

Renewable energy country attractiveness indices



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Global highlights

Welcome to the 2012 global economy. Growth in many countries is faltering and unemployment rates are stagnating. Even the rapid growth countries are showing signs of slowdown. Some five years after the start of the financial crisis, economies are yet to recover and fiscal deficits continue to ricochet across borders.

In the West, such economic difficulties-together with a resurgence of cheap gas-have yet to translate into bold policy announcements. With voters weary of recession and squeezed by ever-increasing demands on their finances, policy-makers have yet to demonstrate the appetite to make long-term investment decisions that would necessitate short-term cost increases. In Asia by contrast, green job creation schemes have surged to the forefront of debate, with countries competing to set out the most ambitious plans.

This theme of Asian innovation plays out in this edition of our Country Attractiveness Indices (CAI), where China has reinforced its top spot position in our league table. Having quadrupled its solar capacity target to 50GW by 2020, Chinese policy-makers are also addressing the oversupply of panels through accelerated domestic installations, which may help it weather the storm of import duties raining down from across the Pacific.

The US, however, has lost points in the index this quarter and now has to share second place with Germany. The contrast between these two markets couldn't be starker. While the upcoming November elections have led to policy gridlock in the US, Germany is pushing ahead with its ambitious renewables agenda, including the introduction of a new mid-size rooftop PV tariff (despite cuts elsewhere) and compensating for losses caused by offshore grid connection delays.

Elsewhere, Spain and Italy's sovereign credit crises have continued to drag them further down the index, while the UK's plethora of policy announcements this quarter have garnered little clarity for investors.

The continued development of emerging markets, by contrast, offer most hope for the sector. South Africa's US\$8.8b (€7b) tender program could open doors for the rest of sub-Saharan Africa, and Saudi Arabia's US\$109b (€87b) solar plan could signal a new green dawn for the Middle East. South America, led by Brazil, is already showing great potential, and Japan has reinvigorated renewable development following a highly attractive new tariff scheme.

Also in this issue ...

Lead article: A debate on whether governments are doing enough to achieve stated 2020 targets and also maintain energy security.

Technology articles: An analytical insight into global trends in wind power and the emerging smart grid market.

Feature articles: We look at the impact of domestic content requirements on supply chain management, and also consider the potential impact of carbon price mechanisms on energy policy and industry players, with Australia's recent launch providing a useful case study.

Overview of indices: Issue 34

The Ernst & Young CAI provide scores for national renewable energy markets, renewable energy infrastructures and their suitability for individual technologies. The indices provide scores out of 100 and are updated on a quarterly basis.

The CAI take a generic view and different sponsor or financier requirements will clearly affect how countries are rated. Ernst & Young's renewable energy advisors can provide detailed studies to meet specific corporate objectives. It is important that readers refer to the guidance notes set out on page 34 referring to the indices.

Forward-looking indices

The ARI and technology-specific indices are forward looking and take a long-term view (up to five-years). This time period forms the basis of both quantitative and qualitative analysis.

All renewables index

This index provides an overall score for all renewable energy technologies. It combines individual technology indices as follows:

1. Wind index – 55% (comprising onshore wind index and offshore wind index)
2. Solar index – 32% (comprising solar photovoltaic (PV) index and concentrated solar power (CSP) index)
3. Biomass and other resources index – 13%

Individual technology indices

These indices are derived from scoring:

- ▶ General country-specific parameters (the renewables infrastructure index), accounting for 35%
- ▶ Technology-specific parameters (the technology factors), accounting for 65%

Renewables infrastructure index

This provides an assessment, by country, of the general regulatory infrastructure for renewable energy (see page 34).

Technology factors

These provide resource-specific assessments for each country.

Long-term wind index

This index is derived from scoring:

- ▶ The onshore wind index – 80%
- ▶ The offshore wind index – 20%

Long-term solar index

This index is derived from scoring:

- ▶ The solar PV index – 85%
- ▶ The solar CSP index – 15%

For parameters and weightings, see page 34.

Ernst & Young was ranked the leading project finance advisor in the Americas, Europe, Middle East and Africa between 2001 and 2011 by *Project Finance International*.

Also ranked Renewables Financial Advisor of the Year and Power Financial Advisor of the Year by *Infrastructure Journal* for 2012.

Comments and suggestions

We would welcome your comments or suggestions on any aspect of the indices. Detailed attractiveness surveys and market reports can be provided, taking account of specific corporate objectives.

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Bloomberg subscribers can access historical CAI scores through the Ernst & Young Renewable Energy – Total Renewable CAI page: {EYRE<GO>}. Each value can be evaluated to reveal history.

20/20 targets: are we doing enough to keep the lights on?

Guest columnist: Jonathan Johns

At the time of writing, India was in the throes of two days of major power cuts due to the collapse of its Northern grid infrastructure – bringing home the vulnerability of rapidly growing economies to often under-invested energy infrastructure.

India has missed its power sector investment targets most years since 1951, with the consequence that its peak demand deficit is nearly 10% (compared with the 10%-20% surplus typically maintained by mature energy economies). This in an economy where 40% of the population is not connected to the grid.

It's been estimated that US\$400b (€322b) of investment may be required in the Indian power sector in the next five years to provide improved grid infrastructure and an additional 76GW of capacity by 2017, according to India's new Five-Year Plan. Overlaid on this is a desire to have 15% of its electricity (excluding large-scale hydro) from renewable sources by 2020, compared with a previous target of 6.4%. This equates to an additional 30GW of renewables capacity in the next five years, compared with 23GW to date.

Underlying the policy shift in renewable electricity is the desire for solar and wind to achieve grid parity with thermal coal by the early 2020s, reducing dependency on coal for its source of power. This would also offer the prospect of providing more off-grid power access (similar to the position adopted by Australia and Italy, for example).

The outage has occurred at a politically inconvenient time, when there are strong budgetary pressures on the Indian economy as growth slows – partly due to the impact of the euro crisis.

In some ways, India displays, albeit through a different lens, the energy challenges faced by a large proportion of economies:

- ▶ The need for huge levels of energy infrastructure investment in relation to generation capacity and grid infrastructure, in a climate when both government and private sector funds (particularly in the form of bank finance) are constrained
- ▶ The desire to diversify toward a more mixed energy economy with a significant component of renewables by 2020, with a view to taking further advantage of those technologies (once grid parity is achieved), thereby lessening the dependence on imported fossil fuels
- ▶ Political pressures to both keep the lights on and to ensure cost burdens are not too high for consumers, while maintaining the levels of investment required

While high economic growth is not a driver for energy infrastructure investment in mature Western economies, the need to replace aging fossil fuel and nuclear capacity is, particularly with the prospect of electrification of vehicle transport, producing a further 20%-30% requirement in capacity. Other special factors such as some countries' desire to migrate away from nuclear and increased electrification of heat production will accentuate the need for more electricity.

A criticism has been made that successive governments in India have invested too little in energy infrastructure – so that material damage to a burgeoning economy has been risked – as evidenced by the recent power failures. This is a lesson for all economies.

It is probable that the strength of the German economy and the advanced nature of its policies mean that it is well placed to achieve the transition to a low carbon energy infrastructure, but elsewhere in Europe, things are less clear.

While many economies have evolved policies to provide the necessary investment, these are in some cases overcomplicated, causing investment to stall (e.g., in the UK with its proposed contract for difference regime). Other economies are suffering from increasing funding gaps caused by budgetary constraints (e.g., in Spain, where renewable incentives have been greatly curtailed, if not reversed). Italy signaled recently that it could soon run out of funds to support its feed-in tariff (FIT) regime. Almost everywhere there remains a lack of bank project finance to meet the scale of demand without European Investment Bank or German Development Bank (KfW) style support.

Accordingly, it is not inconceivable or alarmist to state that in some mature Western jurisdictions, limited regional lower-scale blackouts could start to occur as we approach 2020. They have occurred in the past due to a combination of hot summers increasing air-conditioning demand and due to underinvested grid infrastructures; For example, in 2006, in Europe and 2003 in North America.

If climate change brings hotter summers and lower river levels, this in itself will lead to difficulties, as lower river levels potentially reduce output from water-cooled nuclear and thermal generation plants (as occurred in France in 2003). The intermittency of renewables entering the energy mix will also bring its challenges to grid infrastructure, as will the transition to smart grids.

In retrospect, working back from 2020, it is relatively safe to say there is likely to be a difference between expectations and delivery. The remainder of this article sets the overall context for renewables as part of the energy equation before focusing on the renewable electricity gap that could emerge if policy expectations are not met by delivery.

20/20 targets: are we doing enough to keep the lights on? (cont'd)

Figure 1 maps the current carbon intensity of grid electricity against the gap between 2010 levels of renewable energy and 2020 levels after taking account of expected energy efficiency measures. (This data is based on European targets in gray and International Energy Agency (IEA) expectations in yellow.) As an aid to judging the significance of a country to the overall equation, the size of the gray or yellow circle is scaled by GDP.

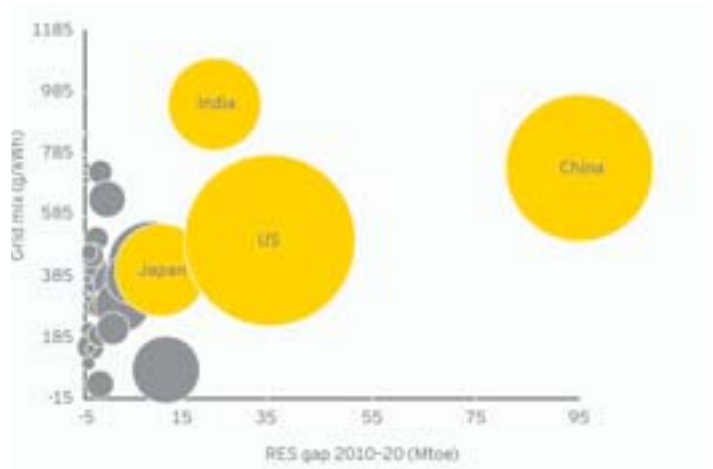
What is particularly striking from this analysis is the degree to which the heavy-hitting and high-GDP non-European countries have high levels of carbon intensity and relatively large gaps in terms of renewable energy investment required to meet implied targets. (Russia has been excluded from the analysis as it does not, at present, feature in the renewable economy.)

Within Europe, it is interesting to note the scale of challenge still faced by the majority of top five countries by GDP, even those who could be thought to be well advanced in renewables. These often have a stubbornly high carbon intensity because of the reliance on coal for power generation. France is an outlier, with very low carbon intensity due to its heavy investment in nuclear, and a relatively large renewables gap due to its only relatively recent focus on the sector.

Figure 2 shows how much the remaining gap has been affected by assumed energy efficiency measures, with Sweden's ambitious targets perhaps having more credibility than the targets put forward by some other countries – while the energy efficiency targets for the UK look conservatively low.

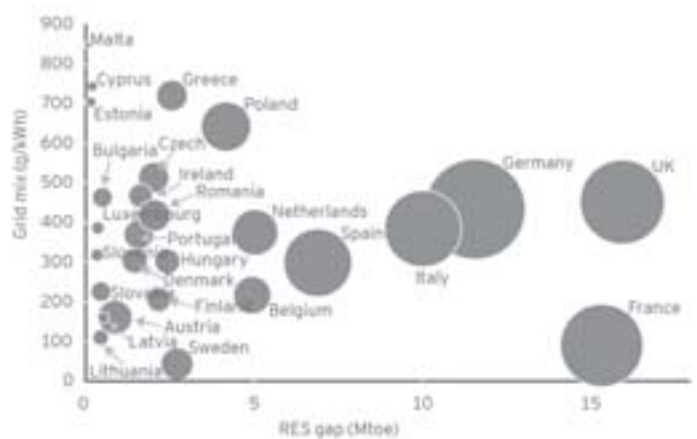
It is arguable that energy efficiency remains the poor relation of energy policy in many jurisdictions, despite having the shortest payback periods. The figures below precede any national action plans likely to be introduced following the new European Energy Efficiency Directive passed in June, which targets 17% of savings by 2020. Unlike the renewables directive, the target is not mandatory on an EU-wide basis, with savings achieved before the 2014 implementation date (2010-14) and also prospective savings in 2020-23 both taken into account. It will be interesting to see whether, in line with this lighter touch approach, the UK's Green Deal and Energy Company Obligation will have the impact planned,

Figure 1a: RES gap 2010-20*



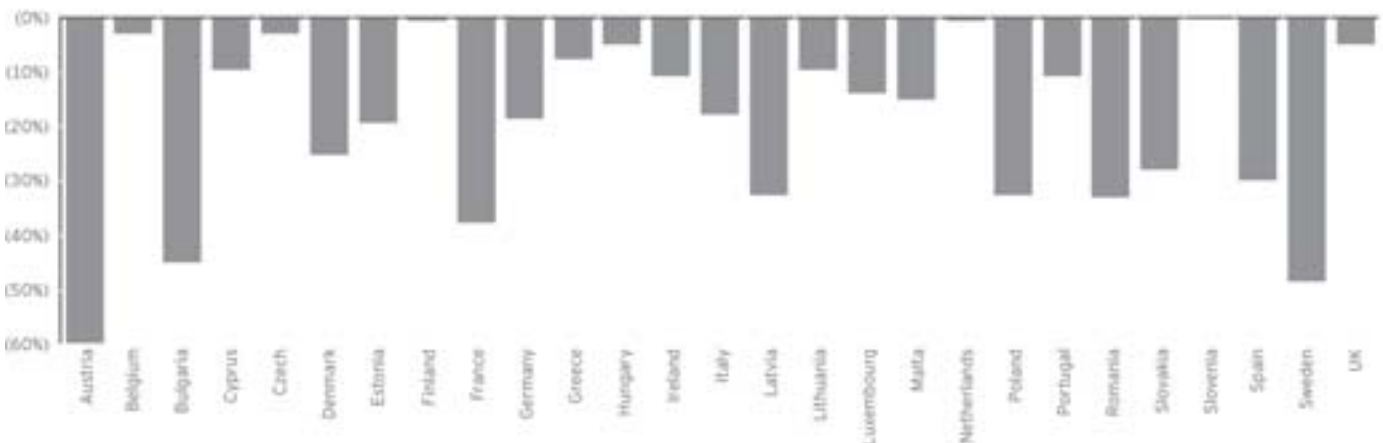
* Grey circles represent EU27 countries, shown in more detail below. Yellow circles represent selected non-EU countries and are based on a 2011-20 RES gap

Figure 1b: RES gap 2010-20 (EU27 countries only)



Source: Page 7 sources 1, 2, 3 and 5

Figure 2: Impact of energy efficiency assumptions on RES gap (%)



Source: Page 7 sources 1 and 2

given that the country is not primed by the relatively cheap sources of finance that support alternative measures in other jurisdictions such as Germany. Notwithstanding the lack of mandatory targets, it would certainly help if, in the future, as much emphasis was given by Governments to national energy efficiency action plans as is given to renewable energy policy support – not just in Europe but in all major economies.

Of course, the level of risk to an economy does vary according to the level and price of indigenous fossil fuels available to it. Figure 3 compares the fuel mix in the principal economies surveyed, showing the fuel mix in each economy and the degree of reliance on imports.

This chart really brings out the challenges posed by India and China where there is a huge dependence on coal as part of the fuel mix. Coal is likely to remain a significant proportion in 2020, despite both countries making extensive investments in renewables. As a consequence of high economic growth, energy consumption is forecast to increase 40%-50%.

What is also clear from the analysis is that, due to a high level of fossil fuel imports, the economies of Italy, Japan and Spain (and, to lesser extent, Germany) are exposed to rising fossil fuel prices that could have a significant effect on the competitiveness of their exports as 2020 nears.

While Spain has a degree of protection from its existing investment in renewables and nuclear, it is not clear that its current policies will lead to that advantage being preserved in the longer term.

The effect of Germany's continued strong investment in renewables (with even more ambitious targets to 2050) makes it likely that it will both significantly reduce its economic dependence on fossil fuels and move away from nuclear power.

Of all major Western economies, the US is arguably one of the most comfortably placed, with a low level of exposure to imports. Moreover, the availability of cheap gas from “fracking” has made the renewable energy investment proposition more difficult to espouse in the US, as both the level of carbon emissions and energy prices have been reduced below levels previously expected; perhaps accounting for the current difficulty, notwithstanding the best efforts of the US Senate Finance Committee in gaining sufficient momentum for the renewal of the production tax credit (PTC), the key driver for investment in onshore wind).

