, a fall of 3m barrels per day, while the global demand for our oil will continue to rise."

Those were far-sighted comments but, even in 2010, although the challenge was apparent, the full glare of complicating factors was perhaps not so clear. Since that time the advent of shale technology has prompted a return to longer term price trends in the international hydro-carbon markets and opened almost boundless seams of carbon resource to countries which have hitherto lacked energy security. Oxford University economist Dieter Helm, has recently remarked on the situation:

"The oil outlook that emerges…is very different from the one envisaged by many in the oil industry, in oil producing countries and forecasters… It is one in which the oil price stabilises in the short run at a much lower level, *where the medium term oil price stays subdued by more and more oil supply and not much demand growth, and where in the long run, the oil price declines*."[5]

In 2010, after the financial crisis but before the period of sustained prices above the USD 100 per barrel mark, the price per barrel of oil was around USD80. Helm's point is that, analyzed over the 150 years or so of the global oil industry, even USD 50 would be a high price. Given that shale technology is only going to become more efficient over the short and medium term (and that renewable energy technology will enjoy similar advances), it is difficult to envisage a situation where countries would sacrifice their own new-found energy security to support the social fabric of other states.

Unfortunately, it gets worse.

Dieter Helm cautions that that the low cost labour model for economic development is not necessarily one which will serve in the future:

"Why should the simplistic model of replicating China's growth play out in other populous developing countries? Is it really the case that the future lies with cheap labour gaining markets for exports in the developed countries? This assumes that the basic technologies will remain labour-cost driven. Yet the emerging growth story is all about robotics, automation, 3D printing – in other words, the application of information technologies to manufacturing and services, and hence a move from labour to digitalised capital. The new technologies will compete more on skills and intellectual capital, and less on manual labour. These technologies are all electric, not oil based. *For electricity, oil is not a preferred fuel source*. Gas has a much more attractive role to play. As the world electrifies, gas out-competes oil, before next generation solar and the new low carbon generation technologies come on stream."

That perspective is not good news for a country with a population 70% of which is aged under 30 and who have grown up under an entirely favourable oil-based economic model (although it should be noted that the Kingdom has extensive gas reserves).

Black Swans

The global temperature for February 2016 was far above the long-term average and was described by scientists as a "shocker" and signalling "a kind of climate emergency"[6]. March 2016 set a new record temperature for that time of year, according to NASA's Goddard Institute for Space Studies. The global temperature was 1.28C warmer than the average for March from 1951 to 1980, which is used as a baseline[7]. Figures recently released by NASA show the global temperature of land and sea was 1.11C warmer in April than the average temperature for April during the period 1951-1980[8]. What we do not know is how rapidly change is likely to occur or how bad it will be, but the trend is clear (and since the climate is a dynamic system, prone to mutually and self-reinforcing feedback loops we are unlikely to ever reach a stable position in this regard in any case). It is apparent that change is occurring "faster than anticipated".

Former Exxon Mobil economist, Hoesung Lee, new head of the United Nations Intergovernmental Panel on Climate Change ("IPCC"), recently said that the goal of keeping temperature rise under 2C remained "…*technically feasible*, although it could become prohibitively expensive. 2C is achievable, and if we fail to act according to what the IPCC has been advising, the cost will rise phenomenally, the sooner we act, we will be able to achieve 2C stabilisation *cost-effectively*," he went on. "The longer we wait to take action, the cost will be a lot higher."[9]

The next landmark report from the UN climate science panel – due to come out in three stages between 2020 and 2022 – will look more closely at policies for dealing with climate change. That could include studies of the relative effectiveness of carbon taxes in different economies, the impacts of technology standards, government funding for research and development, and policies for protecting cities and rural areas from climate change. As a part of that debate, we can expect to see economic (and philosophical) innovations such as Dieter Helm's recent work on the pricing of natural capital achieving further prominence, the key question (perhaps in some respects a restatement of Minister Al Falih's 2010 comment and Hoseung Lee's more recent comments on cost-effectiveness) being: *what would we be willing to give up in order to have more of something else?*

The Intended Nationally Determined Contribution ("INDC") of Saudi Arabia under the United Nations Framework Convention on Climate Change ("UNFCCC") recognises these challenges). Under the INDC two development baseline scenarios are identified – one reliant on the kind of heavy industrialization which (per Dieter Helm above) seems less attractive; the other envisaging economic diversification with a robust contribution from oil and its derivatives with revenues channelled into investments in high value-added sectors such as financial services, medical services, tourism, education, renewable energy and energy efficiency technologies to enhance economic growth. The INDC states that the Kingdom aims to create long-term partnerships with universities, research institutes and the private sector in order to enable utilization of these technologies. The INDC is very clear on what the priorities will be:

"(a) water saving, recycling, capture, irrigation and sustainable management for agriculture purposes; (b) early warning system against meteorological extreme events (such as floods, storms and droughts); and (c) transportation technologies that are resilient to the adverse effects of climate change while reducing and/or capturing transportation-related emissions."

