

# A YEAR OF CRACKING ICE: 10 PREDICTIONS FOR 2014



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And so it is January, time for me to put down on paper what I think the year ahead will bring to the clean energy sector. Last year I talked about clean energy having lived through its Battle of Borodino moment, and surviving to regroup. I am going to stick with Russia this year, but shift scenes.

A few years ago, after a ski-mountaineering trip to Mount Elbrus in the Caucasus, I found myself in St. Petersburg as winter was coming to an end. The River Neva was frozen when I arrived, a wide crystalline stripe, running through the middle of that great city. Looking closely from the bridges, however, I could see that the ice was not quite static – it was moving up and down gently with the water beneath it. Long cracks were propagating across its surface. Within hours, the ice began to move, carried by the flow of the trapped river beneath, slowly first, and then quicker. Two days later there was no sign of ice whatsoever: the Neva had changed from a fixed white plain into a mysterious, dynamic, threatening and exciting river.

OK, so I am no Vladimir Nabokov. But this is an example of a phenomenon I have written about before in this column – phase change, the idea that when important transitions happen in complex systems, initially little on the surface appears to alter, and then suddenly the change is obvious for the eye to see. I believe that the energy system is on the cusp of such a transformation, and that 2014 is when it is about to become obvious to a whole lot more people.

Many of the signs have been building up in the past few years – the way the costs of solar and wind power have closed in on those for conventional power, even

beginning to undercut them without subsidies in many parts of the world; the way grids have become capable of integrating much higher percentages of renewable electricity than previously possible; the way renewable energy with no marginal cost of production has disrupted the clearing prices of electricity markets; the way utilities are finally realising that this poses an existential threat to their business model; the way consumers have enthusiastically adopted new energy technologies when embodied in cool products like the Nest thermostat and the Tesla Model S; the way investors have started to become concerned about stranded fossil fuel assets. These are all tipping points – once passed, it is impossible to go back.

With that in mind, here are my 10 predictions for 2014, drawn up with the help of Bloomberg New Energy Finance chief editor Angus McCrone and our teams of analysts covering renewable energy, carbon, digital energy technology and storage, natural gas, conventional power and advanced transportation. As usual, we will be subjecting these predictions to merciless scrutiny at the end of the year, crowing about what we got right and fessing up to what we got wrong.

## 1. CLEAN ENERGY INVESTMENT TURNS THE CORNER

I realise that we said something similar last year, and were wrong. Our preliminary figures for 2013, released on 15 January, showed that investment was \$254bn, down 11% on 2012 and 20% below the record \$317.9bn invested in 2011. Yet, this time I am more confident that the nadir has been passed. There

are several reasons for that.

One is that after the near-80% fall in PV module prices in 2008-12, there was in 2013 a further bout of deflation in photovoltaics as balance-of-plant costs tumbled. There was also a shift in the mix of PV installations worldwide from relatively more expensive residential, to cheaper utility-scale. In 2014, we may get a bit more system cost reduction, but another large shift in the mix looks unlikely. So, if we get a further rise in PV demand in MW terms – as we expect, see below – then solar investment should rise in dollar terms, rather than fall as it did last year.

Our analysts are also predicting a bounce back in wind installations in 2014 after last year's lull, and public market investment should continue at 2013's higher level, or better, as long as wider stock markets avoid a crash.

The end of last year also saw a big bounce in the number of "green bonds" being raised. While our team is still sorting out how much of this represents new money rather than refinancings, it is clear that mainstream debt providers are discovering the virtues of clean energy, and that is going to make a difference. We are also going to see a lot more "yieldcos", public and private companies structured to hold a diversified bundle of clean energy assets, making them attractive to new groups of investors.

Finally, 2014 will see continued geographical diversification of the industry, including unsubsidised PV plants selling directly to the power grid in northern Chile, which will drive overall investment higher. So my hunch is that clean energy investment this year will be back closer to \$300bn – still not enough to deliver the scale of energy transformation we need, according to the International Energy Agency, but a clear move in the right direction.