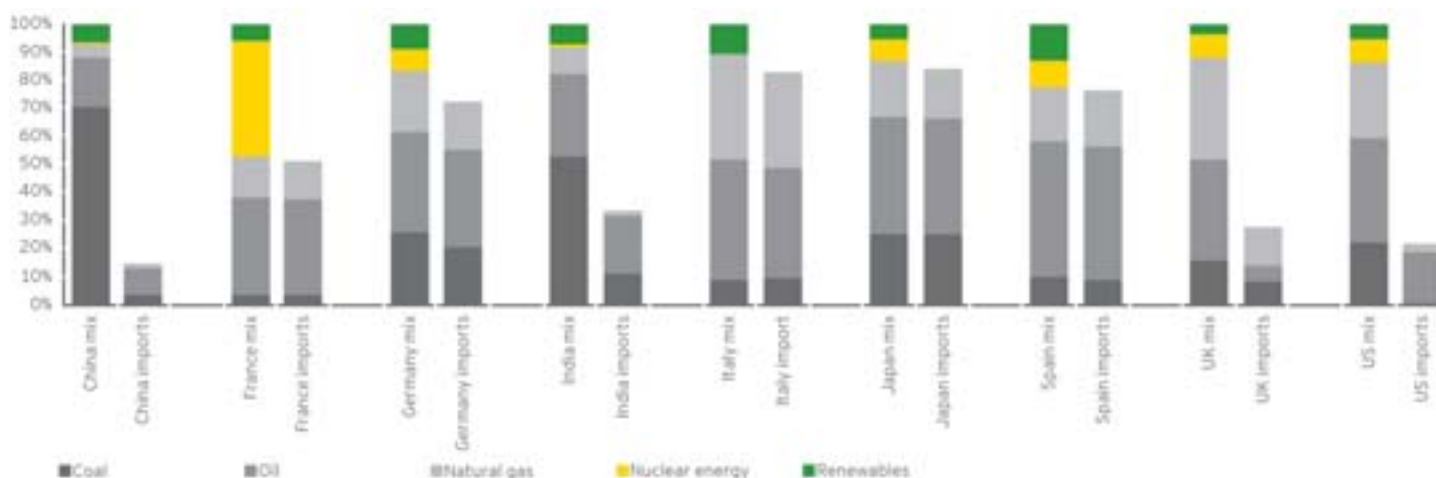
The position of the US may not be what the renewables industry desires but, in the land of hard economics, growth of renewables to a similar proportion of the energy mix as Europe may be some way off, unless its collective position on climate change radically moves.

As discussed in previous articles, the advent of fracking has led to a significant regional shift in natural gas prices in North America (the cheapest) compared with Europe (more expensive) and Asia (the most expensive). This is having a significant impact on global energy infrastructure investment decisions and is not going unnoticed in many jurisdictions.

While the UK's relatively low level of fossil fuel imports may be viewed as attractive, this reflects the current benefits of North Sea oil and gas. With this sector due to decline, it appears to some commentators that the exploitation of shale gas reserves through fracking is more attractive to the UK Treasury than an aggressive pursuit of renewables capacity, with stricter financial rationing of support measures.

However, the cheap natural gas revolution may not go worldwide if the US decides to limit exports by restricting port facilities for export, and other jurisdictions limit the exploitation of the new technologies, e.g., France, where environmental reservations over fracking remain strong.

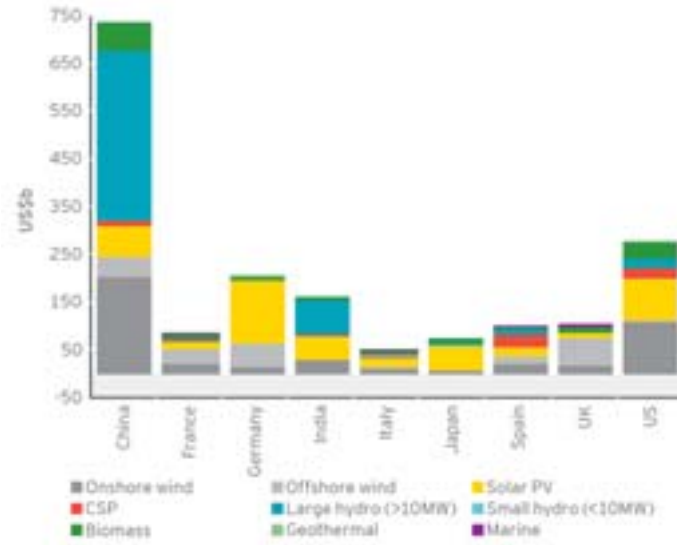
Figure 3: Energy mix by country (%) and proportion of energy imported by fuel type (%)



Source: Page 7 sources 6 and 7

20/20 targets: are we doing enough to keep the lights on? (cont'd)

Figure 4: Estimated cost to meet RES gap (2010-20)



Source: Page 7 sources 1, 2, 3 and 4

One feature of energy policy appears to be that different cultures have different attitudes to which tools are best selected to achieve a transition to a low carbon economy (e.g., nuclear versus gas fracking versus offshore versus onshore wind versus domestic solar). Consequently, politicians focus not on the lowest cost per carbon tonne saved, but rather on the most politically acceptable energy mix.

To date, it has been noticeable that the most politically acceptable policy has not always equated to the cheapest solution or exploited the most prolific indigenous renewable resources. For example, the UK has chosen to focus on the less politically problematic (but much more expensive) offshore renewable sector rather than the cheaper but more controversial onshore sector – consequently (other than in Scotland), it has greatly underexploited one of the best overland wind regimes in Europe.

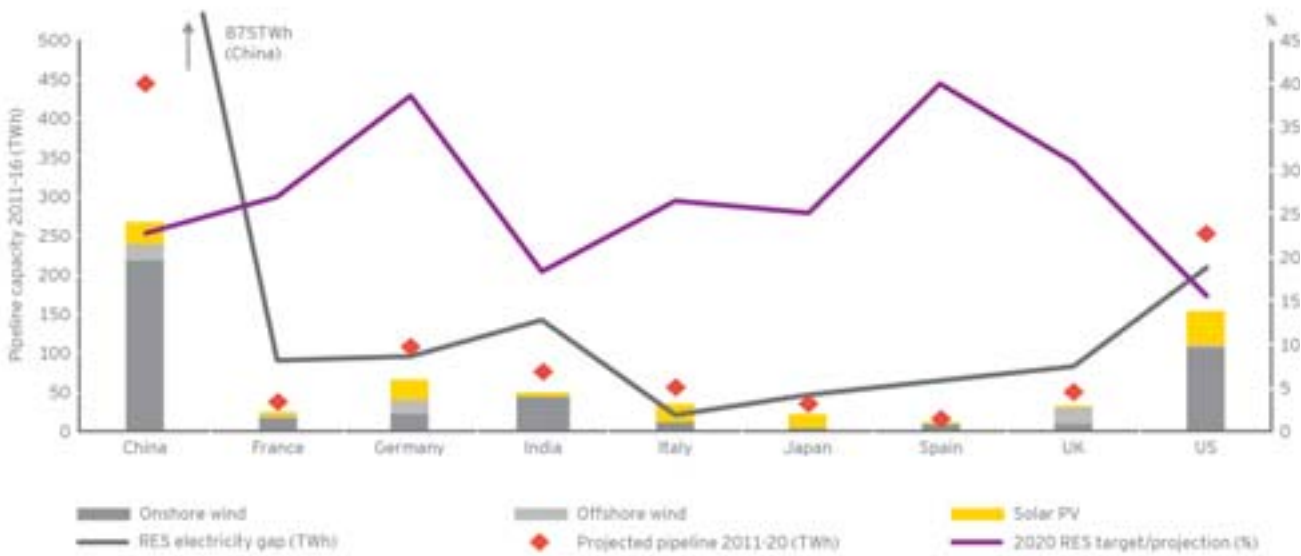
Similarly, but more positively, Germany has invested a large amount of its renewable budget on relatively expensive solar, even though its solar irradiance is relatively poor compared with southern European countries which have invested less.

The impact of technology choice on investment costs is illustrated by Figure 4. This shows Germany's investment disproportionately skewed toward solar and China's already high costs likely to be increased if it implements the forecast level of hydro, rather than continuing to rely on low-cost onshore wind to meet its targets.

To provide an indication of what this investment achieves and what the delivery risk could be, we show in Figure 5 the renewable electricity targets for 2020 together with the renewable electricity gap from 2011 to 2020. The chart also displays Ernst & Young's assessment of the current project pipeline 2011-16 (bar chart by technology) and provides an extrapolation calculated on a straight-line basis to 2020, to provide an indication of whether the gap is likely to be undershot or exceeded.

The graph does need to be interpreted with a degree of caution. For example, the implied undershoot of China and India reflects the huge increase in hydro investment required to achieve the desired share of a remorselessly expanding power sector.

Figure 5: Forecast capacity pipeline (wind and solar only) 2011-16 and RES electricity gap 2011-20



Source: Page 7 sources 1, 2, 3 and 5

Pipeline wind and solar capacity from MAKE, BTM Consulting and LUX forecasts

The challenge for China is not only to continue investment (which, given its state planning approach, it is likely to do), but also to ensure that its renewables are actually grid-connected (with an estimated 20% to 25% of wind not yet connected).

In the case of India, the challenge is the gap that often exists between the budget needed to achieve investment ambitions and that actually allocated. Currently lobbying is taking place for an unprecedented 1% of the overall government budget to be allocated to renewables.

For Germany, the target based on the extrapolated pipeline appears secure. Germany's target should be achieved unless offshore grid connection difficulties become protracted.

In relation to Italy's ambitious targets, while recent experience has been encouraging, the projected overshoot is very dependent on attractive policies being maintained: were these to be removed for fiscal reasons (as may occur) then undershoot rather than overshoot is likely to occur. However, grid parity for solar PV has nearly been reached, particularly in southern Italy, and therefore momentum may well be maintained if technology prices continue to drop and onshore wind investment also continues.

The adverse impact of a drastic reduction in renewables support is illustrated by the poor state of Spain's pipeline, with undershooting of targets almost inevitable.

In France, targets may also not be met due to a strong reliance on 6GW offshore wind target, but only around 1GW in current pipeline. Only 1.9GW was awarded in April for a 3GW tender, and a second tender round has recently been delayed to 2013.

For all three of these countries, there could be one saving grace, however; all of the targets submitted to the EU were based on relatively high levels of growth (around 20%), which are unlikely to transpire given the effects of the euro crisis on their economies.

While the US is likely to achieve a target of 15% of electricity from renewables, this is predicated on the PTC being renewed or replaced by an equivalent measure. Without that support, even the current pipeline could be under threat, given the low natural gas prices.

For the UK, although steady progress in renewable capacity is likely to continue (particularly given the momentum in offshore wind), undershoot of ambitious targets is likely to occur, given the uncertain policy and investment climate and supply chain issues. While its offshore pipeline is well developed, significant delivery challenges remain, given the scale of the challenge.

By contrast, Japan's determination to shift investment toward renewables is reflected in new, markedly more favorable, support measures. This means that there is every prospect that the next five years' installations will exceed the pipeline shown, which was based on assessment of the previous regime. The main challenge is whether infrastructure investment can be mobilized with sufficient speed to achieve the 14% electricity target we have estimated, compared with 10% in 2011.

So, apart from a few honorable exceptions, such as Germany and China, given its planned economy, and perhaps Japan, given its post Fukushima ambition, it is likely that many renewables targets for 2020 will not be met.

Although growth in the sector will still be high, relative to many other sectors of the economy, it is unlikely to be sufficient to prevent further industry consolidation, given substantial overcapacity and continued pressure on margins as governments are increasingly explicit about the need to achieve greater value for money. Further deterioration in Europe's economy could adversely affect even this suggested outcome.

In June, the European Commission suggested that energy policies should be updated from 2020 to provide a more coordinated approach to renewables growth-encouraging exploitation of resources where it is cheaper and driving down costs by greater competition, with support measures gradually declining to encourage cost reduction. Otherwise, there is a concern that investment in renewables will radically reduce from historic levels.

Based on the analysis in this article, it would appear that radical reform should be brought forward to provide further stimulus to the market now, rather than later. This would provide much needed investment opportunities for many economies and increase the likelihood that 2020 targets are met, reducing exposure to future fossil price shocks. The conundrum is, of course, where the money would come from and whether the EU has the remit to move before the expiry of the current directive.

In this respect, the application of Indian climate change lobbyists for 1% of its budget to be allocated to renewables may meet with more success. By 2020, it could be increasingly clear that the Asian and other new economies are the prime drivers of the renewable industry rather than the EU; in a way reflecting a change that, in all probability, has already happened but is not yet fully recognized.

For Europe, the challenge remains to achieve an energy infrastructure mix that reduces exposure to fossil fuel price rises, allows its goods and services to be regarded by consumers as low carbon sourced, and keeps the lights on when economic growth returns. For the Asian economies, the latter challenge is likely to be a recurring theme. For the US, it will be interesting to see whether the shale gas boom will have allowed it to stand safely to one side and observe, or the time will again come when the issue of carbon will become an inconvenient truth.

Key sources:

1. National Renewable Energy Action Plans 2010, European Commission, 2010 (EU27 country-specific)
2. National Renewable Energy Action Plan progress reports, European Commission, 2011 (EU27 country-specific)
3. *World Energy Outlook 2011*, IEA, 2011
4. *World Energy Outlook 2010*, IEA, 2010
5. *BP Statistical Review of World Energy 2012*, BP plc, 2012
6. Gross inland energy consumption by fuel and fuel import dependence (EU27 countries), Eurostat (2010 data)
7. Non EU-27 country energy mix and fuel import dependence data from various publicly available sources

Global trends in wind power

Co-authored by Ernst & Young and Bloomberg New Energy Finance (BNEF)

Onshore wind continues its march toward lower costs and grid parity, a trend that strengthens the future viability of the sector but has put severe margin pressure on its supply chain. Over the next few years, demand for new installations are expected to fall in its traditionally large markets (China, Western Europe and the US), with expansion into new markets (e.g., Brazil, Turkey and South Africa). As the cost of onshore wind energy decreases, policy-makers are revising incentive structures, but the uncertainty caused by political debates or cutting of subsidies prematurely have sent negative shocks to the industry in the short term, particularly in countries such as Spain, Italy and the UK.

For offshore wind, the industry has been slow to take off in Europe, and we anticipate delays in financing and project development over the course of the decade that will derail the EU's ambitious target to build 46.4GW by 2020. However, offshore wind remains a strong growth sector, and innovations in technology and finance, as well as large investment in the supply chain to reduce costs over the next five years, will make it an increasingly attractive area for investors, assuming policy support is sustained.

The next two years will be especially challenging for the global wind industry. Overall, we forecast a record 50GW for 2012, but plunging to 44GW in 2013 before slowly recovering to just below 48GW and to 56GW in 2014 and 2015 respectively. Much of this turbulence is driven by the expiration of the US PTC incentive at the end of 2012. Developers are rushing to complete all projects before the year end and are holding off development activity for 2013, until an extension to the PTC has been secured. As a two or three year extension of the PTC is the most plausible scenario, the US market will likely see another rush to complete installations in 2014 or 2015 followed by another fall in the following year.

Figure 1: Global wind installations and annual growth forecast by region, 2011-20e (GW)



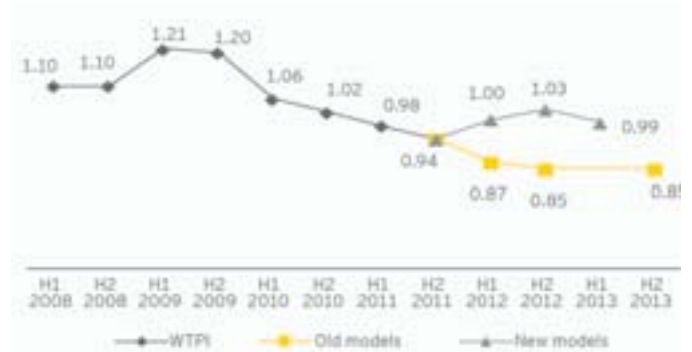
Source: BNEF

Meanwhile, the world's largest onshore wind market, China, continues its slow decline, albeit from very high levels. Although the project pipeline there remains strong, new permitting restrictions from the Government in an effort to stem overcapacity and grid bottlenecks have slowed the project development process. At the end of 2011, the Chinese wind market peaked, with nearly 20GW installed in that year. This will gradually settle to 15GW-17GW per year over the course of this decade. Despite the slowdown, long-term policy support for wind power in China remains strong, and rising coal prices coupled with decreasing turbine prices have made wind increasingly attractive as an energy source.

