CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

Distribution: Cleanpower Delegates, UK Government, visitors to CIR website

Tuesday, 7 July 2009

Cleanpower Executive Summary

Cleanpower is one in a coherent series of business conferences. We have come from an environment where people used to talk about *alternative* energy. They are no longer alternative. They are options within a composite system which will become more renewable and ultimately sustainable by being fossil-fuel free. There is a need to discuss the grid system, which is pivotal in making many new downstream technologies, like battery cars and air-source heat pumps, clean.

Demand for energy will increase at a rate of 1.6% a year for a total of 45% more, in the next 30 years, according to the IEA in 2008.

90% of oil reserves are owned by countries in the Rest of World category, that is, outside the 3 main energy markets of North America, Europe and Asia Pacific. But 77% of consumption of that oil is within those 3 main energy markets.

Energy security is a concern for governments, not to mention the absurdity of transporting these heavy, physical reserves to their point of use.

We need stable, consistent policy, and a much more strategic approach from Regional Development Agencies.

Policies needed from government for wind and other alternative energy were basically transitional policies until a suitable carbon price was globally in force.

We need supplementary national support for some years, but hopefully by 2020, there will be sufficient cap and trade systems for the other incentives not to be necessary. We just need a level playing field now. For now we need this balancing to get fair market entry for clean energy against conventional incumbent energy.

The EU trading system has had too low a price of carbon because of the free allocations or credits to energy companies. America may choose to go the same way.

The real cost of energy factors in cost of carbon.

Climate change presents really interesting alternative energy business opportunities for energy production companies.

When entering the alternative energy market, large energy production companies need a strategy at top level.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

The internal rate of return requirement for alternative energy groups within a conventional (fossil-fuel) energy production company have to meet the same levels, and do so over broadly similar timeframes as for the conventional business.

Expertise in offshore oil could be turned to offshore wind.

The grid needs to move from passive to active.

The ICT needed will be much more complex than the present system. Information will flow much more.

There will be opportunities around demand side management and system balancing through storage.

Suppliers will need to decommoditise energy, and convert what they offer to value-added services. When they realise the business model arithmetic, they will be unafraid of and able to support large-scale energy-efficiency and energy diversity movements.

There has been a lot of opposition to biofuels, because they can exacerbate food shortages. Biofuels can be done very well, or very badly. An energy production company present was deeply conscious of the sustainability issue. Food prices have gone down so that that issue reduced in media coverage. Sustainability is really important. We should look at water requirements, which land would be used, and fertiliser requirements. Any of these things not being done right should be a problem for an energy company when considering investment for market entry.

Wind and solar power will continue to grow and will ultimately become a large mainstream energy sectors. He argued that there was no reason why the wind industry shouldn't go the same way as mobile phones and the airline industry as its competitiveness improves.

In China and the US, growth of wind was really happening because targets were being taken seriously, and even being modified upwards. The US has a 25% renewables 2025 target, also a short term one of 10% in 2012.

There has been enough talking about wind power, and the government and other actors should now halve the talk, double the delivery.

The real barriers for wind in the UK are planning problems, grid, and even aviation rules.

The government needs to take a stronger role in guiding local communities.

Freighting blades from Southern England to other continents such as North America does not make sense any more. And a lack of UK (wind) market is the problem. This was cited as a reason why the UK had become unfavourable as a manufacturing location.

Wind companies are leading in maximally-green accreditation, in terms of embodied energy and manufacturing practices.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

Cleanpower Script

Cleanpower is one in a coherent series of business conferences. We have come from an environment where people used to talk about *alternative* energy. They are no longer alternative. They are options within a composite system which will become more renewable and ultimately sustainable by being fossil-fuel free. There is a need to discuss the grid system, which is pivotal in making many new downstream technologies, like battery cars and air-source heat pumps, clean.

Both the US and China are locked in a new energy technology deployment race, with Scandinavia still coveting a long lead. The US knows that if all the new energy technology ends up coming from China, it will continue to run huge and worsening fiscal debts as it continues to import. The Chinese, perhaps, are doing it partly in competitive spirit, but mainly as they understand unsustainability and pollution, and indeed that the US may not continue to buy as it has done, forever. Meanwhile, the UK is moving forward but is being made to look like it is standing still.

The UK target of 80% emissions reduction compared to 1990 is largely symbolic. To help this move forward, we do need a global level playing field for emissions.

