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SUMMIT 2014 SAW CLEAN ENERGY ON THE ATTACK – 29 APRIL 2014

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By Angus McCrone
Chief Editor
Bloomberg New Energy Finance

The 2014 World Cup, which kicks off in Sao Paulo in six weeks' time, will serve up the usual struggle between teams that like to attack and teams that prefer to defend. Sometimes, it is the defence-minded that prevail – in the 2010 contest in South Africa, there were no fewer than 24 matches with one goal or none.

The contest between defence and attack was a frequent refrain at the Bloomberg New Energy Finance Summit in New York (Twitter #BNEF2014) earlier this month. The consensus at the event was that after a period of strong defence by the incumbent energy industry, the balance of advantage is shifting to its attackers.

The metaphor came up in the very first session, as Jim Rogers, former Duke Energy chairman and newly-minted member of BNEF's Advisory Board, mused that if he was starting his career in our sector now, he might well prefer to be "an attacker", rather than "a defender".

The theme of the Summit, on 7-9 April, was "phase change" – the thesis that we are at a point where the old way of doing things in energy is under real and significant threat as a result of technological improvements, energy security concerns, the quest to extend energy access and imaginative entrepreneurialism. Rogers' observation endorsed this point of view, and over the three days of the Summit we heard time and again that the future would not be like the past.

I could not have written in quite these terms a year ago, or two years ago. At the time of the 2012 Summit, shale gas mania was at its height, with the US basking in $2 per MMBtu natural gas. The consensus there was that clean energy had a future but it would be as an accompaniment to gas. A year later, in April 2013, Superstorm Sandy had underlined the fact that distributed energy and a diversified power mix were of significant value. We encouraged delegates to think about the New Energy ROI – resilience, optionality and intelligence – but there was little sense of an imminent attack on the status quo.

At Summit 2014, however, nearly 1,200 participants will have heard the unmistakable sounds of radical and rapid change.

Not all of that is comfortable for clean energy investors, since the warm water of subsidy is draining fast, and new geopolitical imperatives are pushing some countries to set new – and not necessarily clean – priorities.

The crisis over Ukraine, with Russian President Vladimir Putin's threat to that country's gas supply, has catapulted energy security back to the top of the global agenda. Connie Hedegaard, the European Union's climate commissioner, told Summit 2014: "We need very much to reduce our dependence on imported fossil fuels, currently running at a net EUR 1bn per day." She said Europe needed to invest more in energy efficiency, renewables and "also shale gas".

Marcin Korolec, Poland's state secretary for climate change and former environment minister, put it a different way: "This is a time of change for energy policy in Europe, from one shaped by emotions to one much less emotional." He said the priority should be "jobs, jobs, jobs", and floated the possibility of the EU increasing its bargaining clout by requiring its (unnamed) external gas suppliers to sell their gas via "one single point of entry".

Efficiency rules

One element of the "attack" that is unambiguously good for energy security is efficiency. The Summit heard from many quarters that while it often looks like this cliched "low-hanging fruit" is not being picked, in fact it is increasingly being consumed with gusto, out of the spotlight, around the world.

US energy secretary Ernest Moniz, in a sit-down with Bloomberg New Energy Finance's Michael Liebreich, talked of how his country "needs to accelerate the

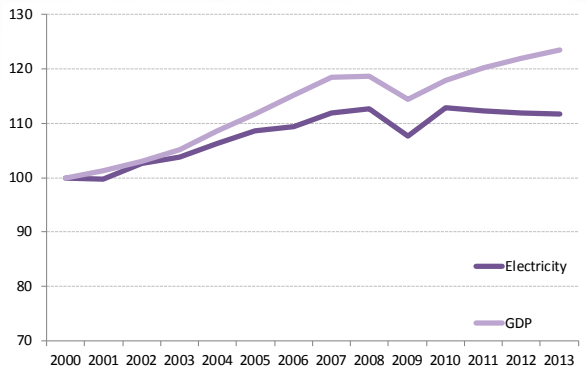
transformation to a low-carbon future, while [electricity] demand is not growing immensely, even may be going down". He outlined the administration's plans to support the President's "All Of The Above" energy strategy, including initiatives in technology and finance.

Chris Crane, chief executive officer of Exelon Corporation, a major US nuclear generator, is feeling the pinch from the apparent decoupling of economic activity from energy demand. He stated that five of his company's nuclear plants are "economically challenged" and under review, explaining: "Currently, the markets are not rewarding nuclear for reliability or low-carbon generation. Demand has fallen in some of our markets, partly due to incredibly effective energy efficiency programmes."

The New York dimension on efficiency was described by the city's former Mayor, Michael Bloomberg. He told the Summit: "We arranged with two banks to have loans available to building owners to convert from Number 6 fuel oil to natural gas. 2,500 of the 5,000 buildings that produce most of the pollution have already converted." He also said that if you fly over New York City, some 80% of flat-roof buildings have been painted white or have living roofs. "If they are white, the energy bill goes down by 25%," he noted.