Turbine prices have hit record lows in H1 2012 at around €0.91m/MW, but the declines have been moderating. However, this masks a divergence in pricing between older turbine models (smaller 1.5MW-2MW turbines), which have seen sharp declines in pricing, and newer models (larger than 2MW), which were above €1m/MW but still at least 10%-15% below their initial pricing expectations. We expect further pricing divergence between turbine models in the near future, but overall prices to stabilize in all regions of the world, including in China, where prices continue to be significantly lower but have also bottomed out.

The wind supply chain came under further margin pressure in early 2012, particularly for manufacturers, ahead of the slump in orders to be seen over the next two years. We expect margin pressure for manufacturers to peak in 2012-13 due to substantial investment in rolling out new products and cost overheads from expanding into new markets. Total global turbine manufacturing capacity is peaking and increasingly shifting away from mature markets, where demand is shrinking, toward emerging markets and new capacity for offshore wind.

Figure 2: Wind turbine price index (WTPI) turbine pricing by old and new turbine models based on date of delivery, H1 2008 – H2 2013 (€m/MW)



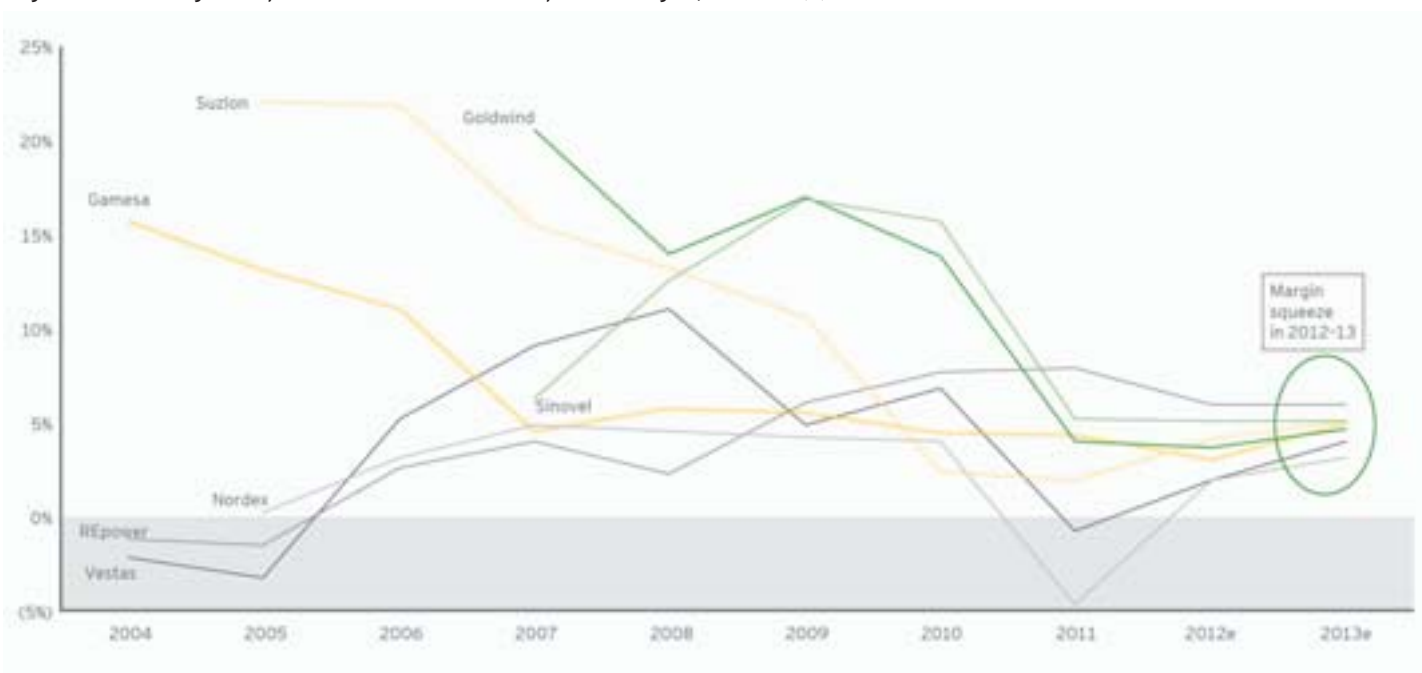
Source: BNEF

Note: contract prices include turbine plus towers and transport to site and excludes VAT. Contracts in China and India are excluded from this analysis due to much lower pricing levels.

To survive, manufacturers are emphasizing new turbine products that offer greater availability and better capture of wind resources in low wind speed areas, in an effort to boost electricity output from projects. Emphasis has also shifted to operations and maintenance of existing projects, where manufacturers can increase revenues by servicing existing operational turbines and building a business around spare parts and monitoring. But, above all, cost reductions are still needed within the manufacturing sector, especially for some European manufacturers with extremely high corporate overheads or a fixed cost base.

Pressure along the supply chain has fueled speculation regarding M&A. We believe, in the short term, that smaller manufacturers will exit rather than be acquired, as their lack of relevant scale or distinctive technology makes them less attractive targets for acquisition. Asian manufacturers, especially, have been looking at acquisition possibilities in Europe, including taking a strategic stake in a competing manufacturer or component supplier, or finding a large utility that will grant market access. So far, this has not occurred, as Asian manufacturers face growing margin pressure and shrinking balance sheets themselves and will require significant financial support from their own banks in order to acquire assets overseas.

Figure 1: EBIT margins of quoted manufacturers and expected margins, 2004-13 (%)



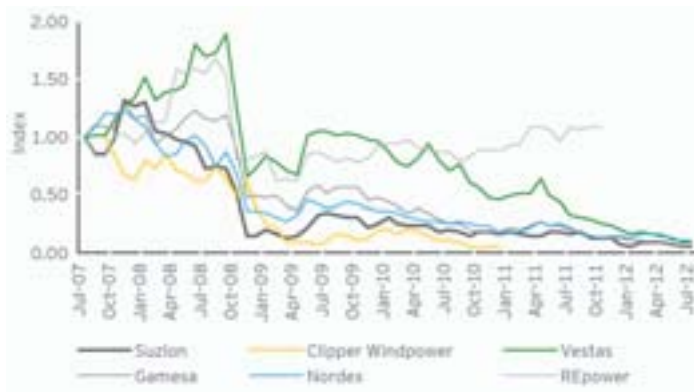
Source: BNEF

Chained to supply: domestic manufacturing

In the Q2 2007 CAI, we wrote about how a tight supply chain situation had both the potential to hold back the renewable energy industry as well as to drive new technology innovation to overcome these barriers (while “traditional” renewables manufacturing increased scale to meet demand). The report also concluded that governments seeking to foster a successful renewable energy industry would need to support the manufacturing sector just as much as generation projects.

In the five years since, renewables markets, and the global economy, have faced unprecedented challenges and change as the world’s economies struggle to deal with an extended period of recession. During that period, the 13 companies we profiled in 2007 have followed the wider macro economic trends, with each experiencing a strong value erosion in Q3 2008 and being unable to regain that lost ground.

Figure 1: Independent wind turbine manufacturer share price trends



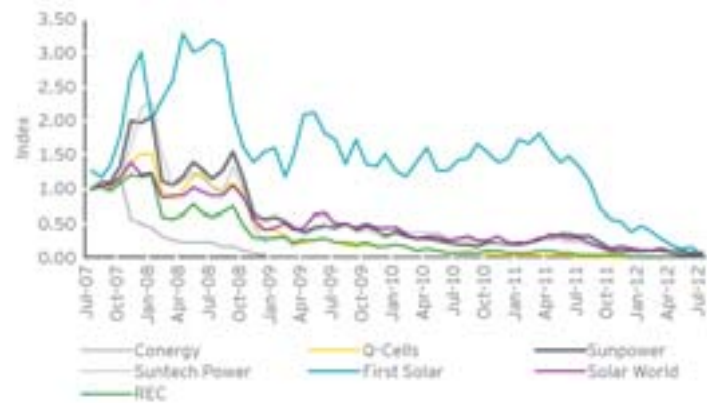
Source: Capital IQ

Our sample of wind manufacturers has also seen attrition over the last five years. Clipper Windpower, for example, was acquired in December 2010 by United Technologies Corporation, after a challenging period of sales threatened Clipper’s finances. United Technologies Corporation is now seeking to dispose of its wind subsidiary along with a number of other non-core businesses to help finance a new acquisition. The challenges for Clipper highlight those faced by the entire wind industry, as it tries to adjust and readjust its product range in response to changing views on US onshore wind growth and offshore wind booms in Europe.

The sample of solar panel manufacturers in Figure 2 hasn’t fared much better, with a number of the companies undertaking significant restructuring programs to account for reduced market demands. It is hard to predict how the new solar competitive landscape may look in the near term, as governments around the world are still reacting to the US raising trade barriers toward Chinese solar panels.

All the manufacturers, wind and solar, have suffered through the downturn. While First Solar initially appeared to be weathering the storm better than most, the last 12 months have seen consistent value erosion.

Figure 2: Independent solar manufacturer share price trends



Source: Capital IQ

The recent manufacturing rollercoaster

Today’s manufacturing environment is the polar opposite of 2007: where bottlenecks once existed across the supply chain, today’s manufacturing landscape is one of overcapacity and an increasing number of restrictions on product or service sourcing.

Overcapacity in the renewable energy sector has been created from strong pre-recession demand stimulating significant new supply chain capacity, a large proportion of which was deployed as demand started to wane following the financial crisis and ensuing recession in 2008.

More positively, from 2008 to 2011, renewables pricing benefited from production oversupply, combined with a sharp fall in commodity pricing flowing through to project components. This allowed many governments to reduce the level of support for projects, passing economies of scale and system price reductions on to consumers at a time when government spending was coming under increasing pressure.

Manufacturing today

As governments around the world have tried to cope with this changing landscape, many have found that traditional high-employment industries no longer exist or are unlikely to support the same historical level of voters in the polls. Additionally, many governments have had to be increasingly proactive in generating support for renewable energy and, in particular, ensuring investment returns. These and other factors have led to the increased use of domestic content requirements across many jurisdictions around the world. Such policies compel renewable energy developers to source a specified share of equipment, or a proportion of total project costs, from local suppliers.

Figure 3: Example markets with domestic content policies



*Italy’s domestic content requirements extend to manufacturing across the EU, not just in Italy.

Historically domestic content markets

Brazil, China and the Canadian province of Quebec have all previously required a certain level of onshore wind project costs to be derived from local sources.

- ▶ Quebec first introduced domestic content requirements in May 2003 along with a tender call for 1GW of projects. Power purchase agreements (PPAs) were only awarded to developers with proof of local sourcing arrangements covering at least 60% of project goods or services. Quebec has maintained market size for manufacturers through the tendering of a further 2.3GW since 2003.
- ▶ Brazil's domestic content requirement, mandating 60% of equipment to be sourced locally, was enacted in April 2002 under the PROINFA program, which also established a 1.1GW target for new capacity. However, political struggles have, to an extent, prevented manufacturers from seizing the opportunities or generating real market demand, as has also been the case in other Latin American markets. In 2009, Brazil removed its domestic content requirements for manufacturing, only to be replaced by a similar requirement imposed by Brazil's development bank (BNDES) for developers seeking financing.
- ▶ In 2005, China established a 70% local content requirement for wind power projects. This policy arguably helped spur China's rapid wind market development before US pressure forced the Government to replace the domestic content requirement with incentives and subsidies.

Solar salvation

More recently, some governments have also sought to capitalize on high-growth solar markets, by way of domestic employment, as a way to compensate for what is incorrectly seen by some opposition groups as high-cost power (with many market commentators failing to compare the cost of solar PV with other forms of new build, peak-load, generation sources).

- ▶ India's Jawaharlal Nehru National Solar Mission is targeting the installation of 20GW of solar capacity and approximately 2GW of manufacturing capacity by 2022 and 2020 respectively. These targets are supported by a requirement for all cells and modules based on crystalline silicon to be manufactured in India (accounting for over 60% of total system costs). The domestic content requirement for CSP is 30% (excluding land).
- ▶ Italy's Conto Energia IV provided for a FIT bonus of up to 10% for solar PV installations in which more than 60% of the project costs (excluding labor) were derived from European sources.

Multiple technologies

Other jurisdictions have sought to establish renewable energy product manufacturing across a range of technologies, seeking security through diversity.

- ▶ In 2010, Turkey added a multi-technology domestic content requirement to its Renewable Energy Law, which provides an addition to the relevant FIT depending on how much locally produced content was used. It should be noted that this excludes local services such as ongoing financing or operations and maintenance.
- ▶ In 2009, as part of its diversification away from traditional manufacturing, Ontario introduced domestic content requirements for wind and solar projects alongside the enactment of a new FIT regime. Wind power projects with

capacity greater than 10kW carry a minimum required domestic content level of 50%, while all solar PV projects attract a minimum required domestic content level of 60%.

Manufacturing future

Europe, traditionally a center for driving renewable energy growth, continues to struggle with economic constraints, and many manufacturers are finding 2012 a tough market. The performance of our sample of 13 companies since 2007 is another illustration of the persistence of global recovery challenges, and we expect this to continue in the near term.

What can governments do?

To attract and retain manufacturing to support the renewable energy supply chain, governments must identify a sustainable market size and provide the basis for corporate business planning. This might be reflected by a forecast number of MWs installed per annum for example. Manufacturers will seek to quantify the opportunity from specific facilities in terms of domestic capacity, export potential or both. Governments can support this through, for example, intermarket agreements, export credit structures, or trade missions and trade agreements.

Additionally, governments can support nascent industries where new local manufacturing enterprises may be struggling or being penalized due to a lack of track record. Support might include, for example, warranty backing for domestic products meeting required standards (subject to public sector balance sheets being able to support such warranties).

Governments are also in a position to influence something that can determine business success but that is more often than not in short supply-market stability. Directly applicable to the more mature technologies, governments can identify a strategy to move renewables out of the political arena and into a position where incentives in their current forms are no longer required, while still helping to maintain project return requirements. Examples might include reducing the cost of project development or appropriately incentivizing utilities to offer long-term PPAs.

Options for supply chain participants

On the supply chain side, manufacturers should continue to prepare and equip themselves to operate in challenging times. Critical to this, for example, is a focus on key customers to increase long-term visibility on project development timing and a better understanding of the supply needs. Closer partnerships with, or acquisition of, project developers in order to "self-supply" and maintain equipment productivity may also help manufacturers adjust in a post-recession world, as well as taking steps to increase workforce flexibility and preserve margins.

Additionally, manufacturers can continue to drive toward grid parity by increasing innovation across both products and integration with balance of systems. This will require manufacturers to listen to feedback on both project challenges and cost drivers from a range of industry stakeholders, such as project as developers, utilities and grid managers.

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Smart grid: a global perspective

Co-authored by Ernst & Young and Bloomberg New Energy Finance (BNEF)

The term “smart grid” means many different things to different people, and encompasses a wide variety of technologies, applications and approaches to energy market design and grid infrastructure investment. However, there is one common theme that underlies all smart grid deployments and policy discussions – the use of information and communications technology (ICT) to bring intelligence to previously unintelligent areas of the energy system.

Figure 1: Global smart grid market size by region, 2008-17e



Source: BNEF

Note: rest of world includes South America, Australia and New Zealand, Africa, Middle East and non-EU Europe.

