

THE ENERGY SYSTEM IN 2014 – DID THE ICE REALLY CRACK?

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For my "10 Predictions" VIP Comment article in January, I used a metaphor borrowed from the end of winter in Russia, talking of cracking ice on the River Neva in St Petersburg.

I pointed out that systemic change, like the breaking-up and melting of the ice on a river, can begin below the surface and become obvious only quite late in the process. I was confident at the start of the year, forecasting that 2014 would be a "year of cracking ice" as the old energy system (centralised, fossil-fuel dominated, geopolitically and environmentally unsustainable) comes under increasing pressure from the forces of change.

It is December, and that means it is time – with the help of Bloomberg New Energy Finance chief editor Angus McCrone – to look back at my predictions for the year, including the 10 specific ones we make for different sectors and financing mechanisms.

First of all, by calling 2014 "The Year of Cracking Ice" I was not suggesting that fossil fuels would have disappeared by Christmas. What I was saying was that events during the year would make it clear to the most hardened clean energy sceptic that irreversible change in the energy system was underway. And I think events have largely borne this out.

As exhibit one, take German giant EON's decision to split off its conventional generation, declaring that the company's future lies in distribution, transmission, new services and, yes, renewables. This follows similar soul-searching by its German competitor RWE, and Vattenfall's decision to sell off its German lignite operations. Anyone thinking these are evidence of a little local trouble in Germany has not spent time with senior utility managers around the world, as I have. From the US to China, the questions they ask are about the future structure of the utility industry. A few years ago it was

whether or not renewable power subsidies would be maintained.

I have just returned from Australia, where Tony Abbott's Coalition government has repealed that country's unloved carbon trading system, but this has done nothing to relieve the pressure to decommission coal-fired power stations in the face of significant overcapacity – driven by renewable energy, which remains popular with the public.

Or take the publication of the Environmental Protection Agency's draft Clean Power Plan regulations, which look set to accelerate coal plant retirements across the US. James Robo, chairman of NextEra, said his company's purchase of Hawaii Electric for \$4.3bn earlier this month is "a postcard from the future of what's going to happen in the electric industry in the United States".

Then there was the steady drip-feed of investment banking reports, pointing out that renewable energy generating costs are becoming competitive with fossil fuels, and predicting systemic change in the generating mix. 2014 was the year when it became clear to all that the utility model of the past was no longer viable.

On the manufacturing side, we saw a rash of capacity investments announced during the year by leading solar companies – anticipating further expansion in the PV market, and the first such moves since 2010. Tesla captured the world's attention with its plan to build a 35GWh-a-year electrical vehicle battery "gigafactory" in Nevada in association with Panasonic, to engineer a step-change downwards in battery costs.

Developments on the international stage also signalled a step change – most notably the agreement between China and the US to limit their emissions, equalling over 40% of the world's total, with China's unprecedented commitment to producing 20% of its power from zero-carbon sources by 2030. That decision alone will require

the addition of renewable and nuclear assets similar in scale to the entire generation capacity of the US grid, in just 15 years. Business as usual? I don't think so.

In India, new Prime Minister Narendra Modi has made strong statements in favour of renewable energy, stating his aim of achieving 100GW of solar capacity by 2022. France joined the majority of the developed world in stating that it would no longer provide development finance or export credits for the building of coal-fired power stations, leaving Germany now firmly in activists' firing line.

Coal-fired power is far from having exited the stage. India's new PM, in addition to his support for clean energy, has made clear that the country will embark on a major programme to build coal-fired power stations. In Brazil earlier this month, developers of gas and coal plants enjoyed a dedicated auction for 3,340MW of capacity to supplement the country's recent surge of wind and solar power. Thailand is close to completing a 3.7GW coal-fired power station in Laos, unable to build it domestically because of local opposition. And China continues to build new power stations, though increasingly it is retiring dirty ones near cities, and by 2030 will be net dismantling them.