## 2. NEW RECORD FOR GREEN BONDS

One of the features of 2013 was a largely friendly debt market. For the first time since 2007 we got through a whole year without any sudden surges in risk premiums as a result of some new twist or turn in the great financial/fiscal crisis saga.

Wherever policy frameworks were stable in 2013, the clean energy sector benefitted from borrowing costs pushed down by competition between lenders and the cheapness of interest rate swaps resulting from low government bond yields.

Conditions may not be quite so benign in 2014 if, as expected, the US and UK central banks move towards raising interest rates, and their equivalents in Europe and Japan move past the point of maximum monetary looseness. It is unclear, however, whether raising central bank rates would push up the all-in cost of borrowing by much. Signs of a strengthening recovery should lead to lowering risk premiums, so higher base rates might have the perverse effect of driving economic activity in our sector.

In any case, while a somewhat higher cost of debt in Europe and the US would deter marginal projects, those with strong economics should go ahead. And in many parts of the world what is holding back projects is not the cost of debt per se, but risk premiums associated with policy uncertainty.

A continuing surge in green bond issuance in 2014 will add further

downward pressure on lending costs. The latest Bloomberg New Energy Finance figures show \$14bn worth of clean energy project bonds and asset-backed securities were issued last year, far above the previous record from 2010 of \$6.5bn. The opening days of 2014 have seen signs this surge will continue: the European Investment Bank issued \$860m worth of green bonds, and a similar amount has come from the World Bank and Export Development Canada combined. I would expect this year's total figure to establish a new record, perhaps at \$20bn or higher.

## 3. ACCESS CHARGES ONLY WAY FORWARD FOR UTILITIES

It is clear that increasing penetration of renewable energy causes problems for utilities, even as its costs drop. Soaring percentages of wind and PV power reduce the capacity factors attainable for fossil-fuel plants and push the spot electricity price towards zero. Cheap renewable energy is also proving problematic for regulators and politicians: distributed PV is great for those households and businesses that have it, because they can generate more of their own power at an ever-more competitive cost, and sell the surplus back to the grid. Unfortunately, it is the have-nots who risk footing the bill as electricity prices soar because the fixed costs of all that electricity infrastructure have to be shared over the remaining customer base.

There are only two solutions: either slow down the growth of solar power – and

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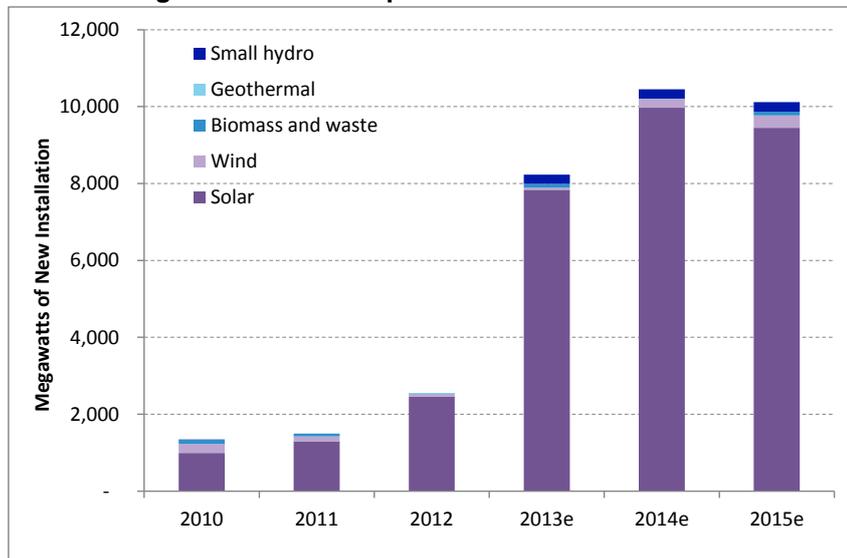
there are certainly utilities who are trying outright to do this – or move to some form of connection charge. Even consumers who buy no net power from the grid generally need to remain connected, selling excess power during the day and buying it back at night or when they put the kettle on. Or just as a back-up in case their system becomes unavailable for any reason.