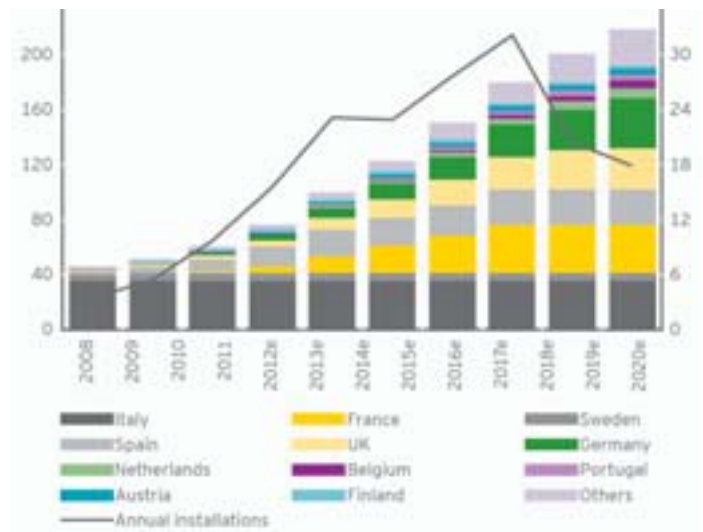
These areas include smart metering, distribution automation, active network management, home and building energy management, demand response, virtual power plants and wide area measurement systems, to name a few. Each country and each utility company has different reasons to invest in smart grid, different technology focuses and different policy frameworks in place. Though smart grid projects are beginning to appear all over the world, here we provide an update on three of the key markets for smart grid technology: Europe, the US and China.

Europe: all eyes on smart metering

Only a few days remain until the 3 September deadline by which each of Europe’s Member States must finalize its cost-benefit analysis for nationwide smart metering. According to the 2009 smart metering directive, each Member State will have to roll out smart meters to 80% of its customers by 2020, if its cost-benefit analysis is positive. BNEF estimates that this directive will lead to the deployment of around 220m smart meters by 2020 (Figure 2).

So far, Italy and Sweden have completed full rollouts, while the UK, Spain, France and the Netherlands have policies in place to pursue one. Most recently, in Q2 2012, a final go-ahead was given in Ireland and a positive cost-benefit analysis result was released in Portugal – both of these countries now appear to be on track toward full deployment. Positive signs were also seen in Greece (the launch of a pilot project) and Poland (steady progress toward smart metering legislation).

Figure 2: European smart meter deployments, 2011-20e (million meters)



Source: BNEF

However, in the Czech Republic and in the Flanders region of Belgium, doubts are being raised about the business case for smart metering, in the Czech case by leading utility CEZ, and in Flanders by its politicians. The door is not closed for smart metering in these two cases, but they do serve as a reminder that not every utility will see a positive net benefit.

The two most closely watched markets are France and Germany – and it is no coincidence that they are also two of the biggest, with around 35m and 45m smart meters to deploy respectively, representing a combined opportunity of around €10b. Though France has a policy recommendation in place for full deployment and Germany does not, both remain in a state of stasis as of mid-2012. French distribution utility ERDF, which had been due to launch smart meter tenders at the start of 2012, is delayed by negotiations with regional authorities and questions around financing, while German utilities await progress on technical standards from the German information security agency.

Toward energy efficiency and renewable integration

Despite the big push for smart metering, Europe’s utilities are aware that a smart grid will require even bigger efforts. On the energy efficiency side, the latest draft of the European Energy Efficiency Directive calls on all Member States to carefully consider the end-user efficiency benefits of smart metering, and to put in place measures to help realize them. For example, energy consumption data from smart meters should be made available to customers and designated service providers – this will help to promote home energy management services such as usage reports, home automation and demand response.

In the long run, European countries will look to smart grid technologies to help integrate the high levels of renewable generation that are expected to come on line. A slew of pilot projects have been launched in the last few years, including those funded by the EU (e.g., Grid4EU, EcoGrid EU and others) and those funded by national governments (e.g., UK Low Carbon Networks Fund, Germany’s E-Energy program and France’s ADEME-funded projects).

US: automation and analytics

In contrast with Europe, the US smart grid market has seen tremendous progress in terms of real project deployments in the last three years, largely driven by the US\$4.5b (€3.6b) in government stimulus grants that were allocated to smart grid projects in late 2009. More than 100 projects were directly supported, boosting the total smart grid spend in North America above US\$5b (€4.0b) for the first time (Figure 1).

The majority of that money was spent on smart meters, and by the end of this year, there will be around 59m smart meters installed in North America. As a result, smart meter shipments will slow in 2013-14, and utilities are beginning to shift their investment focus toward other areas, such as distribution automation and smart grid analytics software.

Distribution automation refers to a set of technologies that improve the efficiency, reliability and resilience of the medium- and low-voltage networks that serve local neighborhoods. Fault detection, isolation and recovery (FDIR) is a key application, particularly in parts of the country that are prone to extreme weather conditions, where storms can knock out distribution wires. FDIR, which requires the deployment of communicating reclosers and switches, improves a utility's response by immediately identifying and isolating a fault rather than waiting for a truck roll to find its location manually. In some cases, power can be re-routed around the fault to restore service partially to the affected areas, vastly improving the utility's performance against key reliability metrics.

Another application, volt/VAR optimization (VVO), is being deployed by utilities to improve the energy efficiency of the grid itself. By fine-tuning voltage and reactive power levels in the network based on current conditions, VVO can reduce line losses and even manage peak demand at critical times. This also helps utilities meet energy efficiency targets set by regulators.

A third and final application area is asset management – the combination of detailed operational data from sensors deployed in the field and analytics software in the utility operations center – to model and predict the wear and tear on key assets within the grid infrastructure, chiefly substation transformers. Asset management analytics is one of the earliest applications of smart grid analytics software combined with Distribution Automation (DA) sensors, allowing utilities to plan infrastructure upgrades and replacements, armed with better information. We estimate that US utilities will spend US\$567m (€457m) on smart grid-related software in 2012, increasing by 19% over the next two years.

China

Much has been made of China's "strong, smart grid," its major grid investments are largely focused on high-voltage lines for long-range transmission, but State Grid Corp of China has also been steaming ahead with ambitious plans to install 300m smart meters by 2015.

In its first round of smart meter tenders for 2012 (the 11th round since 2009), State Grid procured 15.3m single-phase and 1.2m three-phase meters – a very large tender by anyone's standards, and State Grid's second largest ever. Overall, State Grid has bought 124m smart meters since it began the tender process in 2009.

Figure 3: Winner of State Grid single-phase tenders, 2009-12 (number of meters)



Figure 4: Winner of State Grid three-phase tenders, 2009-12 (number of meters)



Source: BNEF

The latest tenders were led once again by familiar names. Four meter companies have cemented their positions at the top in the markets for both single- and three-phase meters: Ningbo Sansing, Wasion, Jiangsu Linyang and Shenzhen Clou. These four account for the top 23% of the single phase market and 41% of the three-phase market.

The pace of smart meter procurement has dramatically slowed compared with 2011. By the same time last year, State Grid had already completed three tenders totaling 36.3m meters – more than double the number it has done so far this year. Part of the reason behind this slowdown is the wait for the large number of meters procured during the last tender of 2011 to be delivered and installed. State Grid is likely to reach or even exceed its target of procuring 50m smart meters in 2012.

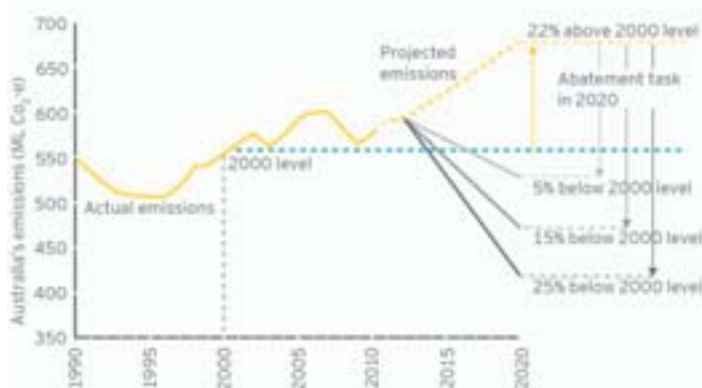
In the meantime, China's 12th Five-Year Plan for smart grid technology has been released and, in a marked change from previous focus areas, targets the integration of renewable energy and electric vehicles as key components of a future smart grid, as well as including large-scale energy storage. According to this plan, 20 to 30 special focus projects, 3 to 5 integrated projects, 5 to 10 smart grid demonstration cities and 60 smart grid demonstration parks are to be established, which will help to determine future directions for China's rapidly expanding grid system.

A carbon transformation for Australia?

The renewable energy sector in Australia came of age on 1 July 2012 with the introduction of the carbon pricing mechanism. After years of debate and controversy, Australia's carbon price mechanism has now come into effect. Placing a price on carbon is the core element of the Australian Government's emissions reduction policy and the central component of the Clean Energy Act, which passed through the Senate on 8 November 2011.

The carbon pricing policy is designed to facilitate a 5% reduction in Australia's greenhouse gas emissions, based on year 2000 levels, by the year 2020. This is a core requirement of Australia's obligations under the Kyoto Protocol and is a target that has bipartisan support. If global consensus is reached (i.e., all major economies commit to restrain emissions substantially and advanced economies take on higher reduction targets), Australia will commit to up to a 15%-25% reduction, depending on the scale of the globally agreed action.

Figure 1: Graphical illustration of carbon price mechanism



Source: Securing a clean energy future: the Australian Government's climate change plan, July 2012

By adopting a price on carbon, Australia joins the EU, Finland, California, South Korea and New Zealand in using this policy measure as an approach to drive emission reductions.

The Australian Government estimates that the combination of the carbon price mechanism and the existing Renewable energy target (RET) will deliver around AU\$20b (€16b) in renewable energy investment by 2020.

However, lingering doubts about the sustainability of the renewable energy sector in Australia still exist. There is significant political uncertainty associated with the introduction of the carbon pricing mechanism, and its ability to support renewable energy development is questioned by many. Coupled with the recent regulatory uncertainty with respect to the RET, it is possible that the new era of renewable energy in Australia could prove to be a false dawn.

In this article, we outline the key features of the new carbon pricing mechanism, comparing it with the carbon pricing policies of selected countries. We also interview four key industry players on their opinion of the Australian renewable energy sector and how the carbon pricing mechanism may impact investment within the sector.

Key features of the carbon price mechanism

Since 1 July 2012, 300 of Australia's largest carbon emitters have been required to purchase permits to emit carbon dioxide into the atmosphere. The permit price is fixed for a period of three years before converting to a market-based price (emissions trading scheme) on 1 July 2015, where tradable permits will be subject to a price cap and price floor.

Only liable entities are required to purchase permits. Liable entities are businesses with direct emissions of greater than 25,000 tonnes of carbon dioxide equivalent (CO₂-e) per year, and suppliers or users of large amounts of natural gas that result in the combustion of over 25,000 tonnes or more of CO₂-e per year. The mechanism covers 60% of Australia's carbon emissions and includes emissions from electricity generation, landfills, wastewater, industrial processes and fugitive emissions (from equipment leaks, bulk handling or the processing of raw materials). Entities that produce indirect emissions as a result of the use or purchase of a product are not liable.

The price of permits during the fixed price period will increase annually by 5%. The initial price of permits is AU\$23 (€19b) per tonne of CO₂-e, increasing to AU\$24.15 (19.78b) as of 1 July 2013 and AU\$25.40 (€20.80b) as of 1 July 2014.

From 1 July 2015, permits purchased by emitters will be tradable, based on a set amount of emissions to be made in Australia. The number of permits will be fixed, in effect limiting the amount of emissions that can be made in any one period. Tradable permits will place a ceiling on emissions once they are allocated to emitters. From 1 July 2015, liable entities in Australia will be able to trade their permits internationally and purchase up to 50% of their liability from permits generated from jurisdictions outside of Australia.

The Clean Energy Finance Corporation

As part of the Clean Energy Act, substantial new funding has been allocated by the Federal Government to support the development of clean energy technology in Australia and encourage innovation in renewable energy. The Clean Energy Finance Corporation (CEFC) is the most significant initiative for the renewable energy sector in Australia.

This organization is, in effect, Australia's version of the Green Investment Bank that has recently been created in the UK. The CEFC will receive funds from the proceeds of the carbon price and will be capitalized with approximately AU\$10b (€8b) to invest in the clean energy sector in Australia.

An expert panel tasked with providing a number of recommendations on the remit of the CEFC has concluded that it should focus on projects that are mainly in the later stages of development, and should seek, as a general principle, to co-finance investments with the private sector. The Federal Government envisages that the CEFC will offer debt and equity on commercial and concessional terms. The CEFC will not invest in carbon capture and storage technology.

International comparison of carbon pricing mechanisms

Australia joins a number of other nations in using a carbon pricing mechanism as the primary method to accelerate carbon abatement. A summary is shown below for comparison.

Country	Carbon mechanism
Australia	Economy-wide carbon pricing mechanism – AU\$23 (€19)/tCO ₂ -e rising by 5% per year during three-year fixed period.
EU	The EU introduced an ETS in 2005 placing a cap on CO ₂ -e that can be emitted by large polluters. European carbon allowances were trading at around €7/tCO ₂ -e and certified emission reductions (carbon credits) were trading at around €3/tCO ₂ -e as at end July 2012.
US	There is no economy-wide carbon pricing mechanism in the US; however, several states have introduced carbon pricing mechanisms, including Maryland, Colorado and California. The “over the counter” – price for carbon allowances in California was US\$18.5 (€16.04)/tCO ₂ -e in July this year.
Canada	Canada, like the US, does not have an economy-wide carbon pricing mechanism, but several provinces have introduced a carbon tax, including Alberta and British Columbia. British Columbia introduced a carbon tax of CA\$10 (€7.9)/tCO ₂ -e in 2010.
Finland	Finland introduced the world’s first carbon tax in 1990, initially with exemptions for specific sectors. The current carbon tax is approximately €18/tCO ₂ -e.
South Korea	The South Korean Parliament passed legislation to introduce a carbon tax starting in 2015. The carbon price is yet to be determined; however, the penalty for non-compliance is AU\$83(€0.06)/tCO ₂ -e.

The Australian renewable energy landscape

The carbon pricing mechanism comes at a critical time for the development of the renewable energy sector in Australia. Investors, developers and financiers have grown weary through years of policy uncertainty. The RET is the primary driver for investment in the Australian renewable energy sector. While it enjoys bipartisan support, it has been the subject of significant upheaval in recent years, delaying or cancelling some investment decisions.

Background on the RET

The RET evolved from the Mandatory Renewable energy target (MRET) in 2009 as a mechanism to drive Australia’s commitment to source 20% of all electricity generation from renewable energy sources. The legislation enacting the RET, the Renewable Energy (Electricity) Amendment Act 2009, passed through both houses of Federal Parliament in August 2009. Under the RET, the annual compliance targets for energy retailers (i.e., utilities) were increased and the scheme was extended until 2030.

Also under the RET, energy retailers could meet their compliance targets through the purchase of renewable energy certificates (RECs) from households (with solar water heaters and solar PV panels) and large-scale renewable energy projects. This combination of large-scale and residential generation exposed a deep design flaw in the system as the overwhelming popularity

of residential generation led to an oversupply of RECs and a collapse in the REC price during 2009 and 2010. As a result, the viability of many large-scale renewable energy projects was seriously affected.

The lingering effects of the oversupply of RECs still remain. Since 2009, energy retailers have been able to accumulate RECs at low cost and thus avoid entering into new PPAs with large-scale commercial projects. This has significantly diminished the ability of project developers to raise finance to construct large commercial-scale renewable energy projects.

To address the impact of residential renewable energy generation on the viability of large-scale renewable energy projects, the scheme was split in early 2011 into two separate components: a Large-Scale Renewable energy target and Small-Scale Renewable Energy Scheme.

As the oversupply of RECs slowly diminishes and the prospect of an undersupply of RECs in the market becomes a reasonable expectation, energy retailers are likely to re-enter the market slowly and provide PPAs to project developers, signaling that a new wave of investment in the sector may be about to begin.

Carbon pricing – Industry perspective

To provide further insight into business and industry issues, we asked four key industry players for their perspectives on the impacts of the carbon price and renewable energy in Australia.

Interviewee: **Kane Thornton, Deputy CEO, Clean Energy Council**

How would you describe your organization?

The Clean Energy Council (CEC) is the main body representing Australia’s clean energy sector. It is an industry association made up of more than 600 member companies operating in the fields of renewable energy and energy efficiency.

What is the opinion of you and your members of the regulatory environment in Australia? How could the regulatory environment in Australia be improved?

The regulatory environment in Australia to date could be classed as “unstable,” particularly given the changes to the RET and the political uncertainty in relation to the carbon price. However, at a macro level, in many respects, all the policy settings are now in place to support the industry, particularly with the establishment of a carbon price and the creation of the Clean Energy Finance Corporation and the ongoing RET.