The National Grid was seeing unprecedented new generation developments and was aiming for a parallel 80% emissions reduction in its own business by 2050. Intermittency of renewables was mentioned as a challenge to address through the smart grid. Many of the assets of the grid are reaching the end of their design life, if not quite the end of their useful life. The ledger of requests for new connections was high at 65GW versus a current total power of 85GW. Most of these were non-renewable though: gas, nuclear, coal and CCS, with renewables being mostly wind. The concept of 'plant margin' was mentioned, and this needs to be maintained.

The 15% target for renewables by 2020 was said by National Grid to be unlikely to be met in full. There was a call for simple regulatory changes, such as being allowed to get on and build new infrastructure before investment has actually been made.

Not only increased capacity for AC, but also new HVDC lines were needed. The latter enables long-distance solar-generated power to come from deserts, etc, as the loss per 1000km is low, under 3%.

In summary, the National Grid is listening to the new visions and calls for the renewable smart grid, but noted that a lot of work was needed, fast. It also noted that biogas was also an exciting development for clean CHP and distributed generation.

One of the 7 Distribution Network Operators, which own the 14 contracts in the UK for this function, talked of the impact of renewables and other policies, such as zero-carbon homes, on the network and their business.

To 2020, the company talked of plant closures in nuclear and coal: 20GW worth, or almost 25% of the current total on the grid.

There would be new nuclear to 3GW, and 30GW of new renewable wind: 19GW offshore and 11GW onshore.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

Other renewables to this date were small. The Severn Barrage would have a significant impact.

Domestic consumers who use air-source heat-pumps as they become quieter, cheaper and perhaps mandated, would affect the business (they use electricity rather than gas, albeit with an energy coefficient of around 5. That is, you use a fifth of the energy produced by the pump, to power it. If you are on a clean tariff, your house is cleanly heated). This would be part of the 20:20:20 EU promise for emissions and energy efficiency.

The grid needs to move from passive to active. We'll need dynamic power ratings. From offshore wind power, you may need 300MW connections. The DNOs are looking at whether you need to replace assets.

The ICT needed will be much more complex than the present system. Information will flow much more. This could mean a smart-energy-IT billion pound market.

There will be opportunities around demand side management and system balancing through storage. Peak shaving involves even more information flow. When one creates a 'virtual power plant' from many consumers' energy pooled, alongside that from major generators. A system operator role needs to be developed and established.

There will be opportunities around demand side management and system balancing through storage. If people move to electric cars, then there will be more power needed for the grid, but there will be storage capability.

The smart grid is more than two-way metering and transmission of electricity.

This grid allows consumers to take active control of electricity production and generation.

The self-healing grid, uses technology to fix localised problems with little/no human intervention. It optimises restoration exercisies and minimises repeat faults.

Consumers will be rewarded for keeping consumption within certain limits at certain times of day, or for time-delays and so on, all of which works in competitive market.

Suppliers will need to decommoditise energy, and convert what they offer to value-added services. Energy will not just be about price per kWh, in the way that what mobile phone operators offer has become highly varied.

A questioner asked whether energy operators were really behind the ideologies of moving to less energy use through energy efficiency and their wish to maximise profit with their current business models. The panel replied that the business model needed to change to consider energy as value-added service, and that there should be a move to a 'sale-of-service' model, i.e. we provide you with your power needs, rather than a certain number of kWh. You move to compete on value not on price. When the energy suppliers do the new business model calculation, they will be unafraid of and able to get behind large-scale energy-efficiency and energy diversity movements, rather than just offering the fig-leaves of "free low energy light bulbs".

The US is the market leader for the smart grid, with $4.5bn funding for smart grid projects.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

Actual deployment is low in Europe. Amsterdam has planned some smart metering in homes, as one example. Smartmeters are piloted and mandated in many countries, which will build the business case for the smart grid.

There is plenty of media puff which detracts from market development. Negative media reports on the smart grid numbered 4 times those that were positive, in one survey presented. Some of this survey was cited at the conference. Consumers correspondingly are eager but concerned according to a survey commissioned by a speaker. Consumers were sometimes worried about privacy of data, but use of smartmeters would build confidence. The mobile phone market has gone beyond this.

Futureproofing smart grid technologies was said to be important.

A number of European renewables projects were described and discussed.