In the US late last year, regulators granted Arizona Public Service the power to impose a monthly charge of \$0.70/kW on new solar customers. The APS had originally proposed a high fee of \$8/kW. On 24 January, Bloomberg News revealed that the German cabinet has backed plans to charge operators of new renewable energy plants larger than 10kW in size a fee of EUR 0.044/kWh for electricity they have generated themselves and then consume. Spain has also proposed a charge on domestic PV owners in its latest energy bill. Details on how expensive this may be are likely within a month or so, but on Spain's recent form as regards renewable energy, I fear it will be a lot more damaging to the PV sector than the Arizona charge.

With luck, other jurisdictions will be more sensitive than Spain and not penalise distributed solar out of existence. I expect this debate to rumble on around the world during 2014, with utilities in a number of jurisdictions looking to shift the balance on consumers' bills from charges per kWh towards charges for access to the grid and the associated services.

By the end of the year it will have

Second largest PV market Japan will install even more solar in 2014



Source: Bloomberg New Energy Finance

become generally clear that consumers and voters prefer access charges to slowing down the shift to clean energy.

#### 4. SOLAR STORMS GIVE WAY TO PROFITS

Year 2013 saw the first glimmers of profitability returning to PV manufacturers, with cell and module prices actually increasing modestly during the year, after what can only be called a profit outage between 2009 and 2012. The stock prices of solar companies, which rebounded over 100% for most manufacturers in 2013, certainly anticipate continuing improvement in 2014.

The return to the black will be helped by another year of PV demand expansion – our analysts expect new capacity added to be 44-51GW, up from our current estimate for 2013 of 39GW. Demand is no longer being driven by European subsidies, other than in the UK, but by China and Japan.

At the time of writing, we are still counting PV projects installed in China in the last quarter of 2013. We have already recorded 9.5GW of projects, and it looks like the total will be between 12GW and 14GW, making it the world's largest PV market last year, with Japan second, the US third and Germany a distant fourth. China will certainly see further growth in 2014, given the country's stated renewable energy plans. In Japan, with its generous tariffs for PV, it would be no surprise to see political friction emerge over the cost of subsidies. However, we think it will be hard to slow down the Japanese PV juggernaut for a few more years. The US will continue to develop its residential and small commercial PV sector, with companies trialling new models for third party ownership and securitisation of small PV systems. The US installed as much new PV in 2013 as it had installed in all years previously up to 2010.

Unsubsidised PV demand will be increasingly a reality. Rooftops in Europe will sprout small systems for consumption in the building, and islands, villages and remote facilities around the world will build standalone PV projects.

#### 5. WIND PICKS UP AGAIN

Hopes are high in the wind sector that the recovery in investment and new orders which started in Q4 last year will

be a sustainable one, now that the Production Tax Credit boom-bust cycles in the US have moderated, the China bubble has ended and (hopefully) politicians in Europe have begun to realise the corrosive effect of policy uncertainty.

This year might turn out to be a watershed year for offshore wind in Europe. Many projects in Germany and the UK are meant to be commissioned in 2016-17, meaning that they need to be financed this year. In onshore wind, our team is forecasting a doubling of gigawatts installed this year in markets outside the old core of Europe and North America, such as Brazil, South Africa, Mexico, Chile, Uruguay and Japan.

One caveat: some manufacturers such as Vestas Wind Systems and Gamesa may have seen their share prices rebound smartly thanks to cost-cutting programmes and improved order flow. Others that are heavily indebted and operating in very competitive markets with tight margins (for instance Suzlon Energy, Repower and a number of smaller Chinese manufacturers) have a lot to prove in 2014.

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

At the end of last year we created an advanced transportation team at Bloomberg New Energy Finance, bringing together our considerable expertise in biofuels, electric vehicles and gas-powered vehicles. This team's first output was an estimate of more than 300,000 electric vehicles to be sold worldwide in 2014, up from a record 200,000 or so in 2013.

The fact that growth will be down to 50% from over 100% reflects the fact that in the world's largest EV market – the US – many of the early adopters have now made their purchases. In addition, the relatively young EV industry will suffer some supply constraints in 2014. Some popular models like the Tesla S, BMW i3, and Mitsubishi Outlander PHV are being produced at full capacity, with significant reservation backlogs. Even for models such as the Nissan Leaf and GM Volt, where the auto makers have room to increase production, production can only ramp up significantly with close coordination between all the supply chain firms, and that takes time.