The CEC shares the view of experts around the world that an Emissions Trading Scheme (ETS) is the most efficient way to achieve a given abatement target. How you transit to this is quite important. A fixed price period, as we have in place now, is a sensible way to ease toward an ETS. The system as is provides certainty of price in the short-term while in the long-term it allows for the creation of a carbon market.

The industry needs stability. The best way to achieve this would be to implement what has been committed to and avoid tinkering or changing regulations. We believe this will be the best approach to providing investors with the confidence to make long-term investments in the sector.

A carbon transformation for Australia? (cont'd)

Do you believe there will be any unintended consequences through the introduction of the carbon price?

It's a bit too early to say; however, what we have seen through the debate about a carbon price is a greater consumer understanding about energy use and energy prices, and ways in which they can reduce their consumption and generate their own on-site renewables. My guess is that demand for energy will continue to fall as consumers change their behavior and become more energy efficient.

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Interviewee: **Mr Miles George, CEO, Infigen Energy Limited**

How would you describe your company?

Infigen Energy is a publicly listed renewable energy company that currently owns and operates around 1.6GW of renewable generation capacity across 24 wind farms in Australia and the US. We are the largest developer and owner of wind farm operating capacity in Australia with 557MW currently in operation, and we hold a national retail license to sell electricity. We have a large pipeline of wind and solar PV development projects.

Infigen has moved into the development of utility-scale solar PV generation, with a view to adding this technology to our generation portfolio. To date, our main focus for this endeavor has been in New South Wales, Australia, where we have three projects approved; and in the US, where we are jointly developing a portfolio of solar energy projects with US developer Pioneer Green Energy.

What is your opinion of the regulatory regime in Australia compared with the other countries where you have operations?

Focusing specifically on the RET, it has been a rocky road. Poorly coordinated policies of previous and current governments, at the state and Commonwealth level, gave rise to a large surplus of Large-scale Generation Certificates that effectively stalled large-scale renewable investment. This was partially redressed through a number of changes to the renewable energy legislation and regulations; however, the imminent RET review continues to reduce investor confidence. If uncertainty continues, we will end up with a stop-start industry similar to the US experience – a roller coaster ride of investment boom and bust that does nothing but add to costs and reduce policy efficiency.

Will the carbon pricing mechanism have a significant effect on your investment decisions?

The introduction of a carbon price is an important step in preparing Australia for a low carbon economy, but, in the medium term, the RET will remain the primary driver of demand for renewable energy investment. Over time, the carbon price will increase to reflect the deeper cuts required to meet Australia's carbon emissions reduction target. The increased cost will be captured in wholesale electricity prices, and investment decisions for new generating plants will be based on the relative cost-effectiveness of renewable and low carbon emission alternatives.

Interviewee: **Mr Andrew Pickering, CIO, Infrastructure Capital Group**

How would you describe your company?

Infrastructure Capital Group (ICG) is a boutique manager of two infrastructure funds, the largest of which owns generation assets across Australia. ICG manages over AU\$1b (€0.8b) in infrastructure assets.

What are some of the challenges faced by investors in renewable energy projects in Australia?

Capital, capital, capital. If it is not wind, it will be enormously difficult for projects to establish viability – witness the problems of geothermal and large-scale solar. With wind there is increasing concern about the quality of the technology, especially economic life. Improvements in technology appear to be focused on size and capacity (i.e., capturing more of the wind resource), rather than reliability. And, again with wind, the “not in my back yard” effect is causing concerns for projects located anywhere near a residential population, particularly in the state of Victoria where planning legislation has effectively curtailed development. Similar planning legislation appears on the agenda for New South Wales and we expect that it will have a similar impact on the development of projects in that state as well.

Where do you see the main investment opportunities arising in the renewable energy sector in Australia with the introduction of the carbon pricing mechanism?

New gas-fired power stations to balance wind generation will be an investment opportunity we will look at. Obviously wind projects will continue to provide good investment opportunities; however, in the short term, there are so many sites and limited capital, with bank debt at tenors of five years or less, it will be tough for new projects. We expect well-managed auctions for operating wind farms to do very well, especially if there is a development angle.

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Interviewee: **Mr Timothy Nelson, Head of Economics, Policy and Sustainability, AGL**

How would you describe your company?

AGL is one of Australia's largest integrated energy companies with over three million residential, small business and major customer accounts. AGL has a significant upstream gas and power generation portfolio, including several thousand MWs of thermal and renewable generation, comprising both base intermediate and peaking capability. AGL is Australia's largest owner, operator and developer of renewable generation assets.

What is your opinion of the regulatory regime in Australia compared with the other countries where you have operations?

AGL is very confident in the RET and the legislation that underpins this; however, in terms of carbon, I think it would be fair to say there are costs being imposed on the sector as a result of the uncertainty. We believe this is manifesting itself in two key ways: suboptimal capital investment and capital market efficiency losses.

Suboptimal capital investment relates to the fact that investors evaluating thermal plants in Australia effectively have a binary decision when it comes to base and intermediate generation, e.g., coal versus gas. Due to the lack of agreement on a carbon abatement mechanism, as an investor, you really wouldn't want to invest in either forms of generation at the moment. For reasons of security of supply, you'll continue to invest in other forms of generation. However, these other forms of generation have a higher long-run marginal cost.

In respect of capital market efficiency losses, providers of debt and equity are looking at individual projects and businesses operating in this energy generation sector and applying a higher risk premium to them, due to a lack of certainty around public policy. So what effectively happens is that as the higher risk premium makes its way into the cost of funds that are deployed within the sector, you see unnecessarily high deployment costs for new generation, whether that be for thermal or renewable, and that has an ultimate impact on electricity prices.

Given the recent issues in the REC market, does AGL have a preference for obtaining RECs in-house or from independent power producers (IPPs)?

AGL has been on record as saying it will go for the most commercial projects, whether that is a project being developed in-house or a project developed by an independent power producer. Due to balance sheet constraints, it's very unlikely that AGL will be able to satisfy our obligations for RECs completely from our own projects, so we expect to be out in the market for PPAs from IPPs as soon as the glut of RECs is washed through. 2015 is generally the year that projects will need to commence operation to ensure a shortfall doesn't occur, so we believe energy retailers will be in the market from next year, seeking to sign up the equivalent of a few thousand MWs of renewable energy generation between 2013 and 2015, comprising mostly wind farm capacity.

Where do you see the main investment opportunities arising in the renewable energy sector in Australia, with the introduction of the carbon pricing mechanism?

In the next few years, wind is likely to continue to be the renewable energy option of choice. But as we see more and more of the optimal sites that are close to transmission lines being taken up, it's likely there will be a crossover point where solar PV will become the technology of choice. The view of AGL is that, between wind and solar, there are plenty of really good opportunities in Australia with high wind speeds or high solar levels.

Where to next?

While the carbon pricing mechanism has largely been well received by the Australian renewable energy industry, it remains an extremely controversial reform, and recent polls suggest that it is unpopular with large sections of the general public. The ultimate fate of the reform lies with politicians (and the Australian electorate). The opposition Conservative party in Australia has vowed to repeal the legislation if they are voted into office in 12 months' time and to dissolve its associated complementary measures such as the CEFC. This, understandably, is creating significant levels of uncertainty in the business community and the renewable energy industry sector in particular.

However, while the fate of the carbon price is doubtful, what is certain is that Australia is planning for a carbon-constrained future for the first time. With bipartisan support for a 5% cut in emissions by 2020, carbon policy will remain a key area of economic reform in Australia for the foreseeable future, providing hope to investors that a new era of growth in renewable energy investment is just around the corner.

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Transactions and finance

Transactions market overview

With a Euro debt crisis that doesn't seem to want to go away, the importance of the energy sector appears to be slipping down the agenda. Subsidy cuts in domestic markets have forced a number of developers, utilities and IPPs to look for investment opportunities in new markets, particularly in Asia, Latin America and South Africa.

Difficult market conditions were reflected in the decline in the value of renewable energy deals in Q2, down more than 50% on the previous quarter. The level of activity remained relatively stable in terms of the number of deals, but this was mainly supported by clean technology and energy efficiency deals rather than transactions in the more traditional renewable energy space. The decline in deal value was mainly driven by Europe and the US, which are both facing limited support for renewable energy over cheaper fuels such as coal and gas.

Most transaction activity in the renewables sector during Q2 reflected the continued consolidation of the market, which is almost inevitable given the competitive landscape, compressed prices and tightening in demand. These factors are particularly hurting less well-capitalized players, and the solar sector is starting to see some casualties. Two equipment makers, Abound Solar of the US and Centrotherm of Germany, filed for bankruptcy in Q2, while General Electric put a halt on previously announced plans to expand its manufacturing capacity in the US, and Schott of Germany exited the market completely.

We have also seen major utilities and energy groups continue to rationalize their renewable energy portfolios through structured divestment programs to dispose of non-strategic businesses and assets, as they seek to deleverage their balance sheets. In May, DONG Energy completed its divestment of 50% of the 277MW Borkum Riffgrund 1 offshore wind farm, to KIRKBI A/S and Oticon Foundation.

Well-capitalized institutional investors and Asian players are actively acquiring these assets from distressed project developers and utilities as they present opportunities for predictable cash flows, prized in the current environment. Q2 witnessed power market participation from several large financial groups, including UK-based investment fund BNP Paribas Clean Energy Partners GP Ltd. and Australia-based private equity firm Macquarie Group Ltd.

The Q2 slowdown in transaction activity and deal values, however, may only be temporary. Investment challenges in the sector and the need for repositioning, especially in light of revised energy strategies in response to the Japanese nuclear crisis, could spur an increase in disposals and strategic divestments by large generators and utilities. Increased deal activity, particularly involving quality generation assets from blue-chip sponsors, could be the catalyst required for institutional capital to properly start flowing into the sector. It will be interesting to see whether deep-pocketed sovereign and family funds subsequently decide to follow.

An increase in outbound Chinese activity is also expected, with solar technology companies and wind sector original equipment manufacturers (OEMs) looking to access new markets through the acquisition of development portfolios. We would expect the vertical integration of the wind and solar sectors to become increasingly familiar as players in the market seek to improve margins through access to a greater share of the value chain.

Figure 1: Global clean energy sector M&A Q2 2012 – value and volume of completed deals



Source: BNEF

IPO overview

Despite a strong pipeline of IPOs at the start of Q2, eagerly awaiting the green light that the market had stabilized, macroeconomic uncertainty returned through the quarter, with a re-ignition of the Euro zone crisis and the poor post-IPO performance of some high-profile corporates potentially demotivating investors and budding IPO candidates.

In Q2, there were 206 IPO deals worldwide across all sectors, raising US\$41.8b (€35b) compared with 383 deals generating US\$65.6b (€52b) in the same period last year, representing a 36% decrease in capital raised. According to BNEF, public markets for clean energy totaled just \$1.2b (€1.0b), almost double the Q1 2012 figure but still 75% below the capital raised in the same quarter last year.

Issuers and investors are understandably waiting for the global market to stabilize and for concerns over global growth to dissipate, before they decide to become active again. However, IPO windows are rapidly closing and opening, and we see this trend continuing in the next few months amid global economic uncertainty. This is even more marked in the renewables sector, where energy policy announcements and subsidy programs, which are currently in a constant state of flux, are key contributors to market sentiment and therefore transaction value. As a result, it is important that companies are well prepared and, when the time is right, are able to take advantage of any window of opportunity. For now, however, all the sector can do is wait, and watch.

“Major utilities are rationalizing their renewable energy portfolios by selling non-core or non-strategic market based assets”
Ben Warren, Energy and Environment Partner, Ernst & Young LLP

Note: All transaction and finance data from publicly available sources

Debt markets and asset finance overview

In Q2, the clean energy sector saw total new investment of US\$59.6b (€48b), up 24% from Q1. While this is still 18% below Q2 in the previous year, a quarter-on-quarter increase should not be dismissed in the current economic climate.

China accounted for a large proportion of this increase in investment, itself experiencing a 92% increase on Q1. This is perhaps not surprising given the country's new solar targets – 50GW by 2020 – and its focus on domestic installations in order to absorb the previous build up of excess solar panels. As well as domestic activity, we are also seeing increased outbound Chinese investment directly into major renewable energy IPP platforms, such as China Three Gorges Corp.'s US\$2.5b (€2b) investment in EDP Renovaveis, and Sky Solar's \$800m (€645m) solar plans in Brazil.

Europe and the US saw an increase in total new investment of 11% and 18% respectively in Q2. The majority of this was driven by new build asset finance – while the number of deals remained broadly the same, the value of these transactions increased by around 40%-50% across the two regions.

Total global new build asset finance of utility-scale renewable power and fuel projects rose 50% on Q1, reaching US\$35.9b (€28.9b) This is a significant, and encouraging, increase relative to the previous quarter, which represented a three-year low in new build asset finance.

Q2 also saw an emerging divergence between investment in renewable energy technology and equipment suppliers, which remained depressed during Q2, and investment in renewable energy projects and assets, which saw stronger growth. This is likely to be driven, not only by renewed focus on domestic installations, but also by risk-averse banks and equity investors preferring to buy operating assets rather than take on construction or technology risk.

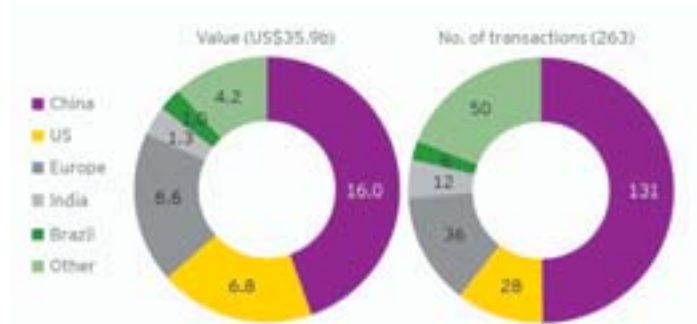
Direct investments by financial institutions is accelerating, but we are seeing a shift from the creation of equity funds to debt funds in a bid to bridge the gap in debt funding and, in some cases, to bring the bond market back into play for the infrastructure assets with

Figure 2: Clean energy new build asset finance raised globally Q2 2012 – value and volume of completed deals



Source: BNEF

Figure 3: Clean energy new build asset finance by region Q2 2012



Source: BNEF

the best "shadow" credit rating. The European Investment Bank, for example, recently launched the pilot phase of its Europe 2020 Project Bond Initiative, a €230m fund to guarantee debt issue by private companies specialized in infrastructure projects.

We are also continuing to see distress in the European OEM market – buyers feel that they can push for lower prices, but tier one prices are still holding up relative to tier two suppliers. Warranties are clearly important in the current market and some buyers and lenders are concerned about over-reliance on any one OEM.

Wind

The wind sector accounted for US\$21.6b (€17.4b) of Q2 investment. Among the largest wind farm projects financed in Q2 were Colruyt's 216MW Northwind offshore wind farm in the US, raising US\$741m (€597m), followed by the £425m (€533m) 270MW Lincs offshore wind farm in the UK. Other top project funding deals included US\$444m (€358m) raised by Invenergy for its 200MW California Ridge Wind Energy Project, and US\$379m (€305m) raised by Iberdrola and Neoenergia for ten wind farms totaling 288MW.

Solar

At US\$33.9b (€27.3b), the solar sector accounted for the majority of total new clean energy investment in Q2, a 19% increase from Q1. New build asset finance increased 50% on the previous quarter. According to BNEF, this reflected continued growth in small scale solar (<1MW), which saw an estimated US\$21.5b (€17.3b) of new investment in Q2. This growth is likely to be driven by the fact PV module prices have fallen by approximately 75% in the past three years.

One of the largest finance deals announced in Q2 was the first phase of the Ouarzazate CSP project in Morocco being developed by the Moroccan Agency for Solar Energy (MASEN). The 160MW project secured debt and equity financing of US\$315m (€252m).

"Direct investment by financial institutions is accelerating but shifting from equity to debt."