An SME technology company talked about microinverters that would enable easier, cheaper, smaller or scaleable installations of PV on buildings that would be more reliable. In particular, a single solar panel could work on its own. This would enable consumers to build up assets and for installations to be much easier and safer to do and therefore cheaper: about a 25% reduction in total cost was claimed. This would help stimulate that solar PV market.

The panel was asked why the end-user customer isn't trusted to own the smartmetering equipment. The response was that the market for smart meters etc was growing faster where owned by the distributor, but that the market would segment between those consumers who wanted more information on their energy and emissions etc, and those that didn't. There is an opportunity for suppliers of equipment either way.

On raising funding from VC for energy cleantech start-up: an example energy SME aimed to get funding in 4 months, and it took 12 months. A 100-slide business pitch was made to no fewer than 25 companies. But “entrepreneurship is still alive, and good companies can get funding”.

Although mainstream take-up of smart meters would be a very astute thing to implement, we should not make announcements about smartmetering for every house, and then worry afterwards about who will pay for them.

The UK supply chain was said to be very fragmented, whereas that of the US was integrated end-to-end. However, the US was said not to be a single market any more than Europe is. State fiefdoms were mentioned later as a problem for the roll-out of wind and solar technologies to serve distant states (where the people are).

The distribution network operator company at the conference admitted that the data requirements around IT for general smartmeter use was a problem they hadn't fully understood and were probably not sophisticated enough yet to deal with.

It was noted that the short switching times from one operator to another was a reason why those suppliers might not want to invest in smartmeters.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

The moderator suggested that we should talk in terms of probabilities and risk, and that although the diversified system is likely to be non-economic at any given point in time, it is also likely to be resilient and upgradeable.

The IPR speaker suggested that cleantech was a fastmoving field, and noted a tool for mapping dangers and opportunities; and that IP was a stepping stone to get additional funding and revenues or capture value.

The concentrating solar power speaker talked of halving the cost of PV with inhouse technologies. He claimed that through HVDC lines and a hypothetical East Atlantic system of power transport, one could cover 90% of the UK power requirements with CSP and suggested suitable biofuel could make up the remainder. He mentioned pumped storage as a way to hold on to the power generated and that batteries could store energy for a week on multi-GWh scales. He priced the electrification of the UK energy system including transport, cleanly, at Euro 26,000 per household, compared to an annual cost of keeping up oil, coal and gas of Euro 70bn, which translates to Euro 1,166 a year.

On marine renewables, it was noted that wave and tidal power is not yet generating on scale anywhere. There were issues of rigging to be sorted out. The total power available might be 5-6% of UK needs, but it was more reliable than other renewables at least on the tidal side which could provide at least 3% of UK needs.

The tidal turbine discussed had no gearbox as the blades are large and slowly rotating.

There were issues around silting up and the dredging needs that this implies, but that this new turbine design obviates this.

The supply chain challenge for tidal was mentioned: we need to build 32 turbines, 10m in diameter or more, a week, until 2020 to meet the target.

The speaker on biomass suggested that biomass-generated power was cost effective and that trees used would have low water requirement, a ten year coppicing cycle, and fertiliser treatments could be somewhat remediated by the choice of tree.

There has been a lot of opposition to biofuels, because they cause further food shortages. Biofuels can be done very well, or very badly. An energy production company present was deeply conscious of the sustainability issue. Food prices have gone down so that that issue reduced in media coverage. Sustainability is really important. We look at water requirements, which land would be used, and fertiliser requirements. Any of these things not being done right would be a problem for reasonable energy companies when considering investment for market entry.

A wind technology company gave a strong argument as to why wind power will continue to grow and will ultimately become a large mainstream energy industry. He cited the way many other industries became important as cost came down and technology improved, such as mobile phones and the airline industry. He argued that there was no reason why the wind industry shouldn't go the same way as its competitiveness improves.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

In wind turbines, the main costs are the blades and tower, each costing about a quarter of the total. This is an area where cost reductions could be made, especially through weight reductions. He mentioned new entrants to watch around this area, including one which claimed it was reducing the weight of a 10MW generator tower to 70 tonnes.

The speakers technology would remove the need for a gearbox and replace it with a synchronous generator through a hydraulic motor, which could be dismantled by hand, and therefore at much lower cost.

The speaker suggested that wind energy could go down to 10% of its cost today in 2009, by 2050, and set this as the challenge to the industry.

A large wind turbine manufacturer speaker suggested wind was a more optimistic area for investment than the rest of the economy.

He suggested wind was competitive compared to other forms of clean energy and was the fastest growing segment of power technology in Europe.

