



Liquid Air and Strategies for Sustainability

A Discussion Paper

The Liquid Air sector, and the innovative technologies exploiting its potential, is constructively aligned with a change in corporate behaviours that link strategies for sustainability with clean technology innovation.

Treating the sustainability agenda as a 'nice-to-have' rather than essential part of an organisation's core operations is rapidly becoming a thing of the past. Similarly destined for the corporate junk yard are the types of myopic behaviour that ignore longer term trends, commodity prices and societal impacts.

One key reason for this change is the simple recognition that issues previously identified as medium term concerns are creating impacts in the present and are affecting profit and loss. Here we are, of course, referring to issues such as volatile energy prices and steep rises in the cost of certain commodities. Also of genuine influence are the increased levels of client and consumer awareness, driven in part by a pervasive and uncompromising social media.

Whilst the communication around this agenda tends to vary from sector to sector, the underlying issues exhibit compelling consistency. They play out as rising costs of operation, shifting patterns of consumer demand and a threat (or opportunity) to brands, services and products. It is these more focused economic realities which are commanding the attention of boards and requiring leadership from senior directors. In short, sustainability has moved from the perimeter to the core of corporate behaviour, dragging clean technology innovation with it and creating an agenda of enlightened self interest.

Of course, as the pattern of corporate behaviour has changed in response to the sustainability agenda, it has also driven new dynamics in the markets and supply chains upon which those operations rely. Many large organisations quickly worked out that the majority of their sustainability impact (and with it much of their corporate brand risk) is held in their chain of supply.

This upstream focus means that, whilst a corporate may make a 'promise', it often relies heavily upon the supply chain to keep it. These corporate commitments span issues as wide ranging as energy and carbon, waste management, water stewardship, ethical procurement and biodiversity.

In respect of the sustainability agenda therefore, just as in many other areas of economic life, corporate values and behaviour represents a key market driver, setting the commercial backdrop to those organisations which hope to supply to them.

Sometimes we see prominent examples of leadership in this arena which translate into significant drivers for business success. Take, for example, Marks & Spencer's Plan A. This well known and much documented programme was initially conceived as a brand led initiative but resulted in unexpected levels of operational efficiency and cost reduction whilst, at the same time identified wider value chain benefits as demonstrated in 'The key lessons from the Plan A business case' report published by Marks & Spencer in 2012.

In an interview with Ethical Corp, Timberland CEO Jeff Swartz identifies his belief that brands must start engaging consumers on social issues to rebuild trust lost during the financial crisis. This includes providing strong leadership in responsible business from ethical sourcing to transparent reporting on its social and environmental performance including capping carbon emissions. Timberland also believes that brave brands that step up to engage customers on social and environmental issues will be rewarded.



As the examples of organisations reaping benefit by focussing upon the sustainability agenda grow, so the shift in behaviour accelerates. This move towards enlightened self interest means that corporate minds are focussed upon those issues which are understood to be contextually relevant and material; a shift from the broad but superficial approach of the recent past.

Since corporate behaviours drive change in the market place, those technologies that are seen as innovative responses to materially significant issues are most likely to unlock investment and generate market traction. As a result, and because organisations with high energy demand are looking for step change and innovation around energy generation, storage and efficiency, Liquid Air may well be heading towards such a point of alignment.

Looking at the range of issues that sit on the 'to do lists' of corporate strategies for sustainability, it is clear to see how the Liquid Air proposition has the potential to play a role in addressing several of the more challenging points of focus. These include carbon reduction, energy storage, energy security and improving the efficiency of transportation.

The carbon reduction agenda is driven by the need to address climate change concerns, in large part by reducing the dependency upon fossil fuels such as coal, gas and oil. This shift needs to occur, however, without compromising energy security and at a price point that is acceptable to corporate, commercial and domestic consumers alike.

Many of the renewable energy technologies that have been developed to address this challenge are unable to deliver energy upon demand. That is to say they will produce peak power when the wind is blowing or the sun is shining but not necessarily when peak consumer demand occurs. This gap between generation and demand is made more significant in the absence of commercially viable energy storage capacity. The ability of Liquid Air to both store wrong time energy but also to release it at an appropriate point goes to the heart of one of the energy challenges faced by many organisations.

The focus that many corporate organisations have upon carbon is also driven by key performance indicators and the communication of competitive positioning. These result in corporate carbon reduction targets often being used as shorthand for energy efficiency, cost reduction and brand led corporate responsibility. For this reason, carbon management programmes are rightly perceived to deliver financial returns on investment since every tonne of carbon saved is accompanied by a material saving in energy costs.

Since the potential for return on investment associated with resource efficiency is increasingly well understood, the availability of capital for carbon reduction programmes has improved. This appears to be the case both from within organisations, even where competing capital demands are high, and via access to a maturing financial market.

Looking at the issue of transport, we are arguably already at the point in the UK where the cost of fossil fuels is driving changes in driver behaviour, influencing the purchase of more energy efficient vehicles and reducing the number of journeys. However, from a corporate perspective and often despite intensive driver behaviour training, vehicle tracking and the use of more efficient vehicles, the cost of fossil fuels remains a material concern to a wide range of organisations including logistics, distribution and public transportation.