Andrew Perkins, Energy and Environment Partner, Ernst & Young LLP

All renewables index at August 2012

Rank ¹		Country	All renewables	Wind index	Onshore wind	Offshore wind	Solar index	Solar PV	Solar CSP	Biomass/ other	Geo-thermal	Infra-structure ²
1	(1)	China	70.2	77	78	70	64	66	47	60	51	75
2	(2)	US ³	66.0	64	66	55	71	71	74	61	67	60
2	(3)	Germany	66.0	69	66	80	61	70	0	69	58	73
4	(4)	India	64.1	64	70	41	66	68	54	61	45	65
5	(6)	UK	55.3	64	60	79	41	47	0	58	36	65
6	(7)	France	55.2	57	58	53	52	56	29	57	33	55
6	(5)	Italy	55.2	56	58	47	56	58	39	50	59	50
8	(8)	Canada	53.4	63	66	46	40	45	0	50	36	66
9	(10)	Japan	50.8	49	50	41	58	63	27	41	48	54
10	(9)	Brazil	50.2	52	55	40	47	49	33	54	24	51
11	(11)	Australia	50.1	49	52	38	53	53	55	43	57	48
12	(12)	Sweden	49.0	55	55	53	37	42	0	58	35	55
13	(14)	Romania	47.7	53	56	39	40	45	0	45	41	46
14	(13)	Spain	47.6	46	49	35	53	52	57	43	26	36
15	(15)	Poland	47.4	54	57	44	38	44	0	44	23	48
16	(16)	South Korea	46.6	47	46	53	48	51	29	41	36	45
17	(17)	South Africa	45.9	50	53	37	43	42	51	37	35	51
18	(18)	Greece	44.7	45	48	33	48	50	33	34	25	32
19	(20)	Belgium	44.6	51	49	58	37	42	0	39	28	51
20	(19)	Portugal	44.3	46	48	35	46	47	35	38	25	38
21	(21)	Mexico	43.9	45	46	40	43	44	40	39	55	41
22	(23)	Denmark	43.0	47	45	58	35	40	0	46	33	53
23	(22)	Netherlands	42.7	48	49	47	36	41	0	37	21	41
24	(24)	Ireland	42.2	52	52	51	26	30	0	43	23	48
25	(25)	Morocco	41.8	40	43	26	48	47	56	38	21	42
26	(29)	Turkey	41.1	43	45	33	40	42	29	35	41	38
27	(26)	Taiwan	40.5	43	44	38	38	43	0	37	38	43
28	(28)	Norway	40.1	48	48	45	26	30	0	45	31	51
29	(30)	Ukraine	39.8	39	41	27	40	46	0	46	32	41
30	(31)	Egypt	39.7	42	44	31	39	39	44	34	24	32
31	(32)	Finland	39.6	46	48	39	25	28	0	53	26	47
32	(33)	New Zealand	39.5	47	50	37	27	31	0	34	51	47
33	(26)	Austria ⁴	38.6	33	40	0	45	51	0	51	34	52
34	(34)	Tunisia	36.6	36	38	27	44	43	47	20	27	40
35	(36)	Israel	36.5	33	38	14	46	47	39	27	28	38
36	(35)	Bulgaria	35.7	36	38	23	36	41	0	35	34	38
37	(38)	Chile	35.0	36	39	24	35	36	31	28	37	41
38	(37)	Argentina	34.6	36	40	22	33	36	17	31	27	33
39	(39)	Hungary ⁴	32.6	31	38	0	31	36	0	43	39	38
40	(40)	Czech ⁴	30.6	31	37	0	31	35	0	31	22	45

Source: Ernst & Young analysis

Notes:

1. Previous ranking in Issue 33 is shown in brackets.
2. Combines with each set of technology factors to produce the individual technology indices.
3. This indicates US states with renewable portfolio standard (RPS) and favorable renewable energy regimes.
4. Score and ranking potentially impacted this issue by a modification to the methodology to remove adjusted weightings for landlocked countries

China remains at the same level in this issue. While the trade war with the US may impact China's export market, it is not yet clear whether the import duties will impact RES generation in the country or not. A recent report by the IEA suggests that China could contribute around 40% of the total increase in global RES capacity over the next five years. Further, while the country is still challenged by oversupply of wind turbines and solar panels, there are signs that the country is taking action to address the grid transmission issues.

The **US** has fallen a point and a half in the ARI due to ongoing uncertainty over the country's long-term RES strategy and political wrangling that is likely to make the development of a cohesive energy policy difficult. A lack of signaling on the likelihood of an extension to the critical PTC for wind projects, and a series of solar sector setbacks have exacerbated this policy limbo.

Germany has increased a point in the ARI and is now level with the US in joint 2nd place. This quarter demonstrated the Government proactively addressing barriers to offshore wind development and establishing some sense of stability in the solar sector.

In **India**, severe blackouts have resulted in speculation that the country has attracted insufficient private investment to modernize its power infrastructure and that renewable energy investment may suffer amid wider power system reforms. This quarter saw few RES project announcements, reinforcing the current period of uncertainty following the expiry of key wind incentives and delays under the National Solar Mission program. Further, it is reported that Indian banks are close to reaching the 15% cap on domestic advances to the power industry, leaving limited scope to boost lending to solar projects. As a result, India has fallen a point in the ARI.

The **UK** has risen to fifth place in the ARI as a result of Italy's fall in the rankings, but has experienced a score decrease overall. While a number of policy and subsidy announcements were made this quarter with the aim of establishing "transparency, longevity and certainty" for the country's RES sector, the general consensus appears to be that the Draft Energy Bill, ROC bandings and decarbonization strategy announcements have fallen short of this objective and, to an extent, even created greater uncertainty.

France has fallen a point in the ARI due to ongoing investigations into the validity of certain wind and solar tariffs, which could impact the attractiveness of the country's subsidy schemes, at a time when the government's medium-to long-term plan for renewables remains unclear. The fall of Italy in the rankings results in France moving up to sixth place, despite the score decrease.

Italy has fallen a place in the ARI to take joint sixth position with France, due to worsening economic conditions putting pressure on access to finance for clean energy infrastructure projects, and confirmation of solar FIT cuts and installation caps in early July.

Japan has climbed further to ninth place in the ARI following confirmation of the generous FIT rates proposed earlier in the year in respect of wind, solar, biomass and geothermal projects. The new tariffs came into effect on 1 July and are expected to be the catalyst for significant growth across the country's RES sector.

Brazil has fallen to tenth place in the ARI, mainly due to the withdrawal of funding by the national development bank (BNDES) in respect of projects utilizing turbines supplied by companies who have failed the bank's local content requirements.

Australia has increased a point in the ARI following the introduction of a AU\$10b (€8b) CEFC, providing loans, guarantees and equity investments for cleantech and renewable energy projects. The shift to a low carbon economy under the country's new carbon trading scheme should also complement the RET.

Spain has fallen in the ARI, due to worsening economic conditions, as reflected by a Standard & Poor credit rating downgrade to BBB+ from A and worsening default credit swaps. Q2 also saw government proposals for a major hike in the electricity tax rate, likely to hit both RES and non-RES projects.

Poland has gained a point in the ARI following the latest draft of the Renewable Energy Act (REA), which sets out technology-differentiated GC coefficients alongside other revised provisions. The specific subsidies are expected to boost investment in RES, particularly in offshore wind, large-scale hydro and solar PV, which receive more than 1.5 GCs/MWh.

South Africa approved 19 RES projects totaling more than 1GW of capacity as part of its second round Renewable Energy IPP program. The 19 projects, worth an estimated US\$3.4b (€2.7b), comprised nine solar PV projects with a total capacity of 417MW; seven wind power projects totaling 562MW; two small hydro projects totaling 14MW; and one CSP project of 50MW. This brings total investment under the auctions to around US\$8.8b (€7.1b).

Denmark's ambitious new targets to generate 35% of energy from renewable sources by 2020, increasing to 100% by 2050, has increased its score in the ARI.

Morocco has risen a point in the ARI as a result of strong market activity throughout Q2, including CSP project financing and wind tender submissions.

Turkey has increased a point in the ARI thanks to significant solar activity in the quarter, and a commitment by the European Investment Bank for €150m of loans to finance renewable energy and energy efficiency projects as well as exports.

Bulgaria has fallen a point in the ARI following the announcement that renewable energy FITs would be slashed from 1 July to ease pressure on electricity prices and adapt to lower technology costs. Alongside the FIT cuts, the energy regulator has also increased end-user electricity prices by 13% and approved a 34% hike in transmission grid tariffs.

Chile has gained a point in the ARI due to strong signs of increasing market activity through Q2 across the wind and solar sectors, including the announcement of an upcoming CSP project tender.

Argentina, while not dropping a full point in the ARI, has fallen in the infrastructure index following the nationalization of oil company, YPF SA, raising concerns this could undermine the country's goal of diversifying its power supply and could push up the cost of loans for infrastructure projects as banks seek to offset risk. Further, the move has caused speculation over the fate of electricity companies who are potentially already on the brink of collapse following a decade of frozen electricity tariffs.

The Czech Republic has fallen again in the ARI following confirmation that generous RES subsidies are to be abandoned from 2014 and the announcement of the Government's intention to extend its own tax on solar power beyond 2013.

Wind indices at August 2012

Rank ¹		Country	Wind Index	Onshore wind	Offshore wind
1	(1)	China	77	78	70
2	(2)	Germany	69	66	80
3	(3)	US ²	64	66	55
3	(3)	India	64	70	41
3	(5)	UK	64	60	79
6	(6)	Canada	63	66	46
7	(7)	France	57	58	53
8	(7)	Italy	56	58	47
9	(9)	Sweden	55	55	53
10	(10)	Poland	54	57	44
11	(11)	Romania	53	56	39
12	(11)	Brazil	52	55	40
12	(13)	Ireland	52	52	51
14	(14)	Belgium	51	49	58
15	(15)	South Africa	50	53	37
16	(15)	Australia	49	52	38
16	(17)	Japan	49	50	41
18	(17)	Netherlands	48	49	47
18	(17)	Norway	48	48	45
20	(20)	South Korea	47	46	53
20	(23)	Denmark	47	45	58
20	(20)	New Zealand	47	50	37
23	(20)	Spain	46	49	35
23	(23)	Finland	46	48	39
23	(25)	Portugal	46	48	35
26	(25)	Greece	45	48	33
26	(25)	Mexico	45	46	40
28	(28)	Taiwan	43	44	38
28	(29)	Turkey	43	45	33
30	(29)	Egypt	42	44	31
31	(31)	Morocco	40	43	26
32	(31)	Ukraine	39	41	27
33	(33)	Argentina	36	40	22
33	(34)	Tunisia	36	38	27
33	(34)	Chile	36	39	24
33	(34)	Bulgaria	36	38	23
37	(40)	Israel	33	38	14
37	(34)	Austria ³	33	40	0
39	(38)	Hungary ³	31	38	0
39	(38)	Czech ³	31	37	0

Source: Ernst & Young analysis

Notes:

1. Previous ranking in Issue 33 is shown in brackets
2. This indicates US states with RPS and favorable renewable energy regimes
3. Score and ranking potentially impacted this issue by a modification to the methodology to remove adjusted weightings for landlocked countries (previously amended to reflect lack of offshore potential but lack of resource now captured in attractiveness)

Germany has proposed new rules to help offshore grid connection, limiting grid operators' financial liability for delayed offshore connections at €100m, whereupon the Government will step in. Other grid announcements this quarter, such as a subsea connection with Norway, will also ease wind power transmission links.

India's Tamil Nadu state government is to provide five-year interest-free loans to companies looking to develop the 14GW of untapped wind potential in the state. However, the combination of a currency slide and the end of wind-specific tax incentives is threatening to make the wind projects unviable by pushing up the cost of imported components.

France's wind tariffs are currently being assessed by the country's Supreme Court on the basis of state aid; a negative outcome could mean the cancellation of FITs for the wind sector. France has also fallen a point in the offshore index amid concerns that the Government will delay the second round of the offshore tender and jeopardize the country's ability to achieve its ambitious 2020 offshore wind target.

Poland's offshore wind sector received a boost this quarter following the award of five offshore wind permits totaling 4.5GW. Further, while the revised draft of the REA reduced support for onshore to 0.9GC/MWh, this was an improvement from the 0.75GC/MWh announced in the December 2011 draft.

Brazil has fallen a point in the wind index following the decision by BNDES to refuse wind developers loans covering some 2GW of turbines that were to be procured from five high-profile manufactures that, according to BNDES, have failed to meet 40% local content requirements. Further, government power auctions, in which wind was expected to feature heavily, have been delayed until October amid concerns about dwindling demand for new projects.

Denmark increased a point in the wind index with a predicted 1.8GW of additional onshore wind capacity by 2020 under the ambitious new energy targets, and government plans for two major offshore wind tenders covering at least 1GW of capacity.

Morocco received 16 submissions for a tender starting this year, targeting 2GW of wind by 2020. The submissions included a joint proposal by EDP and Goldwind for a huge 850MW wind farm. The quarter also saw the announcement of a 150MW project to be developed jointly by Mitsui and EDF, with at least 30% of the construction reported to be undertaken by Moroccan companies.

Chile's largest wind farm secured US\$245m (€197m) in project financing in Q2. Construction has already begun on the 115MW project, which will utilize turbines supplied by Siemens, and is expected to achieve commercial operations in 2014.

Bulgaria falls a point in the onshore wind index due to the 23.1% reduction in the country's above-market FIT rates for large-scale wind projects to BGN0.133 (€0.068)/kWh.

Solar indices at August 2012

Rank ¹		Country	Solar index	Solar PV	Solar CSP
1	(1)	US ²	72	71	74
2	(2)	India	66	68	54
3	(3)	China	64	66	47
4	(4)	Germany	61	70	0
5	(6)	Japan	58	63	27
6	(5)	Italy	56	58	39
7	(8)	Australia	53	53	55
7	(7)	Spain	53	52	57
9	(8)	France	52	56	29
10	(10)	Greece	48	50	33
10	(10)	Morocco	48	47	56
10	(10)	South Korea	48	51	29
13	(13)	Brazil	47	49	33
14	(14)	Portugal	46	47	35
14	(14)	Israel	46	47	39
16	(16)	Austria	45	51	0
17	(16)	Tunisia	44	43	47
18	(18)	Mexico	43	44	40
18	(19)	South Africa	43	42	51
20	(19)	UK	41	47	0
21	(24)	Turkey	40	42	29
21	(21)	Ukraine	40	46	0
21	(21)	Canada	40	45	0
21	(21)	Romania	40	45	0
25	(24)	Egypt	39	39	44
26	(27)	Poland	38	44	0
26	(26)	Taiwan	38	43	0
28	(27)	Sweden	37	42	0
28	(30)	Belgium	37	42	0
30	(27)	Bulgaria	36	41	0
30	(30)	Netherlands	36	41	0
32	(33)	Chile	35	36	31
32	(32)	Denmark	35	40	0
34	(34)	Argentina	33	36	17
35	(36)	Hungary	31	36	0
35	(35)	Czech	31	35	0
37	(37)	New Zealand	27	31	0
38	(38)	Ireland	26	30	0
38	(38)	Norway	26	30	0
40	(41)	Finland	25	28	0

Source: Ernst & Young analysis

Notes:

1. Previous ranking in Issue 33 is shown in brackets
2. This indicates US states with RPS and favorable renewable energy regimes

The **US** has fallen a point in the solar index as a result of the ongoing controversy over the future of the loan guarantee support given to the solar sector in particular, exacerbated by a series of bankruptcies of solar companies. Notwithstanding the import duties imposed on China's solar sector, the US manufacturing market continues to struggle with falling panel prices, with General Electric having announced in Q2 its plan to delay construction of a new manufacturing plant.

China remains level in this issue's solar index. While the Government has, for the second time this year, cut the FIT awarded to projects under its Golden Sun program by 21% from CYN7.0 (€0.9) to CYN5.5 (€0.7) per watt, this has, to an extent, been offset by the Q2 announcement of increased domestic capacity targets for solar. The country aims to have 21GW of solar capacity on line by 2015 and 50GW by 2020, an increase from the previous target of 15GW and 20GW respectively.

Germany has confirmed solar FIT cuts and spending caps, including a new mid-size category (10kW-40kW) receiving €0.185/kWh – higher than would otherwise be received for such projects – giving some certainty to the sector.

In early July, **Italy** confirmed solar FIT cuts averaging 39%-43% in its fifth Conto Energia, due to come into force from 27 August. Overall outlay of installations will also be limited by a budget to be set every six months; €140m will be available for the first half year, reducing to €120m and then €80m.

Spain continues to see an increasing number of solar project proposals that do not require subsidies, indicating a move toward 'grid parity'. While this does not outweigh Spain's current economic situation and the proposed electricity tax hikes in the current solar index, it does bode well for longer-term growth in the sector.