In China and the US, growth of wind was really happening because targets were being taken seriously, and even being modified upwards. The US has a 25% renewables 2025 target, also a short term one of 10% in 2012.

The speaker suggested that after 2009, wind was moving from a marginal position to mainstream. But now there is a financial crisis. This industry is also being hit with reduction of almost 80% in announced orders. But the driver is the cost of energy.

The real cost of energy factors in cost of carbon; this is changing significantly and investors are keen to understand these dynamics.

Lead time – much generation needs to be replaced in next few years – wind only has 2-5 years lead time. Nuclear takes ten years or more to build.

Green jobs are a strong driver for this industry: (reference available) 15.1 wind jobs created per 1MW capacity installed. This doesn't mention jobs lost elsewhere. The focus is on full manufacturing base, but also there is maintenance, transportation, installation etc, so even more jobs are created.

It would be good to have whole value chain in every country, but even if this is not achieved, most countries can probably at least benefit from some parts of it. Wind is much more indigenous than fossil fuels, and this is good, as politicians want to keep value base in their country.

The UK is one of world's best wind potentials. Why do we not see more installation of wind in this part of the world? It is not because there isn't enough space... the speaker put it to the delegates that this is a discussion we need to have in UK society. The Climate Change Act is good. Slides shown indicated how relatively feeble the UK's take up of wind power is in 2009, given its major resources, wealth and base of manufacturing and business.

There has been enough talking and that government and other actors should now halve the talk, double the delivery!

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

The real barriers for wind in the UK are planning problems, grid, and even aviation. The government believes it is still in the second world war and wants to fly very low! If you move closer to "the enemy, Germany", the speaker jested, *they* don't have the same radar constraints. And in Denmark, the capital's main airport is just 1km away from one of Scandinavia's largest offshore wind farms.

The government needs to take a stronger role in guiding local communities.

We need stable, consistent policy, and a much more strategic approach from Regional Development Agencies, like EEDA and EEI. Delegates were shown an example European supergrid and told that the UK is sitting on a golden egg: it could actually export electricity.

Demand for energy will increase at a rate of 1.6% a year for a total of 45% more, in the next 30 years. Much of this demand could be satisfied by oil and gas. But there is a large separation between where the energy is consumed and where the fossil fuels come from. As we saw, this becomes a national problem when one considers wind, and one of transport up to a couple of thousand kilometres or so where concentrated solar power.

90% of oil reserves are owned by countries in the Rest of World category, i.e. outside the 3 main energy markets of North America, Europe and Asia Pacific. But 77% of consumption of that oil is within those large energy markets of the West. So energy security is a concern for governments (not to mention the absurdity of transporting these physical reserves to their point of use).

Can we invest to the degree necessary to bring these reserves to market? These reserves are often unconventional – oil sands (which means greater-than-ever damage to the (visible) environment in terms of land degradation)

Then we bring in climate change, so alternative, clean energy is being invested in. This presents really interesting business opportunities for an energy production company.

When entering the alternative energy market, large energy production companies need a strategy at top level. Our example sifted through at least 10 generic types of technology and literally hundreds of business models. It noted that there are many hundreds of investment opportunities in clean technology, with many dotcom investors and entrepreneurs now in the space having moved segment.

This company had questions like: Is this going to be a material business opportunity? Can we imagine that this sector will be significant? Do we have the internal competencies and skillsets to do well in this segment? If not, can we partner with someone? Does the technology scale well? Is the technology reliable? Is it viable in market competitive? Will the business be reliant on subsidy?

The company wanted to see a price on carbon applied to all use of energy (whether switching on a light or taking a train journey).

Ultimately, four "winners" were picked. Biofuels, wind, solar and CCS.

The company has a plan to invest $8bn by 2013 and has already invested $2.9 billion dollars to 2008. These were set for the next 5 years. It was hoped that the company would see these businesses become 'cash generative', and then it might look for new areas of investment.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

The competitor set in cleantech is different from and less familiar than that of oil and gas. The speaker said that they were careful even paranoid about competitors in the space. They were careful about positions taken in the space and wanted to partner in innovative ways to leverage positions.

In wind, given the interstate transmission needed from where the wind is to where the consumers of energy are, there will need to be a strong lead from federal government to prevent bottlenecks caused by local state fiefdoms.

