

# TWO SETBACKS FOR CLEAN ENERGY, OR ARE TIMES A-CHANGIN'?

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Two big, disconcerting clean energy stories hit the headlines in the last month. The first was our report that global investment in the third quarter of 2016 was down 43 percent on the same period a year earlier; the second was Australian Prime Minister Malcolm Turnbull blaming overly aggressive renewables targets for an eight-hour system-wide black-out of Adelaide and the rest of South Australia on September 28. What might seem like two unconnected stories may actually be signs that the clean energy times, in the words of Bob Dylan, this year's Nobel Laureate for Literature, are a-changin'.

Let's look at the investment trend first of all. The [figures](#) coming from our Bloomberg New Energy Finance database, totting up actual funds committed around the world, showed clean energy investment in the third quarter of this year at just \$42.4 billion, down from \$74.4 billion this time last year. It was the lowest quarterly total since Q1 2013 and less than half of the \$90 billion record chalked up in Q2 2015.

This was not just a flash crash in investment volume either. Q1 and Q2 this year were also down, albeit by a bit more than 20 percent in each case rather than more than 40 percent. Clean energy investment so far this year, far from setting a new total to beat 2015's record, as we predicted it would at the start of the year, is running 30 percent below last year.<sup>1</sup>

How could we have got it so wrong?

## Behind the Fall

One point to note is that the goal posts moved – thanks to the arrival of new information, Bloomberg New Energy Finance revised up the record 2015 investment total by \$20 billion to \$348.5 billion, when we crunched our mid-

year numbers in July. That made it significantly harder to match last year.

Another is that the 3Q 2016 figures suffered from some quirks of timing. For instance, just after the end of the third quarter and in the first days of the fourth, public markets investment in clean energy got the benefit of the \$2.1 billion of new money raised by Innogy SE, the renewables and grid offshoot of RWE AG, the German utility. On October 7, RWE sold 25 percent of Innogy to outside investors. The new equity issued makes Innogy the biggest public market new investment of 2016 so far, beating \$1.7 billion raised by Tesla Motors Inc in a secondary issue in May.

Other timing issues hit 3Q investment in the developing world. Round 4 projects in South Africa are due to be financed before year end, but there was nothing in the first nine months of this year to compare to the Round 3 financings in 1Q 2015. An auction in Chile in August saw renewables win 52 percent of the generation offered, at a world-record low price for solar power of \$29.10 per megawatt-hour. However, those projects will only secure finance in the coming months, so they are not in the asset finance figures for 3Q; for the moment, there have been few wind and solar financings in Chile during 2016 to compare to 2015's total of \$3.3 billion. In the Middle East, there have been more large, eye-catching contracts (including a Masdar 800-megawatt PV plant in Dubai), but these have not yet officially achieved financial close, so are waiting to hit our investment numbers.

It is also possible that we have simply been too conservative about investment in the first three quarters of this year. At the end of each quarter and year, we tot

corporate and government R&D and digital energy asset finance.

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<sup>1</sup> Note that the annual total includes some categories of investment not estimated quarterly – including

up the deals we observe, and then come up with our best estimate for deals we will only hear about in the fullness of time. Some time later, we review those estimates – just like a government producing final GDP figures. One number that could change is investment in Japanese solar; our team reckons that small-scale system costs there may have plunged between 2015 and 2016 from \$3 to a more typical figure in the global markets of \$1.60 per watt, but we may still be underestimating the investment volume somewhat because full-year solar installation volumes are unlikely to fall too far from 2015's record 11.5 gigawatts.

### Multiple Slowdowns

However, it is clear that a number of key markets are seeing real slowdowns in demand for renewable energy equipment. For once, Europe is not the culprit – in fact, in the first nine months of 2016, clean energy investment there was up 2 percent on the same period of the previous year, thanks to a whopping \$22.5 billion in offshore wind financings, already well ahead of the record \$16.9 billion figure for the whole of 2015.