2014 saw growing momentum behind fossil fuel divestment and the "carbon bubble". In November Mark Carney, governor of the Bank of England, said that he had asked it to investigate the risks fossil fuel companies pose to financial stability. The language of the carbon budget has strongly influenced the trajectory of the international climate negotiations too. At COP20 in Lima, there was much discussion about adopting a target for a 50% or even 100% reduction in carbon emissions from energy by 2050. The very fact that these proposals were not laughed out of the room represents a sea change. For too long the orthodoxy in the energy sector has been that the world's economic health is synonymous with its production of carbon emissions. 2014 was the year when evidence of uncoupling became inescapable.

As for wild cards, typically in January I failed to anticipate the ones that really hit the markets. The biggest geopolitical story of 2014 has been the upheaval in Ukraine, President Vladimir Putin's grab for Crimea and the Russian-speaking eastern provinces, and a resulting, urgent focus in Europe and elsewhere on energy security as the overriding priority.

The second wild-card in 2014 was the 40%-plus plunge in oil prices since mid-June. Contrary to much mainstream commentary, there are relatively few near-term implications for clean energy. \$60 oil is not good news for EV sales or biofuels, but most renewable

energy investment is on the power generating side of the electricity system, so it competes with gas, not oil. The connection between gas and oil prices is complex. Outside the US, gas prices are often linked to oil, so the impact might be felt. However, with most investors expecting oil prices to rise again as soon as excess production capacity is squeezed out, it is not clear that a downward spike in oil prices will do much to dent clean energy demand. And in the US, shutting down unconventional oil wells reduces the amount of associated gas that is produced, and might even drive gas prices up, not down.

In summary, therefore, 2014 just about lived up to sobriquet I gave it, as the "Year of Cracking Ice".

Now it is time to look at our detailed predictions for 2014, and – to stick to the Russian theme – insist on *glasnost* and openly and fairly mark how we did at the start of the year.

1. CLEAN ENERGY INVESTMENT TURNS THE CORNER

We said in January that clean energy investment would rebound in 2014 from last year's (slightly revised) \$251bn, ending two years of decline from the 2011 peak. We cited a stabilisation in PV prices combined with ongoing solar build-out, plus a recovery in wind installations. We also mentioned increased public market investment, including more money going into "yieldcos" that hold renewable energy assets.

Our final 2014 investment numbers have not yet been crunched – spare a thought for the data team that gets to work through the holidays – but the first three quarters of the year have already seen 85% of the total 2013 investment figure, so a half-reasonable final quarter would put the 2014 total at least 10% up on last year, perhaps coming in around \$275bn.

As far as the detail is concerned, public market investment in the first nine months of 2014, at \$12.7bn, was already up on the full-year 2013 figure of \$11.6bn; PV installations this year will be a new record (see below); there has been a 50% rally in wind capacity additions; and US yieldcos and their UK equivalents, the quoted project funds, have raised approximately \$4.5bn from investors in 2014 so far.

After two years of declining investment, it is good to see the corner turned, and even better that we were spot on in our predictions.

Score 10/10

2. NEW RECORD FOR GREEN BONDS

We said there would be a further surge in green bond issuance, beyond 2013's \$14bn, mentioning "perhaps \$20bn or higher", helped by a general bond-friendly environment of low inflation and interest rates, and also by increasing investor interest in the long-term yield attractions of renewable power projects. We also talked of "further downward pressure on lending costs".

We were almost completely right. Our latest [Research Note](#) on asset finance in Europe shows that the all-in cost of debt for an onshore wind project in Germany is now down to less than 3%, including the KfW refinancing option, and has even tumbled back to less than 4.5% in Italy, despite that country's unwelcome retroactive tariff cut for PV projects. In the UK, we estimate the average all-in debt cost at 4.6%. These are record-low figures.