In relation to the Vision, a rapid acceleration of climate change is a Black Swan.

Squaring the Circle

Squaring the circle of energy efficiency, cost effectiveness and subsidy is likely to be at the heart of most if not all future PPP/concession arrangements.

In the Saudi context, SEC has a fundamental role on the supply side. There have been indications that the government (the 80% shareholder) is considering restructuring it – into generation, transmission and distribution companies. This is a relatively well-trodden path globally – lots of good lessons have been learned and can be applied here. Indeed, there are several dominant players in various utility markets which benefit from home-country golden share investment and support, leveraging off the knowhow

garnered in their domestic markets to win market share overseas. The scope for a Saudi player to morph over time into a company with a footprint as extensive as a Veolia or an Engie is very real. Indeed Abunayyan and ACWA Power have already made significant strides. If that path can be based on diversifying into new technologies which create jobs then at least some of the goals in the Vision and the INDC are within reach.

Others are already implementing a similar strategy – Italian oil major Eni (in which the Italian state owns around 30% of shares) aims to bring 420 megawatts of mostly solar power generation online by 2022 by reusing derelict land linked to existing fossil fuel operations. Chief Executive Claudio Descalzi expects Eni to invest 1 billion Euros over the next three years in renewable energy projects and research[10]. For the Kingdom, this process has to start with SEC. In the January 2014 prospectus for SEC's Sukuk Al-Istithmar, the position advanced on generation company restructuring was stated to be as follows:

"Each GENCO will be incentivized to operate as efficiently as possible, with performance being measured against key performance indicators…the creation of wholly owned GENCOs which are incentivized to operate efficiently and compete against each other should ensure significant improvements in [the] generation business."

It may also make sense to have a separate company, tasked with operating as the single buyer for renewable Independent Power Projects, perhaps under a non-negotiable Power Purchase Agreement following the example of the South African Renewable Energy IPP program which made very significant advances in the sector over a comparatively short period of time with explicit selection criteria linked to local socio-economic development and job creation[11].

A competitive procurement process for renewable energy is currently under preparation and evaluation. Consistent with the Vision, any scheme of that scale will have to embed local job creation as part of its overall business case. As regards renewables, it should be noted that a new wave of technology is being developed which offers enhanced effectiveness in terms of generation and, crucially, storage. The Kingdom is actively participating in this already – last year it was announced that hot sand concentrated solar power is set to become a commercial reality with significant environmental and cost benefits, especially as regards rural power generation. This is a very significant step forward as existing solar technologies have encountered reliability and degradation issues in conditions of extreme heat and dust.

The position of nuclear in the overall energy mix cannot be understated. King Abdullah City for Atomic and Renewable Energy ("KACARE"), the body with oversight of the nuclear program in the Kingdom, will have to start delivering on installed capacity sooner rather than later if Vision 2030 is to be accomplished. Given the travails of the global atomic energy market, commissioning the 16 or so planned nuclear stations by 2030 looks increasingly challenging. Minister Al-Falih has recently also assumed charge as the chairman of the board of KACARE[12]. KACARE is targeting the replacement of 50% of the Kingdom's fossil fuel power generation with renewable (including atomic) generation by 2032.

In terms of the drive for efficiency highlighted by Minister Al Falih, it is highly likely that having gone through a process of corporatisation, elements of SWCC and/or NWC (and their international contractors) will be subject to increased scrutiny with the underlying aim of curing inefficiencies in the systems and, in particular, leakage rates. The requirement for potable water in the Kingdom is among the highest and most subsidized in the world – transitioning to a position where the subsidy reduces over time will have to be calibrated to private sector job creation.

Ability to Pay

The very difficult part in all this will be, of course, getting the public to pay. There is no easy way around this – outsourcing that risk to distribution companies or under some form of concession may be one solution but gearing the introduction of anything approaching cost reflective charging with employment opportunities will be vital (the private sector is not likely to accept that risk without a very high level of confidence in its ability to collect or a copper-bottomed guarantee from the state).