No, the drop in clean energy investment so far this year is due to almost every other region: a reduction of \$7.4 billion in the global total resulted from U.S. investment falling 19 percent in the first three quarters of 2016; a reduction of \$0.8 billion came about through Indian investment falling by 11 percent; a cut of \$5.7 billion resulted from a 73 percent fall in commitments in the Americas excluding the U.S. and Brazil; a \$5.5 billion dent came from a 54 percent fall in investment in the Middle East and Africa; a \$14.7 billion negative impact came from Japan's 60 percent drop; and a massive \$32.2 billion reduction resulted from China's 40 percent fall in investment.

The slip in investment in the U.S. reflects, ironically, the effect of good news. The five-year extension to the Production Tax Credit for wind and Investment Tax Credit for solar, agreed by Congress last December, provides security for investors – but it also means that there is less urgency actually to get ahead and finance projects this year, as opposed to next year or the year after.

Developing economies, specifically Latin America excluding Brazil, and the Middle East and Africa, saw sizeable reductions in investment in 1Q-3Q 2016 despite the fact that many investors see them as promising “new” markets for wind and solar. The global economic slowdown of the past few years has fed through to unexpectedly weak electricity demand (even in countries like India and Peru), which is causing some utilities and governments to hesitate about expanding generating

capacity. In India, happily, this has affected coal build-out first; in a few countries it has started to affect renewable energy.

The biggest investment downturn, by some distance, is happening in China. A boom in Chinese PV installations saw some 22 gigawatts installed in the first half of this year (much of it financed in 2015), but after a change in the feed-in tariff, second-half installations in that country are likely to slow to just 6 gigawatts. Our colleague Justin Wu examined this in a VIP Comment article in May, [\*What Does a China Slowdown Really Mean for Clean Energy?\*](#) He posited that, although investment there would fall this year because of indigestion after last year's financing boom and because of lower costs per megawatt, the clean energy sector would in due course come through it and the project pipeline looked strong for the next few years. So the investment data for the first nine months of 2016 are probably exaggerating the sharpness of the slowdown – but nevertheless, if China is no longer going to be the engine of *growth* in global investment, that alone signals a major sea-change for the clean energy industry.

### More for Less

Global investment would have been much higher so far in 2016 had it not been for further falls in the cost of renewable power technology. Our latest Levelized Cost of Electricity Market Outlook, covering the second half of this year and due to be published this week, will show just how much costs per megawatt-hour for onshore and offshore wind have fallen recently, partly because reverse auctions are driving ever-more-intense competition among developers. The latter, in turn, demand lower costs from manufacturers, service providers, landowners and others.

Michael Liebreich's [keynote](#) at the BNEF EMEA Summit in London on October 11 (see slide 30) divided the recent history of the clean energy sector up into two periods: the “spend more, install more” years up to 2010, and the “spend the same, install more” years from 2011 onwards. Despite falling dollar investment this year, BNEF's solar team continues to expect demand for PV, in gigawatts, to carry on expanding. In our latest PV Market Outlook, their conservative scenario showed installations rising from 56 gigawatts in 2015 to 68.3 gigawatts in 2016, following by 73.2 next year and 82.2 in 2018.

The plummeting costs for renewable energy that are driving “spend the same, get more” are still powerfully at work. Faced with their domestic market slowdown, Chinese manufacturers, faced with a sudden production glut, are going to export it to other markets. While



surplus Chinese wind turbines will most likely remain in Asia, surplus Chinese solar panels will not – they are likely to crash prices once again worldwide.

This quarter's investment downturn may perhaps herald the beginning of a new era, as clean energy pauses for breath after a decade in which wind and solar have grown from providing less than 1 percent of world electricity to 6 percent. But if it does, it will be an era of "spend less, install more", not of "spend less, install less".

### **Aussie Black-out**

Now for the other big story this month, the South Australia black-out. On September 28, a state-wide black-out hit South Australia, home to 1.7 million people, following a big storm. Prime Minister Turnbull lost no time in stating that the black-out should be a wake-up call for state governments that have set renewable energy targets "that are extremely aggressive, extremely unrealistic, and that have paid little or no attention to energy security."