On green bonds, Bloomberg New Energy Finance is now forecasting 2014 issuance of \$40bn, nearly three times last year's figure. Green bonds still have plenty of questions to answer, as noted in our September VIP Comment, [Green bonds: where's the beef?](#) But there is no doubt they are taking off. They are acquainting new types of institution with low-carbon investments and providing a new focus on clean energy commitments by the likes of utilities and development banks.

The only criticism one could make of our prediction is that we under-cooked it.

Score 9/10

3. ACCESS CHARGES ONLY WAY FORWARD FOR UTILITIES

In 2013 we saw the decision by the Arizona Public Service to impose a monthly charge of \$0.70 per kW on new users of small-scale PV needing also to access the grid. There was also discussion in Germany about imposing a fee on operators of renewable power projects larger than 10kW for electricity they generate and consume themselves. We forecast that this debate "would rumble on around the world during 2014", with other utilities moving to impose similar charges.

And we were right: the issue has indeed continued to rumble. Germany implemented its charge on self-consumption for PV over 10kW in August – in theory to pay for the feed-in tariffs for systems already built and reduce the EEG-Umlage cost to other users. Utilities in Ohio, Wisconsin, Massachusetts, Minnesota and many other US states continue to push regulators either to restrict net metering for solar panels, or to allow a fixed fee to (according to them) cover the costs to the grid of providing back-up, though it is in fact often more directly

related to extracting value from past investment in the grid.

The main caveat over this prediction is that while there has indeed been much discussion around the world, this has generally not yet culminated in actual changes to rate structures for PV self-consumption.

Score 7/10

4. SOLAR STORMS GIVE WAY TO PROFITS

We forecast that 2014 would see solar companies continuing to return to profitability, helped by "another year of demand expansion", with new capacity added in the 44-51GW range, up from 39GW in 2013. We also looked forward to further growth in Chinese solar deployment, and a US market continuing "to develop its residential and small commercial PV sector, with companies trialling new models for third-party ownership and securitisation of small PV systems". We also flagged possible "political friction" in Japan over its high solar subsidies.

Some 11 months on, our solar team is estimating that global PV installations this year will indeed end up between 44GW and 52GW, with part of the difference resting on just how much of a year-end surge there is in China. Japan has, as expected, applied a brake on its solar surge, though it is the newly self-confident utilities that have been resisting the advance of PV, rather than political parties concerned about excessive subsidies. In September, Kyushu Electric suspended the evaluation of grid connection requests beyond the 12.6GW of solar and wind projects already subject to applications, while it reviews how much renewable power it can cope with on its grid. Three other utilities have taken similar action.

What about profits? In the second quarter of 2014, the latest reporting period for many, three of the four biggest quoted module makers (JinkoSolar, Trina Solar and Canadian Solar) were in the black, with only Yingli marginally in the red. Most polysilicon, wafer and cell makers were also enjoying positive margins, one of the main exceptions being Germany's SolarWorld, which reported a negative second quarter but a return towards profit in the third.

Meanwhile, there have been announcements in 2014 of manufacturing capacity expansion by Hanergy, Hanwha SolarOne (in South Korea), Hanwha Q Cells (Malaysia), SunPower (South Africa), S4 Solar (Brazil), JinkoSolar (South Africa), Canadian Solar and GCL-Poly (China), and various others.

SCORE: 9/10

5. WIND PICKS UP AGAIN

Our main wind prediction was for a resurgence in onshore capacity additions from 2013's depressed 31.7GW. Our latest [Wind Market Outlook](#), for the fourth quarter of this year, estimates that 2014 will see 48.8GW installed worldwide, a record, and indeed the sub-headline to that report is "Closing out a strong year".

Among the strong markets this year have been China, thanks to the urgency of building before anticipated tariff cuts in 2015, and Germany, where up to 3GW of onshore capacity may be completed ahead of January's shift to lower tariffs and a potentially more uncertain local planning regime.