In Q2, **France** announced the results of its First Solar tender, approving 214 projects totaling 514MW and representing an investment of around €1b. It is hoped that the large number of projects will be the catalyst for accelerated growth in the country's solar sector. However, Q2 also saw confirmation that FITs relating to integrated power plants installed on certain buildings will be canceled due to eligibility, assessments having incorrectly been based on the utilization of the building.

Morocco received approval for €246.8m of funding from the African Development Bank to finance the country's largest CSP project, comprising a €168m and a €78.7m Clean Technology Fund concessionary loan to part-finance the first phase of the 500MW Ouarzazate project.

Turkey's energy regulator announced in Q2 that bids would be invited in June next year for capacity licenses totaling 600MW through to 2015. This is compared with the current 10MW of capacity. Separately, China's Sinovel and Turkey's Agaoglu Group have agreed to develop a US\$1b (€0.8b) wind farm project with 600MW of generating capacity.

Bulgaria falls a point in the solar index due to the 55.1% reduction in the country's above-market FIT rates for PV projects greater than 200kW to BGN0.237 (€0.121)/kWh.

Chilean construction company, Sigdo Koppers, has signed an agreement with China's Sky Solar to build more than 300MW of solar capacity in the country. The Chinese company will invest around US\$900m (€725m) in the project. In other solar news, the Government announced a tender for the construction of a 50MW CSP plant that will receive financing support from the Clean Technology Fund, the Inter-American Development Bank and the International Finance Corporation, as well as a US\$20m (€16m) government grant.



Solar targets increased but US trade war continues

Ranking	Issue 34	Issue 33
All renewables index	1	1
Wind index	1	1
Solar Index	3	3

Source: Ernst & Young analysis

Policy

Q2 has seen an increased focus on China's domestic energy strategy, in response to an excess supply of solar panels and significant wind power curtailment resulting from insufficient grid-connected turbines. In a bid to address China's chronic grid access problem, and increase the amount of renewable energy generated and consumed, the National Energy Bureau has proposed a quota system, which will require power companies generating more than 5GW to attribute 11% of their installed capacity to RES, and 6.5% of gross power generation must be RES – generated electricity. Grid companies will also have to buy a specified percentage of electricity from RES by 2015, ranging between 3.2% and 15% across the different grid companies. As yet, there is no active market in China to trade renewable energy quotas, but it is hoped that the new policy will discourage grid companies from wasting wind power. The new system is expected to be finalized later this year and implemented in 2013.

This quota proposal may also be complemented by the construction of China's third ultra-high voltage direct current power transmission project, which has seen State Grid Corp of China investing \$3.79b (€3.05b) in another west-to-east transmission line in a bid to solve the country's grid challenges.

Notwithstanding the challenges faced by China in developing its infrastructure to support its shift in focus toward domestic RES capacity, a recent report released by the IEA indicates that China will account for 40% of the additional 710GW of new global renewable electricity capacity by 2017.

Wind

In the short term, China is continuing to curb construction of new onshore wind capacity in a bid to allow the grid infrastructure to catch up with the rapid growth of installations in recent years. As such, it is anticipated that China will experience its first year of slower growth for almost a decade. BNEF estimates that developers will install 18.6GW of new capacity, down 7% from last year. This is exacerbated by the slow progress of offshore wind development to date, with work yet to begin on four commercial offshore projects awarded in the first auction in 2010. According to the Chinese Wind Energy Association, this is a result of the State Oceanic Administration and other government departments disputing the original locations of the projects awarded by the National Energy Administration.

However, in Q2, Shanghai Donghai Wind Power Co., announced its intention to invest about CYN1.9b (€0.24b) in a 100MW offshore facility next year. The project, which is the second phase of the East China Sea Bridge facility, is awaiting government approval and expects to start construction in the first quarter of 2013, if granted.

In late July, the US imposed tariffs of as much as 73% on wind towers imported from China, following a complaint by the Wind Tower Trade Coalition in December 2011.

Solar

Following the imposition of preliminary anti-subsidy tariffs on Chinese solar panels in March, the US Department of Commerce (DoC) also introduced preliminary anti-dumping tariffs of 31%-250% in May. These rates were higher than expected and, together with the duties of approximately 3%-4% imposed in March, could make Chinese models 27% more expensive in the US market compared with other international manufacturers, according to BNEF. A final decision on the issue is due in October this year.

On 19 July, a month after reports that Chinese firms had filed trade complaints with the Ministry of Commerce, China's Ministry of Commerce announced its own investigation into solar products imported from the US; specifically, whether US producers had been selling polysilicon below cost price and whether US firms have been unfairly advantaged by government subsidies.

However, China could end up fighting its battle on multiple fronts. A group of European manufacturers, led by Germany's Solarworld, has also lodged an anti-dumping complaint against China. While any resulting import duties may be lower than those imposed in the US, the move would make it difficult for Chinese suppliers to avoid the duties given the size of the European market.

In other solar news, as a result of falling costs for solar panel components, the Government has, for the second time this year, reduced the subsidy awarded to solar projects approved under the Golden Sun program in the current year. The incentive has been reduced by approximately 21% from CYN7.0 (€0.89)/MWh to CYN5.5 (€0.70)/MWh.

Notwithstanding the ongoing trade row with the US, China is starting to see high levels of domestic project activity following a government announcement in Q2 urging an accelerated pace of domestic solar installations. The Government has increased its 2020 target from 20GW to 50GW, and its 2015 target from 15GW to 21GW, compared with approximately 3.1GW of installed solar capacity at the end of 2011. The focus on domestic installations has been spurred by the need to absorb an excess supply of panels, as a result of increasing difficulties in exporting products due to falling demand in Europe and US import duties.

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RES policy uncertainty lingers on

Ranking	Issue 34	Issue 33
All renewables index	2	2
Wind index	3	3
Solar Index	1	1

Source: Ernst & Young analysis

Policy

The pending November elections and ongoing trade wars with China make it increasingly unlikely that a cohesive long-term renewable energy strategy will emerge out of the US any time soon. The extension of key stimulus programs remains uncertain and political wrangling will almost certainly delay any silver linings that do appear.

Finance

Two US senators have introduced legislation that would allow renewable energy projects to benefit from tax incentives currently available only to fossil fuel projects. The proposed act would amend the federal tax code to allow wind and solar schemes to fall under the attractive Master Limited Partnerships business structure and thereby be taxed as a partnership with access to capital at a lower cost. It is perhaps unlikely that such a bill will be passed so late in an election year, but it may herald a new vision of renewables financing in the US.

Wind

The imposition of duties of 73% and 60% on wind towers imported from China and Vietnam, respectively, may provide some relief to US wind manufacturers in the short-term. However, it is likely to bring few benefits in the long term, should Congress fail to extend the PTC for wind projects, due to expire at the end of this year. While activity in the sector has been strong in the year to date, as developers scramble to finish projects before December, with an estimated 2GW of projects financed in Q2 alone, BNEF predicts that 2013 will see new build capacity of only 1GW-2GW compared with around 11GW this year. This figure could increase to 4GW-6GW should Congress extend the PTC beyond the end of this year, even if this decision comes at the eleventh hour after the November 2012 elections.

However, last minute decisions will do little to ease wind sector tensions and the inability of investors to make long-term plans. Corporate giants Microsoft and Sprint are the latest to join the battle over the PTC, claiming that failure to extend the tax credit would tax corporate's that purchase significant amounts of renewable energy and damage financial performance during a period of economic turmoil.

Solar

US solar manufacturers may also receive some respite as a result of the anti-subsidy and anti-dumping tariffs imposed on Chinese solar imports, although the impact of China's own investigation into US practices is yet to be assessed. The US may find itself facing unintended consequences, given that China imports a large amount of raw materials and equipment from the US to produce its solar panels.

The US solar sector is also currently at the center of a debate over the Department of Energy's (DoE) loan guarantee program. A Republican-led bill that proposes more transparency on loans for renewable energy projects and proposes the phase-out of the program, has passed through the House Energy and Commerce Committee's energy and power sub committee and now proceeds to the Senate. Dubbed the "No More Solyndras" bill, the legislation action was sparked by the collapse of Solyndra two years after receiving a US\$535m (€431m) loan guarantee. While not expected by some to pass through the Senate, the recently announced bankruptcy of Abound Solar, a US manufacturer awarded a US\$400m (€322m) loan guarantee (against which US\$70m (€56m) was borrowed), does little to weaken the Republicans' case. Should the bill be successful, it could bar the DoE from granting loan guarantees to any company that filed its application after 31 December 2011 for part of its remaining US\$34b (€27b) loan budget.

Signs of woe in the solar sector continued as the slide in solar panel prices forced General Electric to announce in July that it would suspend construction of its solar panel manufacturing plant in Colorado by at least 18 months. The thin film factory was slated to be the biggest in the country.

More positive solar news came in the form of an announcement by the US Interior Department that it has identified 17 solar deployment zones across six states, which will be regarded as "priority areas" for solar projects and will benefit from faster permitting procedures. It is estimated that the sites may eventually be used to support 23.7GW of generating capacity.

Q2 also saw the 100MW milestone being reached by the Aqua Caliente project in Arizona. Once complete, the 290MW project will be the largest solar PV power plant in the world.

Geothermal

EnergySource recently commissioned its 49.9MW power plant in California's Salton Sea geothermal field. It comes at a time when many are reconsidering the role geothermal plays in the national energy mix, considering its reliable and consistent output, relatively low cost and significant resource. Although the PTC's fate is still uncertain and currently is set to expire at the end of 2013 for geothermal plants, leaving a less substantial 10% ITC, in the short term, the industry appears poised for rapid expansion. The Geothermal Energy Association recently announced that 2GW of geothermal capacity is currently under development nationwide, of which 950MW is in advanced stages. This could have quite an impact, given that technology currently accounts for only 3.1GW of domestic output.

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Solar FIT cuts confirmed and offshore grid compensation given some certainty

Ranking	Issue 34	Issue 33
All renewables index	2	3
Wind index	2	2
Solar Index	4	4

Source: Ernst & Young analysis

Policy

Q2 saw Germany reinforce its withdrawal from nuclear power, with proposed resolutions on key areas of uncertainty that have plagued the renewable energy sector in recent months. Specifically, confirmation of subsidy changes for PV and the introduction of compensation rules for offshore wind grid connection. However, the replacement in May of pro-renewables Environment Minister, Norbert Rottgen by less well-known Peter Altmaier, has possibly re-introduced some mixed signals for the sector. While fully supporting the shift away from nuclear, Altmaier has, in recent interviews, cast doubt on whether the country's 2020 targets are achievable and said his priority is to make sure that electricity prices do not rise too much. Notwithstanding, in the first six months of the year, Germany sourced a record 25% of power from renewable sources.

Solar

Following the release of issue 33 of the CAI, which set out the solar PV FIT amendments proposed by Chancellor Merkel's Government, the German Parliament's upper house voted to suspend the FIT cuts and send the proposed bill to arbitration. Following negotiations with federal state representatives, the Government won agreement on the cuts in June and, while the majority of the original bill survived unchanged, there were some revisions that were welcomed by the sector.

- ▶ A new category of higher than expected subsidies for mid-size rooftop systems of 10kW-40kW has been introduced at a rate of €18.5/MWh, higher than would otherwise have been received. All other sized systems will be subject to the previously announced cuts from 1 April 2012.
- ▶ Previous plans to introduce a 90% limit on subsidies for plants larger than 10kW have been suspended, and will now come into effect in 2014.
- ▶ Incentives will decline in smaller monthly steps rather than in large annual or semi-annual chunks as previously.
- ▶ A total solar PV capacity cap of 52GW has been set, after which no subsidies will be paid. Given Germany's current installed capacity of approximately 28GW, analysts predict the upper limit could be reached in as little as five years.
- ▶ A "growth corridor" of 2.5GW-3.5GW per annum up to 2020 will be applied.

The federal regulator revealed that 2.3GW of capacity was installed in the first four months of the year, more than three times the 812MW in the same period last year. This is likely to be mainly driven by developers seeking to avoid the subsidy cuts in April. At the same time, First Solar has announced that it will delay the close of a German plant until the end of this year to meet unexpected strong demand in Europe. The company still intends to scale back production in the fourth quarter.

This positive solar news was partially offset by a series of bankruptcy filings in the quarter, most notably Q-Cells. While the company is attempting to continue trading, it is a stark reminder that industry giants are not immune to the sectors' woes.

Offshore wind

The Government has started to address TenneT's current challenges in complying with its obligations to build the German offshore grid by agreeing on key pieces of legislation, including:

- ▶ Coordination between construction and grid connection by means of a binding offshore grid development plan, which will officially stipulate the time of completion, the location and capacity of future grid connection points to allow for better coordination with the onshore grid expansion.
- ▶ A liability regime to compensate for losses caused by grid connection delays. Key elements include 90% compensation of lost FITS and a liability cap (€100m per case of damage) on the grid operator for unintentional material damage, whereupon the Government will step in.

The draft law is expected to come into force within 2012. While these provisions will not completely resolve the challenges faced in respect of the offshore grid, they should go some way toward whetting infrastructure investors' appetite for co-investments in the offshore grid. However, the sector still faces significant challenges. Despite a host of projects in the planning and construction stages, operational capacity remains low and, to reach the stated target of 25GW by 2030, will require an increase of more than 12,000% on 2011 levels.

Grid

In other grid news, Germany and Norway have agreed plans for a 1.4GW subsea cable linking the renewable energy assets of both countries. A cooperation agreement is expected to be signed in September 2012 and it is hoped the infrastructure project will help mitigate lost power potential from lack of RES storage capacity. This is particularly important for Germany, where wind power can often not be shipped to customers in the south, resulting in turbines being shut down in times of surplus production.

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Policy announcements leave RES sector in limbo

Ranking	Issue 34	Issue 33
All renewables index	5	6
Wind index	3	5
Solar Index	20	19

Source: Ernst & Young analysis

Policy

This quarter saw significant policy activity in the UK, from the release of the draft Energy Bill and the ROC banding review to the shock news that gas is higher up the Government's agenda than previously thought. The lack of clarity and detail across the various policy announcements, and the ambiguous messages coming out of the Treasury and the Department of Energy and Climate Change (DECC), have been frustrating for the renewable sector. The ongoing uncertainty risks delaying the development of the sector, and in particular, the achievement of the UK's 2020 target.

Draft Energy Bill

The draft Energy Bill released in May represents the legislation that will support the Government's Electricity Market Reform package. The bill includes provision for the new "contract for difference" FIT scheme to replace the current ROC banding scheme, and a capacity market to ensure adequate back-up power for renewables. However, the bill has been criticized for containing few decisions on the new FIT and being light on detail with no concrete plans set out. The omissions have concerned some industry players and the bill has done little to dispel the fear that its provisions, including the proposed carbon floor price, could prompt a "dash for gas" by favoring gas and nuclear over renewables.

Decarbonization

One of the most obvious omissions from the draft bill was a binding commitment to decarbonize the UK's electricity supply by 2030 in line with the Committee on Climate Change's recommendations. It has, over recent months, become much more likely that the Government, driven by Chancellor George Osborne, is planning to establish the UK as a "gas hub" and will prioritize decarbonization of the energy sector "in the 2030s," a decade later than planned. This has caused concern throughout the clean energy sector, that the Government's new carbon goals will come at the expense of commitment and long-term investment in renewable energy.

ROC banding review

Other significant policy announcements this quarter covered the results of the ROC banding review undertaken by DECC. Support for onshore wind will be reduced by 10% from 1 April 2013 to 0.9ROCS/MWh for the period of 2013 to 17 as expected, despite a call by the Chancellor for a 25% cut. However, the announcement included a provision to review onshore wind costs later this year, allowing the possibility of additional cuts in 2014. Offshore wind retains 2ROCs/MWh until April 2015, when support will be cut by 5%, with a further reduction in the following year.

A series of tariffs for different levels of biomass co-firing has been introduced, ranging between 0.3ROCs/MWh and 0.9ROCs/MWh. The support level for conversion of coal-fired plants to biomass was confirmed at 1ROC/MWh, while dedicated biomass plants will continue to receive 1.5 ROCs/MWh until 31 March 2016, before falling to 1.4ROCs/MWh thereafter.

Wave and tidal projects received a boost from the increase of support from 2ROCs/MWh to 5ROCs/MWh, subject to a 30MW limit. There was no change to the support offered to large-scale solar projects, but a further consultation later this year is planned to determine the reduced level of support of the technology which, the Government says, should be at a much lower level consistent with FITs for small-scale solar projects. Investors have indicated that this further delay for a decision on solar support continues to leave them in limbo and unable to commit to projects beyond March 2013.