The facts, so far as the grid operator has ascertained, are that the storm blew down three 275-kilovolt transmission lines; this caused a drop in voltage that in turn triggered 445 megawatts of wind turbines to turn off; this in turn overloaded the interconnector to the neighbouring state of Victoria, which failed, leading to system failure; and finally, equipment contracted to restore power quickly, failed to do so.

Despite Turnbull's statement, it does not appear that wind was the culprit at all. Indeed the head of energy for Siemens Australia has stated that a gas turbine would have shut down in just the same way as the wind turbines did, had it been deployed in a similar way. Why did the wind turbines turn off? In short, they were designed to do this, to protect their equipment during a system fault. However, it appears that the system operator had insufficient information of the settings governing the wind farms' emergency shutdown. Therefore the reduction in output was unexpected, so matching load could not be shed fast enough, leading to a cascading fault and a system-wide shut-down.

Our Australia analysis team points out that if the operator had better knowledge and processes for wind farms, it should have been able to anticipate and manage this situation, averting the black-out entirely, or at least reducing it in extent and time. BNEF clients can read our analysts' report [here](#) and a follow up [here](#). The team also points out that three fossil-fuel generators, two that were supposed to provide system restart ancillary services, and one that was supposed to provide power

to a remote region also failed – a fact largely overlooked by politicians.

One thing this episode demonstrates is that resilience can be a double-edged sword for renewables. When Superstorm Sandy shut power to 8.5 million homes and businesses in the New York area just before the November 2012 presidential election, it sent a warning to the U.S. about over-reliance on centralized generation and a traditional hub-and-spokes grid. Diversity of power sources – a mix of wind, solar, small-scale PV, hydro, gas, geothermal, coal, nuclear generation – adds to resilience. Flexibility, storage, grid intelligence, small-scale generation, relying on local natural resources all look like good bets to improve dependability of supply.

On the other hand, a more complex, interconnected grid, teeming with power sources in scattered locations, some only able to generate when the sun shines or the wind blows, may conceal instabilities that only become apparent in an emergency. Cybersecurity may be even more of a hazard for a complex, data-heavy electricity system than it was for the old, 20<sup>th</sup> Century beast, as we argued in an [article](#) for BNEF clients earlier this year. More extreme weather events due to climate change, and more geopolitical tensions, add further potential shocks. And if black-outs were to shut down power in a developed economy for days or longer, no matter which technologies were to blame, the social, economic and political repercussions could be severe.

### **Signs of Changin' Times**

The most interesting aspect of the South Australia black-out, however, may not be that it emphasises the increased attention we need to pay to resilience: it may be in the reaction of Turnbull.

Clean energy skeptics have long argued against it on cost terms. Only a few years ago, renewable energy's false friends were quick to profess how much they would support it if only it were grid-competitive. Well, new renewable energy projects have not just become competitive with coal, gas and nuclear power, particularly in a place like Australia, but have started underbidding them on levelized cost by a rapidly-widening margin. So its opponents switched tack: oh, they said, wind and solar power are both variable, they can only work when storage becomes cheap. But what we have seen is region after region passing 10, 20, 30, 40 percent renewable power, with smart engineers and market designers figuring out how to deal with its variability at an affordable cost. The potential technologies for storage and balancing, short, medium and long-term, are plentiful, as shown in the London

Summit keynote (see slide 73), and there are no show-stoppers on the horizon.

The experience of South Australia shows that we are entering a new phase, where opposition to renewable energy will be on the basis of its impact on reliability and resilience – because resistance on the basis of cost is becoming implausible. As with cost and variability, resilience is a problem that will yield to good engineering, but that will not stop it being a key political battleground over the next few years.

So there you have it, the two top news stories this month – investment in clean energy pausing for breath, and politicians starting to talk about its impact on resilience – both of them look like signals that we are entering a new phase in the history of the sector.

Let us leave you with some closing words, again from Dylan: “Come senators, congressmen, Please heed the call, Don't stand in the doorway, Don't block up the hall. For he that gets hurt, Will be he who has stalled, There's a battle outside raging. It'll soon shake your windows and rattle your walls, For the times they are a-changing!”

Indeed..



## ABOUT US

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