Where we were a little off the mark was on offshore wind. We said that 2014 might be a watershed year, with the financing of a number of projects in German or UK waters for commissioning in 2016-17. Actually, the Netherlands has been the star turn in offshore wind, with the \$3.8bn financing of the 600MW Gemini project in May (the biggest ever financing of any non-hydro renewable energy project), and also the Noordoostpolder Urk deal in July. There have been a couple of UK and German financings of new capacity (West of Dudden Sands and Borkum Riffgrund), but it would take one or two more in the week before Christmas – perhaps MEG 1 or Baltic 2 or even Cape Wind in the US – to make 2014 truly a "watershed" year.

Score: 8/10

6. ELECTRIC VEHICLE SALES GROWTH SLOWS TO "JUST" 50%

This prediction started off with the fairly safe assumption that growth in the market would be well down on 2013's figure of 69%. We pencilled in a 2014 sales total of 300,000 worldwide, and commented that there would be some supply constraints as popular models such as the Tesla S and BMW i3 came up against full manufacturing capacity. We also talked of a possible "break-out" year for demand, perhaps in 2015 or 2016.

It looks like this year will have seen solid growth for EVs, with sales in each of the first three quarters well up on the previous one. But our analysts, in their just published Q4 2014 Global Electrified Transport Market Outlook, are now looking at a somewhat more modest total for the year, of 280,000, equivalent to 35% growth over last year. It looks like the reasons for the slower growth are the fulfilment of pent-up pre-launch demand in California, the need to pump-prime newer markets around the world, and a delay while incentives to buy EVs come into play in China.

Looking forward, we remain bullish about EVs – particularly in the light of growing concerns about air quality in cities around the world, and new Chinese tax measures to stimulate the market in 2015.

SCORE: 6/10

7. SMART GRID HYPES LESS, DELIVERS MORE

We suggested that in 2014, global smart grid investment would remain stable, around the \$15bn mark, with China and the US both pausing and the growth coming from Europe, as mandated smart meter deployments get started, and also Japan, "as beleaguered Tepco starts its mass roll-out". Also, we said that increasing efforts will be made in Europe to enable demand response to play in power markets.

Our prediction was on the money on smart grid investment. The main area we did not get right was growth coming from Europe. Several major smart metering roll outs have seen further delays this year, including the UK and Germany. The European Commission downgraded its target for the penetration of smart meters recently, from 80% to 72%. We think even this is unlikely to be met given the delays, and we currently expect around 65% coverage by 2020. On the flip side, the urgency is growing in parts of Europe such as Italy and southern Germany for cost-effective smart grid tools to manage ever-growing renewables penetration.

Score: 7/10

8. US NATURAL GAS PRICES TO SAG

This particular prediction had a very shaky start as North America's "polar vortex" forced temperatures down to minus 40 Celsius in places, and demand for gas shot up. At moments in February and March, the Henry Hub price got as high as \$8-9 per MMBtu. Eventually, however, the price resumed the downward course we had forecast, and is currently at \$3.50, having started the year at \$4.34.

Our January crystal-ball gazing also said that North American gas production would rise "only slightly in 2014, before surging between 2015 and 2018", and that there could be exciting developments on shale gas in places such as Mexico and China.

In the event, supply rose more than expected, spurred on by the winter's high prices. In general, gains in US production are partially but not wholly being offset by losses in Canadian production. The new demand will come online in fits and starts, but really get going in 2017-18. And in Mexico, there have been delays but the

necessary constitutional changes have been made and reforms are on the way to allow for foreign participation.

Score: 7/10

9. US EXTENDS PTC, BUT LATE

Such is the unpredictability of Congress' behaviour on the key incentive for wind development, the Production Tax Credit, that the issue of whether it gets extended is really one for the hardened gambler. However, we took a leap in the dark in January and said that if Congress holds true to form, it will not act on the PTC, which expired at the end of last year, "until after the November elections when it is in its 'lame duck' period".