It should, for example, be no surprise to see that a move towards low-carbon buses is occurring at a time when fuel prices are rising, fare pricing is highly competitive and local authorities are increasingly concerned with air quality and health issues. Indeed, there is some emerging evidence that the increase in the use of more fuel efficient diesel engines is actually reducing air quality, especially in cities where SOX and NOX emissions are concentrated (as highlighted in the 'Better accounting for NOX/ NO2 emissions in air quality action planning' document by the Institute for Transport Studies at the University of Leeds).



To be successful and gain traction in the corporate market space, the deployment of new low-carbon technologies, such as liquid air, need to address issues already identified as material. They also need to deliver measurable corporate returns; whether these returns are measured in terms of financial benefit, brand equity or the delivery of risk mitigation. These returns will clearly differ depending upon the particular corporate organisation. For example in a retailer they may play out in built environment, brand and transport logistics whereas for a bus company the focus will primarily be on the delivery of reliable low-cost/low-emission transport. The demand for reliability means that a new innovation seeking to replace an existing technology may pose an unacceptable degree of risk, especially where the new technology has no track record of long term operation. As such, the ability to integrate innovative technology alongside proven systems may prove compelling, particularly around a critical area of operation.

Previous research has identified that whilst existing diesel buses can be seen as inefficient, operating at about 7mpg whether laden or empty, the cost of investing in hybrid replacements is difficult to quantify. This is not only due to the initial capital cost but also in relation to the long term maintenance requirements and cost of replacement batteries which remain uncertain. In the same way the lack of a hydrogen refuelling infrastructure is perceived by some as a significant technology barrier to the widespread introduction of hydrogen fuelled vehicles.

Rather than looking towards wholesale replacement technology, innovations that can run alongside conventional power plants and provide progressive efficiencies (such as kinetic recovery and improved transmission efficiency) may be perceived as lower risk. An example of this is the potential for the Dearman Engine to utilise low grade radiator heat to assist in powering hotel loads by the use of a secondary power plant. It is understood that this adaptation may also allow the potential incorporation of stop-start technology since the primary diesel power plant would no longer be needed in stop mode. Similarly, it may be able to run alongside hybridised buses to boost acceleration. These types of lower risk, progressive efficiency may be seen as easier to adopt in the short to medium term given current business models and performance requirements.

Applying a similar logic, major retailers and other corporate property occupiers are increasing the use of energy centres. These often constitute renewable energy generation plants, set alongside new buildings in order to provide a degree of energy security, price hedge and carbon reduction. The materiality associated with energy cost and carbon intensity is increasing the opportunities for liquid air technologies to close the loop between low grade waste heat, whether it be from the energy centres or new buildings, with other energy needs; for example refrigeration compressors, back-up power generation and right time grid energy generation.

In logistics, refrigerated vehicle fleets and large refrigerated logistics buildings are often an essential part of the operation. Here, running liquid air technology alongside existing diesel engines may provide additional benefits in terms of reducing compressor noise for sensitive urban or out of hours deliveries. In the associated logistics buildings, the production of waste heat from compressors and other operations, aligned to the need for back-up energy generation and low emission fork lift trucks, combine with the increasing use of adjacent energy centres with the potential to covert wrong time renewable energy to right time grid energy.

In each of these cases, there is the emerging opportunity for an alignment between the benefits of liquid air technologies and well defined corporate needs. Liquid air is showing the potential to respond to a defined agenda, deliver via a mature supply chain infrastructure (and adapt this to a low carbon liquid air supply chain), deliver within well defined corporate safety protocols and evolve alongside existing technology. As a consequence, it offers an opportunity to deliver lower risk new technology disruption, step change solutions, long term corporate resilience to energy and carbon markets and quantifiable returns on corporate investment and published targets.



Most corporate organisations accept that, in order to deliver on materially significant corporate goals, solutions will ultimately need to be provided through the use of new, innovative and potentially disruptive technologies. For management boards, however, the balance is to embrace new innovation whilst simultaneously managing operational risk. It is, perhaps, those executives who display these skills who will lead the corporate success stories of the future.

In conclusion, experience shows that where technology lines up with a defined corporate strategy and can deliver quantifiable returns then the potential exists to gain commercial traction. This is particularly the case where supporting infrastructure and skills already exist within an economy. The emerging Liquid Air Energy sector in the UK, and the technologies being developed to exploit its potential, seem to exhibit many of the characteristics required to do just that.

SIMON PRINGLE

Head of Sustainability and Cleantech

+44(0)2078932760 (DDI)

+44(0)7530724524 (Mobile)

simon.pringle@bdo.co.uk

KEVIN SCHOFIELD

Principal Consultant, Sustainability and Cleantech

+44(0)2078932969 (DDI)

+44(0)7891 446421 (Mobile)

kevin.x.schofield@bdo.co.uk