Job Creation

The climate agenda may provide some of the impetus for job creation. One of the many suggestions in the Chatham House report cited above relates to retro-fitting the built environment of the Kingdom with environmentally sustainable measures. We have seen recently a move to Saudise the telecoms industry – thousands of young Saudis are being trained to perform functions which were previously the preserve of foreign workers. If a similar approach can be adopted as regards the building of new housing stock (and that build program is based around a zero carbon design criteria, or as close as possible) then it should begin to reduce the rate of increase in domestic demand and, longer term, embed benefits which will benefit future generations. There is also genuine scope for enhancing consumer product regulation to incentivise greener outcomes and create fewer burdens on the supply-side – and the Gulf Standards Organization is likely to play a key role policing such enhanced standards over the next period.

Will these sorts of measures generate the intended 6 million additional jobs for Saudi citizens required by the Vision by 2030? Certainly not on their own. But then the Vision also contemplates contributions in other areas, for example, in tourism and domestic military manufacturing, which would make substantial contributions to the employment piece but will also have to adhere to increasingly stringent energy efficiency standards.

Investor Issues

As well as a compelling public relations campaign to educate domestic tariff payers, some consideration will also have to be given to large energy users – the kind of concerns who demand secure, consistent supply as a fundamental part of their business platform. In this context there is probably space for developer originated IPPs with a wide range of scaling – from small energy parks in economic cities or even the new resorts intended on the Red Sea through to larger scale schemes for specific industrial plant or natural resource projects (and it should be noted that the Kingdom is replete with resources other than oil). Faced with uncertain supply, users may turn to back-up interim power solutions – and these have a definite role, although given the associated concerns around pollution, it is hoped, a finite one. Transitioning the energy mix away from reliance on oil will bring challenges and the restructured industry will have to maintain a level of resilience based on the older technologies whilst this is in progress. The question is not “if” but “how quickly” this has to be achieved.

All of which understood, we anticipate that the successful future investor is likely to have certain characteristics (and we also anticipate that the same will probably become a driver for the Saudi Arabia General Investment Authority and the Economic City Authority over time). First, high quality job creation and training is likely to be fundamental (and there are already some well-developed mechanisms in this regard). Second, if the investment relates to reducing the overall burden of energy consumption directly or indirectly, this is likely to be encouraged and made a priority. Thirdly, if the investment brings with it manufacturing or construction capacity then this will also be treated as a priority, especially where as a part of the business plan it can be shown that energy efficiency or indeed renewable generation is part of the overall package – a very good example of this is the 3MW solar PV installation at BMW’s robotised MINI plant in the UK (and Morocco’s recently announced plans to retrofit 600 mosques with solar PV technology is also a very welcome precedent). There are many businesses in the green-tech space that fulfill some or all of these criteria. Other businesses (for instance in the hotel sector) will have to consider their energy and water needs especially carefully. Education, which is also generating huge investor interest in the Kingdom, will also have to incorporate energy efficiency in the fabric of its buildings as much as in any revised curriculum.

Education is the new Black Swan

Given that the Vision sets out the prospect that the Kingdom will transition to an economy based on investment rather than oil revenue, climate related issues will be embedded in the country’s investment platform. The Public Investment Fund, set to become custodian of the Saudi state’s shares in the soon-to-

be partially floated Saudi Aramco, will be fundamental in this drive and it may well find itself inundated with attractive opportunities to incubate such new technologies, as envisaged in the INDC. That is certainly the path on which Bill Gates[13] has embarked – "There are dozens of things like that [artificial photosynthesis] that are high risk but huge impact if they are successful," he was reported saying last year at the Paris climate conference. His Breakthrough Energy Coalition, which includes Prince Alwaleed bin Talal in its line-up of supporters, is to pump seed money into promising ideas that have been shunned by an energy sector pursuing a "business as usual" trajectory. It is hoped that this would help promising innovations make the transition from laboratory proof of concept to fully fledged commercial viability. Questing after the magic bullet which can be harnessed in time to avoid catastrophic habitat loss is certainly essential, but equally should not prevent immediate steps to improve energy efficiency and build resilience. All of the above are required.

Globally we are faced with the consequences of our failure to wean ourselves from our "addiction to oil". The young people of the Kingdom, and their peer group across the world, will inhabit that new reality. But, as will be gleaned from the above, there are many "moving parts", each of which, to greater or a lesser extent, depends on the others. Ultimately (and sooner rather than later), some hard choices will have to be made (and then probably remade) based on a critical, iterative analysis of what is a fluid, developing and complex situation. The pursuit of educational excellence is therefore perhaps the single most important element of the Vision.

Francis Patalong is a Senior Associate in the Corporate/Commercial Group of Al Tamimi in Riyadh. He has extensive experience in PPPs, IPPs, renewable and social infrastructure projects in Europe, Africa and the GCC region. f.patalong@tamimi.com

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