It was claimed that it takes 7 months of wind energy to pay back energy needed to build a wind turbine. Wind companies are leading in maximally-green accreditation, in terms of embodied energy and manufacturing practices. The wind turbine company said that it would soon will produce wind turbines with green technology, but that this was a process of change over time.

The energy production company recognised that minimising use of energy and emissions is an important issue in business operations, and that several years ago the company pledged to reducing its operational emissions. It calculated its emissions then, and seeks to measure the decline as result of actions being taken.

The wind turbine company noted that freighting blades from Southern England to other continents such as North America does not make sense any more. And a lack of UK (wind) market, because of low levels of harnessing the power available, is the problem. This was cited as a reason why the UK had become unfavourable as a manufacturing location.

A questioner put it to the energy production company that its expertise in offshore oil could be turned to offshore wind. It also mentioned that its petrol stations could be turned to electricity. The response focused on the issues of maintenance of wind turbines, particularly the gearbox, and how being offshore means travel in a boat, whereas onshore is much easier to keep up with. (The company seemed to be less focused on electrical provision at service stations, where biofuels were another big bet. The suggestion may have been that biofuels could also be turned to electricity?) On onshore wind, there has been a goldrush mentality in the US, many companies trying to beat deadlines for building power stations to win back tax credits. This had caused quality problems.

Reliability of gearboxes of wind turbines seemed to be a recurring theme. Gearboxes have historically been a weak point. What is the industry doing about this? 3 years ago the wind turbine manufacturer put effort into the reliability issue. To be real about becoming mainstream, what we need is competitive cost-per-MW over lifetime, not installation cost. Gearboxes: fundamentally the wrong thing, another wind company argued, for transmission of the scale. But it is just physics, and there is some hope for them by being careful, but will struggle, for technical reasons, above 3MW scale. It is not as simple as ‘lets get rid of gearbox’: direct drive has cost and weight issues. It’s also about efficiency and weight.

The internal rate of return requirement for alternative energy groups within a fossil-fuel production company have to meet the same levels, and do so over broadly similar timeframes as for the conventional business. NPV calculations were used. To plan against risk, projects had to be competitive even at the worst point in the business cycle; energy markets are considered cyclical.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

Competitiveness also depends on the variable price of oil and gas. Brazilian ethanol projects, for example, compete $40 a barrel. If oil is at $100 a barrel, those projects compete much sooner. CCS was cited as an exception, since a lot of technology improvement is needed before it becomes competitive.

One worries that we can produce savings for manufacturers. Until renewables are a significant portion of the total power generated, price will still be set by fossil fuels. An aim is to achieve scaling up of manufacturing, reducing the cost of producing turbines.

Among the innovative partnerships being developed, our wind turbine manufacturer was partnering with an aerospace company, which has decades of experience with wind passing wings and bodies of aircraft.

Policies needed from government for wind and other alternative energy were basically *transitional* policies until a suitable carbon price was globally in force. *Stability* in this was asked: where Spain pulled out of feed-in-tariffs but Germany remained, the former caused a lot of problems for business.

The EU trading system has had too low a price of carbon because of the *free* allocations or credits to energy companies. This is like the central bank flooding and “trashing” the market by printing money.

After 2013, we need supplementary national support for some years, but hopefully by 2020, there will be sufficient cap and trade systems for the other incentives not to be necessary. We just need a level playing field now: we need this balancing to get fair market entry for clean, renewable technology deployment against dirty, unsustainable, conventional incumbents.

CIR Cambridge

landline: 01223303500 mobile: 07720047402

jhayward@cambridgeinvestmentresearch.com

http://www.cambridgeinvestmentresearch.com

PRACTICAL INFORMATION FOR 2010 CLEANPOWER CONFERENCE

Date and venue

Friday, 18 June 2010, Registration 09:30 for 10:00 conference plenary start. Day ends 17:30

Buckingham House Conference and Expo Centre, Murray Edwards College, Huntingdon Rd, Cambridge CB3 0LF, UK

Registration

To register for the Cleanpower Conference 2010, please go to

www.cambridgeinvestmentresearch.com/events/register.htm

Pricing is given at that site for delegates and there is a link to sponsorship opportunities and pricing.

Contact

Please contact Project Director Justin Hayward, jhayward@cambridgeinvestmentresearch.com +44 1223 303500 for more information on all aspects of participation, such as speaking, sponsoring, exhibiting, or writing papers for the conference relevant to its communications.

We look forward to hearing from you and receiving your feedback.