While 300,000 vehicles is not a large proportion of the world's light vehicle market, we believe it demonstrates that EVs are in the process of passing through the credibility barrier, with early adopters reporting high degrees of satisfaction with their purchases. EVs are still on track to beat conventional cars in terms of total costs of ownership by the latter years of this decade, and air quality issues are rising up the agenda of cities and their mayors around the world. We remain bullish about EV uptake in the medium and longer term, and we should expect a break-out year sometime soon, perhaps 2015 or 2016. It might even happen in 2014.

#### 7. SMART GRID HYPES LESS, DELIVERS MORE

In 2014, global smart grid investment will remain stable, around the \$15bn mark. Within that, China's major investment cycle on smart grids will have peaked for the time being, as has North America's first wave of smart metering deployments. Growth will come from Europe, as mandated smart meter deployments get started, and also in Japan, as beleaguered Tepco starts its mass roll-out. Perhaps the biggest disappointment will be Brazil, where regulations governing a smart meter roll-out look set to come into force, but are unlikely to have the desired impact.

In the US, the deafening fanfare around smart grid analytics software will start to be backed up by evidence as the first utilities using smart meter and other grid data prove it helps optimise operational and energy efficiency, including theft detection, efficiency programme targeting and demand response optimisation. This will be followed by an increasing number of real sales.

In Europe, increasing efforts will be made to enable demand response to play in power markets. There is a growing understanding that high penetrations of renewable energy require flexible demand. The technological and economic market structures to enable this will take years to build, but momentum will grow in 2014.

#### 8. US NATURAL GAS PRICES TO SAG

Over the past few years, Bloomberg New Energy Finance built a strong team of gas analysts, specialising in unconventional gas, liquefied natural gas

trade flows, and the essential role of gas in the wider energy transition. The team expects North American gas production to rise only slightly in 2014 before surging between 2015 and 2018, when newly-built power plants, industrial facilities and LNG export terminals unleash new sources of demand.

Until then, the US market will remain over-supplied, and prices in 2014 will again fall below \$4/MMBtu (from the current figure for Henry Hub of around \$5), to the surprise of many in the market who think the only way is up.

Mexico's upstream will undergo the biggest changes since nationalisation in 1938, with new regulations being enacted, probably in early spring. Mexico amended its constitution in December 2013 to allow for foreign participation in the upstream oil and gas sector. These should allow private companies to drill in Mexico, breaking Petroleos Mexicanos' monopoly and injecting some much-needed cash into the sector, but the impact will only begin to be felt in 2014.

This year will also see more data on the prospects for shale gas outside the US. There has already some good news from Poland, with San Leon Energy announcing the first marginally productive well. The year could see much more exciting announcements from Mexico and China, but we are anticipating further trench warfare between shale gas companies and anti-shale activists in the UK, with only modest progress despite acres of breathless news coverage.

## 9. US EXTENDS PTC, BUT LATE

For wind and other renewables sectors, one of the biggest questions for 2014 is whether the US reinstates its Production Tax Credit. The PTC, which subsidises wind production by \$23/MWh over the first 10 years of a project's life, expired at year-end 2013. Wind sector advocates are lobbying hard for immediate action, but any legislation supporting it will likely only move if attached to extensions of other key business tax credits. If Congress holds true to form, it will not act on the PTC until after the November elections when it is in its "lame duck" period. Thus is economic policy conducted in the US these days.

This year will also see the Obama

administration continue its efforts to regulate coal-fired power generation through unilateral rule-making. The Environmental Protection Agency is due to finalise regulations requiring new power projects, in essence, to have CO2 emissions profiles matching or surpassing those of modern natural gas-powered plants. This summer, the EPA is due to release regulations on existing power plants. If sufficiently stringent, these could hasten the demise of many of the oldest and least efficient coal-burning plants in the US. And during the course of the year we will learn whether 2013's near-ban on coal investment by development banks and trade finance institutions will have the desired effect, or whether private money or South-South money simply steps in to close the gap.