What happened? On 3 December, the House of Representatives in the lame duck Congress voted to extend the PTC and a whole clutch of other tax breaks to the end of this month. An extension of a just few days for the PTC would not be much use to the US wind industry since few projects could take advantage of that window, and anyway the bill still needed approval from the Senate at the time of writing. But the House move does at least keep hopes alive of the new Congress voting for a longer extension at some point in 2015.

We predicted that the EPA would release regulations in the summer on existing power plants, and "if sufficiently stringent, these could hasten the demise of many of the oldest and least efficient coal-burning plants in the US". The EPA did indeed launch its Clean Power Plan this summer, and estimated that compliance costs would be a net \$9bn in 2030. A Research Note by our US power team, entitled *Who's afraid of the Clean Power Plan?*, published last month, concluded: "Companies whose wholesale market operations are likely to be most negatively impacted ... are those that emit lots of carbon, have high emission rates relative to their state standards, and operate in states with high overall compliance costs."

It looks like we did well on both these predictions, but unfortunately much uncertainty has simply been pushed into the future. Have we seen the end of the PTC? Will the Republican-controlled House find a way to derail the EPA's coal regulations?

Score: 8/10

10. THE DEATH OF ORTHODOXY

This was something of a qualitative, rather than quantitative prediction. I wrote, rather boldly, in January: "Until now, it has been up to the proponents of a new [energy] system to argue that change is on its way. In 2014, the tables will turn. Change will be the default assumption, and it will be up to the proponents of orthodoxy to argue why they disagree." I cited as agents

of change the shrunken cost of PV per kWh, the much reduced price of light-emitting diodes, and the first grid-scale battery investments, forecasting for the latter that it would be higher in 2014 than last year's figure of 155MW.

On the specific point about battery storage, we were a little too optimistic. Our analysts now say that the 2014 total looks like ending up north of 100MW but south of 155MW, as some projects have been pushed into next year. However, the news flow has been exciting, with Italy's Terna pushing ahead with a 75MW storage strategy, the first projects of which are being commissioned late this year, and Southern California Edison in November awarding 235MW of battery capacity to be installed over the next few years.


As described in my introduction, although the fossil fuel dominance of the energy system lives on, 2014 showed that it has taken some life-threatening wounds. It can certainly no longer stick to its comfortable mantra that a post-carbon energy system is unthinkable.

The EON company split shows that for some incumbents, it is becoming riskier and less attractive to be in fossil-fuel generation than it is to be in renewables. And the move to capacity markets in countries such as Belgium, the UK and Germany, as well as the Brazilian power auction, shows that governments now need to find ways to subsidise gas and coal capacity to stay open. Meanwhile, more and more wind and solar projects are going ahead, in places such as South America, because they are cheaper than the gas, coal or nuclear alternatives. The perceived neat line between renewables (subsidies needed) and fossil fuel (subsidies not needed) was always an oversimplification. Now, it is disappearing.

Score: 8/10

Well, there we have it. We have been returning to our annual predictions and evaluating them each year end for eight years now. Our 2014 score of 79% is our highest since 2007's 83% – and compares to 70% in 2013 and 68% in 2012. Skill? Maybe. Perhaps clean energy's advances are becoming more predictable. Or perhaps we just got lucky!

In any case, in January, we will be back, chancing our luck with a fresh set of predictions for 2015. I do not think it is giving much away to say that we expect clean energy investment over the next 12 months to gain further momentum. Indeed we might even be calling it as a break-out year: we are expecting further cost reductions in PV, wind and other forms of renewable



energy generation, as well as in power storage and demand response; we are also expecting significant new policy announcements to back up commitments at Paris at the decisive COP21 negotiations. All that is required is a benign macroeconomic environment, and things could get very interesting – in a good way.

And on that seasonally cheerful note, let me wish all of Bloomberg New Energy Finance's clients and friends happy holidays and a prosperous New Year!

ABOUT US

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