The backdrop to all their remarks is that electricity consumption trends in developed economies are continuing to undershoot expectations, even as countries pull out of the post-2008 downturn. According to the International Energy Agency, electricity supplied in OECD (Organisation for Economic Co-operation and Development) countries increased by 12.6% between 2000 and 2008, but in 2013 was still 0.8% below that 2008 peak, even though economic growth in that bloc has been 4.1% since then. To take the UK in the most recent year as an example, GDP rose by 1.7% in 2013, but electricity consumption fell by 0.5%.

Economic growth and electricity supplied in OECD countries



Source: IMF electricity statistics, OECD economic outlook

White heat of technology

Also boosting the "attack" at Summit 2014 was evidence that new technology will be able to strengthen further clean energy's cost-competitiveness. James Hughes, chief executive of First Solar, predicted that photovoltaic costs would continue to "plummet". He said: "We will see conversion efficiencies rise dramatically over the next several years. That drives cost out of the entire system because you have fewer panels supplying more power. And we'll also see cost reductions as a result of further integration of the panel into the balance of system and into the AC side of the system."

Summit 2014 saw the announcement of the next batch of New Energy Pioneers – 10 technology providers judged to be potential game-changers by an independent panel. One of them, 1366 Technologies, is promising to reduce the manufacturing process for silicon wafers from four steps to one, doubling yields and reducing labour costs by two thirds. "By the end of this decade, solar will be cheaper than coal," said Frank van Mierlo, chief executive.

Bloomberg New Energy Finance's Justin Wu presented research showing that it may be possible to extend the operating life of a wind turbine to 30 or even 35 years, thanks to mid-term refurbishment costing just 10-20% of the original capital cost. This could lead to lower levelised costs of electricity for wind, as could more obvious technological changes cited by turbine maker Alstom, such as the move to 6MW devices with 75-metre-long rotor blades.

Jeff Immelt, chief executive officer of General Electric, said at the Summit: "We have been in wind energy since 2002. At the beginning, wind cost 20-25 cents per kWh. At a recent Colorado auction, it came in at four cents per kWh." He also identified power storage as an area about to see dramatic improvement in cost-effectiveness, saying that GE is "investing like mad in sodium batteries", and working on a spray technology for fuel cells that could raise efficiency from 38% to 60%.

There was much excitement in New York about the potential impact on storage costs of the electric vehicle battery "gigafactory" being planned by Tesla Motors. There was also intriguing debate, at a packed break-out session, as to whether the primary role of storage - outside the electric vehicle market – would be to balance variable wind and solar generation, as many have assumed up to now, or to help the grid function more smoothly and to act as additional capacity to meet short-lived demand peaks. That session also heard about tension between the most effective location for storage (near the customer load) and the place where it

becomes eligible for US tax credits (adjacent to the renewable energy plant).

Storage will not have it all its own way in the energy transition. Demand response by industry, and eventually by consumers, may offer lower-cost means of balancing variable wind and solar power than banks of batteries – even if these are much cheaper in the future than they are now. And pumped hydro, the source of more than 95% of power storage currently connected to world grids, is not always finding life easy right now. Claes Rytoft, chief technology officer for the power systems division at ABB, said that the peak-price hours around midday that used to enable Swiss pumped hydro projects to make money "are gone because of PV".

Nuclear is another area where technology may be moving the goalposts away from the incumbents. I already mentioned the struggles of Exelon with five of its nuclear stations. In a keynote address to the Summit, Alex Salmond, First Minister of Scotland, criticised the UK government's deal last autumn with EDF on a subsidised electricity price for the proposed GBP 16bn Hinkley Point reactors. "The contract involves subsidy payments of up to GBP 1bn per year for the next 35 years. That's GBP 35bn to support a mature technology in one power station – by way of comparison, those subsidies are four times the total support, under the Renewables Obligation, for all of the UK's renewable power in the decade to 2012," Salmond said.

The challenge inside the nuclear sector comes from small modular reactors. Jay Surina, chief financial officer for NuScale Power, an Oregon-based technology developer, said: "Our 45MW modules are put under water and do not have any pumps, it is all done by natural circulation. We do not need offsite power to control decay heat."

Emerging economies' advantage

One of the messages of this year's Summit was that emerging economies are now the location for some of the strongest attacks on energy's old way of doing things. Rogers addressed the issue of how to bring electricity to the 1.2bn people who do not currently have access. He said that what works in his view is "micro-grids, solar, battery technologies", and that the advent of these micro-grids could also protect developing countries from the effects of storms and other disruption.