## 10. THE DEATH OF ORTHODOXY

For my 10th prediction, I return to the theme of phase change. For over a hundred years the orthodox view of the energy system prevailed. Power generation was big, dirty and central. Grids were centralised and dumb. Reliability was provided by holding over-capacity. Vehicle fuels were oil-based. For some years now we have been saying that this orthodoxy is not going to hold in the future. I predict 2014 is going to be the year when this becomes starkly obvious to most people. Until now, it has been up to the proponents of a new 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.

In 2014 there will simply be too much evidence of a sea change, affecting the very architecture of the energy system, for it to be ignored or belittled.

The orthodoxy that clean energy is an expensive luxury cannot be maintained when wind power can be sold for \$0.05/kWh and solar for \$0.010/kWh, before subsidies, in more and more parts of the world. The externality costs of coal are hard to deny when China's smog dominates the world's headlines. The developing world is still being told by people who should know better that solar power costs \$0.35/kWh; in 2014 it will be impossible to maintain this fiction as project after project is delivered at half or a third of that price, easily undercutting market prices and helping to drive them

down, not up.

In 2014 we will see the first real fruits of massive investments in smart grid, delivering measurable savings and service improvements to more and more people. Light-emitting diode bulbs can now be bought for \$10, instantly knocking down utility bills, and in 2014 people will become perfectly used to them and stop listening to stories about how they produce inferior quality light. We will start to see the impact of grid-scale power storage investment – some 155MW of grid-scale battery storage was commissioned last year, and we expect a further increase in 2014. Fuel cells are finally challenging conventional products in terms of power and heat output, and at costs which are no longer exorbitant, so they too will start to make their presence felt in 2014.

In short, 2014 is the year in which some of the benefits from a decade of surging investment in clean energy will finally make themselves felt. A decade ago, 2004 saw the start of five years of breathless coverage of the environment and climate, which carried the clean energy sector along on a surge of exuberance. Copenhagen in 2009 marked the end of that period: Climategate showed the unattractive side of climate scientists; technological hopes were dashed; the crisis and austerity made clean energy look like an expensive luxury. Or maybe the media just needed a new story to create controversy and attract eyeballs.

If I am right about the benefits of clean energy becoming apparent, 2014 will mark the beginning of a new five-year cycle: the year when mainstream media starts to swing back behind clean energy, to highlight not just its promise, but what it has delivered, and to hold its opponents to account. The next narrative could be the emergence of clean energy solutions despite the odds. One can always hope.

Well, there you have it – 10 predictions, to be assessed at the end of the year. As usual, I demand the right to a get-out-of-jail-free card in the event of a black swan during the year. By their nature you can't predict black swans, but here are my current candidates: economic crisis in China as it tries to get the debt genie back in the bottle; an economic crisis in France as growth fails and it is forced to try austerity; a big regional conflict,

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perhaps in Asia; surprisingly good or bad news about shale gas anywhere in the world; unexpected technical progress on mini-nukes, synthetic biofuels, storage or low-energy nuclear reactions; a clear resumption of atmospheric warming or a vast weather catastrophe; or a dramatic increase in activism, perhaps spurred by disappointment if Keystone XL is approved.

Still, the over-riding theme for 2014 is that it will be characterised all over by signs of rapidly-accelerating change, as a number of trends which have picked up over the past few years suddenly

converge and break out, without requiring any additional black swans.

We will be picking up the theme of phase change at the seventh Bloomberg New Energy Finance Summit, which takes place at the Grand Hyatt in New York, 7-9 April. See <http://about.bnef.com/summit/>.

We will be examining the thesis that change in the energy industry will happen like the melting of winter ice on the Neva: "gradually, then suddenly," as Ernest Hemingway described his bankruptcy.

We will be looking at what it means for businesses, investors and policy-makers as the old certainties suddenly give way, as it becomes clear that things have begun to change beyond recognition, that the old heuristics can no longer be relied on, that the future will be mysterious, dynamic, threatening and exciting. We have space for 1,000 leading decision-makers. Do make sure you are one of them!

Meanwhile, I wish you the very best of luck watching the ice cracking and the waters beginning to flow in 2014!