Another of this year's Pioneers, the Nairobi-based company M-Kopa Solar, has supplied solar-powered appliances to 60,000 African homes in the last 18 months and, according to managing director Jesse Moore, has been "backed by a bank to increase that to one million homes".

Maria van der Hoeven, executive director of the International Energy Agency, said that developing countries with growing power needs can leapfrog directly to more flexible power systems, and that means "potentially high shares of wind and solar". A related point was made by Achim Steiner, executive director of the United Nations Environment Programme: "Renewable energy in developing countries is a shortcut to accessing electricity because we don't want to have to wait another 20-30 years for the grid to be built out."

The contest is far from won for clean energy. Tony Elumelu, chairman of African investment company Heirs Holdings, told the Summit that his home country of Nigeria has just 5GW of electricity capacity now, but "could do with 160GW". There was a lot of interest in wind and solar, he said. However, it is unclear the extent to which the opportunity being opened up to the private sector will benefit renewables rather than fossil-based options.

The fossil-fuel generation source that looks most vulnerable to clean energy attack is diesel. It has the advantage of low initial capital costs but the disadvantage of very high running costs. In regions separated from any main grid, such as islands and remote areas, it will face increasing competition from wind and solar, perhaps backed up by batteries.

Wolfram Krause, head of strategic market intelligence at Younicos, a battery-to-grid specialist and another Bloomberg New Energy Pioneer, argued that islands were fertile locations for storage: "Grid services will be provided by batteries, while the actual kilowatt-hours are provided by wind and solar. That will make possible a reduction in diesel generation," he added.

The opportunities for cost-competitive wind and solar in developing country locations is explored in a chapter of the report *Global Trends in Renewable Energy Investment 2014*, published on the first day of the Summit by UNEP-Frankfurt School and BNEF.

Financial innovation

The forces of attack are also at work in finance, challenging established models that may not be adequate for the era of phase change. For the past 18 months Bloomberg New Energy Finance has been seeing new sources of capital begin to flow into clean energy. Green bond issuance increased last year to a record level of $14bn, and Q1 2014 saw another doubling compared to the same period in 2013. New breeds of quoted renewable energy project funds and "yield companies" have emerged, raising more than $2bn in a little over a year.

However, the financing challenge remains formidable. In developed economies, there is not – at the moment – an absolute shortage of bank debt, but there may well be one in the years ahead as Basel III regulations bite. Some countries – particularly those that have retroactively changed support schemes – remain red-lined for bank debt, and many utilities have reined in investment in renewable energy in order to shore up their balance sheets. The overall share of institutional assets accounted for by direct investment in clean energy remains miniscule. In developing economies, there is often a shortage of finance for energy projects, despite the best efforts of development banks, because of a paucity of local lenders and equity providers, and because of policy and foreign exchange risks.

The Summit heard about some of the difficulties. Ernst Rauch, head of the corporate climate centre at Munich Re, said that the insurer has invested EUR 1.5bn in renewable energy and green infrastructure, but "for the most part, that was last year and before. The current policy uncertainty is a major hurdle in the way of making more investments." He predicted: "With all the uncertainty, there will be a further slowdown in investment from non-traditional investors such as institutions." Jim Barry, chief investment officer for renewable power at BlackRock, told of the damage that retroactive policy changes in Europe have done to investor confidence. "Meet an insurance company in Kansas and they will bring up Spain," he said.

It was to address the financing challenge that Liebreich, chairman of BNEF's Advisory Board, and others launched the Finance for Resilience (FiRe) initiative.

At the Summit, 12 of the best ideas were presented by their "champions", and delegates got to vote on their favourites.

The ideas ranged far and wide, from mainstreaming green bonds, to raising a debt fund to support the distribution of pre-paid solar power, to building a EUR 1bn follow-on tranche of the European Investment Bank's GEEREF fund-of-funds. Each idea had to offer the promise of creating incremental billion-dollar-plus investment opportunities in clean energy. Summit participants enthusiastically supported the six winners. FiRe/BNEF teams will be working with the winners to help implement their ideas by this time next year, and will report back at Summit 2015.

Summit 2014 came at the end of two very difficult years for the clean energy industry – years of consolidation, years of reduced overall investment in clean energy. What participants heard, however, was that far from being on its knees, the clean energy sector is in decent health. Costs are down, technologies are maturing, finance is accessible in many places, policy-makers – while not flush with money – are supportive.

In June, we will see whether attackers or defenders have the edge in the latest football (or, if you prefer, soccer) World Cup. Over the next few years, we expect a struggle royal between "offense and defence" in the energy sector. If Summit 2014 is anything to go by, there is going to be a lot of goalmouth action.

For more material on the 2014 Summit, see http://about.bnef.com/summit/, and for more on the FiRe initiative, see http://www.financeforresilience.com/

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Contact

sales.bnef@bloomberg.net

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