Q2 did see some clarification of support for small-scale solar projects, ending months of uncertainty. The new rate of £0.16 (€0.20)/kWh (down from £0.21 (€0.26)/kWh took effect on 1 August and will be available for a 20-year period instead of a 25-year period. A degression mechanism will reduce support, depending on the capacity installed in previous periods. At the same time, DECC almost halved its forecast for the industry to deliver 22GW by 2020 and now expects to reach 11.9GW by 2020. Changes to FITs for small-scale wind, hydro and biomass plants will take effect from 1 December 2012.

Offshore wind

In other news, there were positive developments for the UK's offshore wind sector this quarter. The Government gave approval to 1.1GW of capacity, giving a boost to the country's offshore wind pipeline. DECC gave the go-ahead to Centrica's 580MW Race Bank project and Warwick Energy's £1.5b (€1.88b) 560MW Dudgeon development. In mid-July, Centrica and Dong submitted initial proposals for a giant 2.2GW offshore wind farm in the Irish Sea between Anglesey and the Isle of Man.

In a bid to identify and overcome barriers to offshore wind development, the government's Offshore Wind Cost Reduction Task Force has set out a number of key actions and specific recommendations that must be implemented to try to cut the cost of generating electricity in the sector to £100 (€125)/MWh by 2020 from around £140 (€176)/MWh today.

However, these positive developments were partially offset by the announcement that Danish wind turbine manufacturer, Vestas has canceled plans to build a factory in the UK to produce its 7MW offshore turbines, leading to speculation that foreign investors remain skeptical about the Government's commitment to the offshore wind sector.

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Wind and solar FITs embroiled in legal reviews

Ranking	Issue 34	Issue 33
All renewables index	6	7
Wind index	7	7
Solar Index	9	8

Source: Ernst & Young analysis

Policy

The election victory of Francois Hollande in May 2012 is potentially good news for France's RES sector. Contrary to his predecessor, Hollande has pledged to scale back France's reliance on nuclear power, reducing the current 75% of electricity output from nuclear to just 50%. The gap, he claims, will be met by an increase in renewable energy. However, the Government's short-term strategy is not yet clear and two 'think tanks' have been created to produce proposals on the development of France's wind and solar sectors, for consideration at September's International Conference on Biodiversity & Sustainable Energy and Development. Further, the French nuclear lobby is likely to make any transition to renewables slow and painful, and the phasing out of nuclear will heavily depend on the extent to which renewable energy is capable of filling the gap given France's relatively slow progress toward meeting its 2020 target.

Wind

The validity of the 2008 wind power FIT Order has been challenged before the Conseil d'Etat, the French administrative Supreme Court, on the grounds that the FIT qualifies as state aid and should therefore have been presented to the EC (which it was not). The FIT is financed by a special contribution tax paid by consumers.

On 15 May 2012, the Conseil d'Etat decided to suspend the case and filed a preliminary ruling referring the question of state aid to the Court of Justice of the European Union (CJEU). If the CJEU ruling, which is likely to take at least a year, confirms that the FIT does qualify as state aid, the Conseil d'Etat may have no choice but to cancel the 2008 FIT, which could be a significant blow to the wind sector.

However, it is noted that the Conseil d'Etat has not challenged the FIT amount so far, and it therefore remains valid. Notwithstanding this, the French Government could issue a new FIT Order and notify it to the EC at any time, or, in the event that the CJEU does qualify the FIT as state aid, decide to review the FIT level.

The challenge over the validity of the wind FIT has caused some nervousness across the renewable energy sector as a whole, that any qualification by the CJEU could be used to challenge the validity of the other renewable FITs that are also financed via the electricity special contribution tax.

In response to the anxiety caused by these judicial events, the newly appointed Minister of Environment has affirmed her support for France's onshore wind sector and indicated that the Government will ensure that PPAs entered into under the 2008 FIT Order will not be jeopardized.

In offshore wind news, notwithstanding the award in April of four wind farm contracts worth approximately €2b and totaling approximately 2GW of capacity, a report from Electricité de France SA (EDF) published by the French Senate in July indicates France will fail to meet its target of 6GW of offshore wind capacity by 2020. The report forecasts it will have 3.9GW of capacity installed, but only half of this will start generating electricity by 2020. There are also concerns that the Government's second offshore tender looks likely to be delayed until early 2013.

Solar

The solar sector has also been the subject of legal controversy this quarter. In a decision dated 12 April 2012, the Conseil d'Etat declared null and void some of the provisions of the solar FIT Orders from 12 January 2010 and 16 March 2010 relating to the utilization of the building for integrated solar installations.

The annulment has been determined on the grounds that distinguishing the kind of buildings that qualify for the solar FIT is not justified, with the Conseil d'Etat stating that the only criteria that should be taken into account should be: (i) the project's anticipated costs to benefit ratio, and (ii) contribution to the country's energy independence and security objectives. As a result, the €0.58/kWh tariff has been canceled for integrated power plants installed on residential buildings or buildings used for health or educational purposes.

This decision does not affect PPAs that have been concluded on the basis of the original Orders; however, there is a concern that it could make the FIT Order of 4 March 2011 legally fragile, as it is also based on a building utilization criteria.

In other solar news, in the first of its two competitive tenders, the Government approved 214 solar projects worth approximately €1b. Of the total 541MW awarded, 95% related to projects with capacity exceeding 250kW. According to the regulator, ground-mounted project bids offered an average purchase price of €188/MWh while rooftop projects averaged €210/MWh. Significantly, the total capacity awarded exceeds the 450MW limit planned for large-scale tenders under the previous Government. Details for the next solar tender will be announced following the distribution of a policy recommendations report due on 13 September.

Marine

The French Government is continuing to support the development of ocean energy technologies actively, in addition to offshore wind. The national authorities have disclosed a road map for tidal energy, including an objective of installing 2.5GW and a possible tender in 2014. GDF Suez is studying the possibility of installing turbines at two sites, including plans to install a pilot plant of three to six turbines from 2015, with a capacity of 3MW-12MW, in the Raz Blanchard area.

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Turbine manufacturers lose out on BNDES funds

Ranking	Issue 34	Issue 33
All renewables index	10	9
Wind index	12	11
Solar Index	13	13

Source: Ernst & Young analysis

Policy

Q2 saw confirmation by Brazil's Ministry of Mines and Energy that its upcoming A3 and A5 power auctions, due to be held on 28 June and 16 August respectively, will be postponed until October. According to the Government, the decision to delay the auctions was made to allow the approval of environmental licenses for key hydropower projects, although it also reflects concerns about permit delays and flagging demand from power distribution companies. Some market participants have claimed this indicates a need for greater diversity in the power auctions.

The auctions, which require developers to begin generating power within three to five years following the signing of the PPA, have registered 1,245 projects with a total combined capacity of approximately 52GW, around half of which relates to wind projects.

Finance

In early July, Brazil's wind energy sector felt the wrath of the local content requirements imposed by the country's development bank, BNDES. Five large wind turbine manufacturers were denied funding relating to 2GW of turbine orders, on the basis that they had failed to source the required proportion of parts from local suppliers.

Turbine makers are initially required to get 40% of their components from Brazilian suppliers, with this rate eventually increasing to 60% on a schedule that varies by suppliers, although BNDES may decide to extend or abandon those shifts in light of recent events. The projects, which utilize Vestas, Siemens, Suzlon, Acciona or Fuhrlander technology, may need to redefine their respective financing strategies if BNDES funding is not available. Suzlon has also announced its decision to build local manufacturing facilities to help it meet the requirements.

Grid

Complementing its ambitious renewably energy plans, Brazil is seeking to protect itself against enormous losses of power each year due to theft through the deployment of millions of smart meters. Subject to legislation due by the end of 2012, Brazil aims to invest around US\$16b (€13b) within the next decade to develop a smart grid infrastructure. It is also seeking to cut transmission power loss over distance by up to 50% through installation of HVDC cables that allow two-way transmission of DC current. Such infrastructure improvements will be required to support the country's energy targets.

Wind

Brazil's wind sector is continuing to grow at an impressive rate. Installed capacity at the end of 2011 was 1.5GW, but GWEC estimates a further 7GW is in the pipeline for completion by 2016. The power auctions in 2011 produced some of the lowest-ever bids for wind energy on an international basis and were competitive against other sources of energy (e.g., gas) without subsidies. While this movement toward grid parity has been broadly welcomed, it has also increased pressure on developers to reduce costs, although turbine costs have also been falling. According to the American Meteorological Society, the winds in the northeast of Brazil in particular are the most consistent weather system in the world and allow companies to use lighter and cheaper turbines. Renova Energia, which started operating a wind farm cluster comprising 14 wind parks with total capacity of 294MW, the largest in South America, forecasts a 50% load factor compared with a 25% average in Europe.

There is also evidence that wind energy developers could start to sell their power through negotiated contracts as opposed to the government auctions that have driven wind power prices down to date. Free market contracts are likely to generate power prices much higher than the average price of BRL99.54 (€39.31)/MWh agreed during one of last year's auctions. Tractebel Energia, the Brazilian unit of GDF Suez, secured BRL358m (€141m) from BNDES to build four wind projects with capacity 115MW, a the view to selling the power generated to large private sector power consumers.

Solar

At the start of Q2, the Brazilian National Agency of Electrical Energy, ANEEL, approved important new legislation that it hopes will significantly boost growth in the sector. To date, solar has lagged far behind other renewable technologies. The legislation sets in place net metering regulation for solar systems up to 1MW to increase power consumption flexibility, and an 80% reduction in distribution taxes for power generated by plants up to 30MW. São Paulo-based renewable energy developer, Bioenergy, has credited the new regulations as having inspired it to hold the first unregulated commercial auction of solar power, planned for 9 August.

Despite these developments, however, the Government maintains that solar is still not competitive with other energy sources and that low demand for solar power means there is no urgency to develop it at present. As such, solar still does not feature in the government's multi-technology power auctions, though this may change in the medium term, given the downward spiral of PV prices.

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Attractive FIT scheme opens up RES market

Ranking	Issue 34	Issue 33
All renewables index	9	10
Wind index	16	17
Solar Index	5	6

Source: Ernst & Young analysis

Policy

Following the tragedy of Fukushima, the Japanese Government is determined to ensure the rapid spread of alternative forms of generation. Nuclear power had been expected to provide half the country's energy by 2030, but replacing this with oil-and gas-based generation to date has come at a high price. The US\$29b (€23b) cost of importing fuel in the year to March 2012 resulted in a Japanese trade deficit for the first time since 1980. This, combined with increasing concern in the country over carbon emissions, has led to a concerted effort by the Government to pursue growth more proactively in the renewable energy sector.

And proactive they have certainly been: Japan is currently debating RETs gets of between 25%-35% of total power generation by 2030 and has implemented, with effect from 1 July 2012, an attractive FIT scheme that aims to incentivize the development of 2.5GW of new renewable energy capacity by March 2013 and ongoing RES investment beyond. BNEF has estimated that investment in clean energy could more than double to US\$17.1b (€13.8b) from the US\$8.6b (€6.9b) invested in 2011.

The table below sets out the FIT rates that came into effect on 1 July across a number of technologies.

Technology	Scale	Tariff (YEN/kWh)	Number of years available
Solar	>10kW	42.0 (€0.4)	20
	<10kW	42.0 (€0.4)	10
Wind	>20kW	23.1 (€0.2)	20
	<20kW	57.75 (€0.6)	20
Geothermal	>15MW	27.3 (€0.3)	15
	<15MW	42.0 (€0.4)	15
Biomass	Dependent on fuel type	13.65-40.95 (€0.1-€0.4)	20

The rates above will apply from July 2012 through to March 2013, beyond which rates will be revised annually or semi-annually if deemed necessary by the energy minister. Eligibility to receive these FITs is principally driven by a project's ability to achieve government accreditation and secure a PPA before the end of Q1 2013.

There is general consensus that Japan's attractive FIT regime will generate a significant boost to renewable energy investment in the short to medium term. The real question is whether policy-makers will be able to avoid the "boom-bust" impact of generous incentives witnessed elsewhere across the renewables markets.

As part of its new RES agenda, the Government is also easing restrictions on land use for solar and wind power, and relaxing regulations on small hydropower parks. The Government has also relaxed regulations on geothermal drilling and exploration in national parks, which contain around 80% of the country's estimated 23GW of geothermal resources.

The Government also seems to be considering the potential long-term impacts of its RES package. The Ministry of Economy, Trade and Industry announced that it intends to continue investing heavily in the energy storage market, and a report from the Ministry estimates Japan could take 50% of the market, which is expected to grow to US\$250b (€201b) by 2020. Last year, Japan's share was 18% of a market worth around US\$65b (€52b). The Ministry wants to ensure that the promotion of renewables is not in vain if surplus power cannot be stored and is therefore wasted.

Solar

While the new FIT scheme offers generous rates across a number of technologies, the high solar FIT particularly stands out at a time when some countries across Europe are making regular cuts to their respective solar incentives. Japan's FIT is around three times the rate currently payable in Germany. BNEF estimates the FIT may spur around 3.2GW-4.7GW of new capacity, generating an investment of at least US\$9.6b (€7.7b).

Electrical giant, Toshiba, has already announced plans to build a series of solar plants on Japan's tsunami-devastated north-eastern coast, totaling 100MW and costing around YEN30b (€0.3b) This would be the country's biggest solar program to date, and construction is expected to begin at the end of this year.

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RES support scheme boosted by latest draft Act

Ranking	Issue 34	Issue 33
All renewables index	15	15
Wind index	10	10
Solar Index	26	27

Source: Ernst & Young analysis

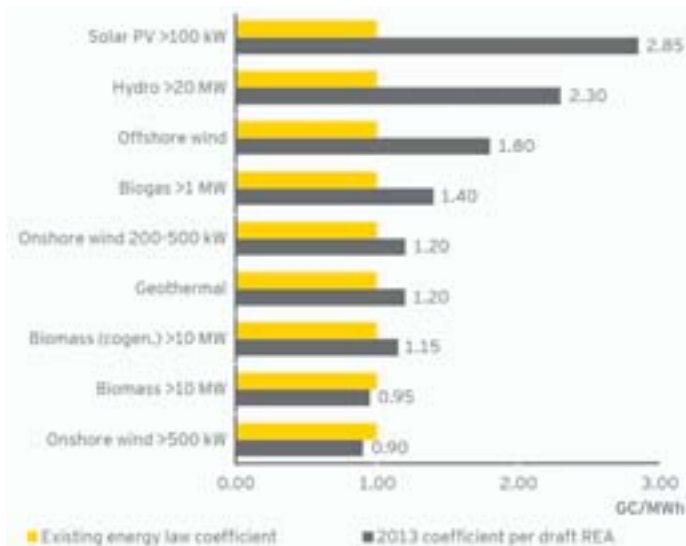
Policy

At the end of May and July, Poland released revised drafts of its REA, originally presented in December 2011, following a period of public consultations. The drafts further clarify Poland's proposed RES support scheme and comprehensively set out the main revisions to the existing Polish Energy Law. The REA is expected to be finalized and binding in 2013. The key provisions of the latest draft are set out below:

1. Green certificate (GC) technology differentiation

The REA introduces corrective coefficients that create technology and capacity bandings, compared with the previously technology-neutral GC scheme (where 1GC=1MWh). The coefficients will be published by the minister of the economy every three years, with the latest draft of the REA proposing the first round of coefficients for 2013–17. Figure 1 summarizes the coefficients set for 2013, which will be gradually decreased until 2017, e.g., onshore wind >500kW will reduce from 0.9GCs/MWh in 2013 to 0.825GCs/MWh in 2017.

Figure 1: Selected renewable energy coefficients in 2013



Source: Draft of "Act on Renewable Energy Sources", Polish Ministry of the Economy, 27 July 2012.

2. Period of entitlement for GCs

GCs will be issued to a RES project for 15 subsequent years from the date of operation. Projects that became operational before the REA comes into force will be eligible for 15 years from the start of generation; however, a coefficient factor of 1GC/MWh shall be applied throughout the term. Under the existing Polish RES support scheme, a RES project remains eligible for GCs as long as it is in operation.

3. Pricing and purchase obligation

Currently, the Polish RES support system requires "suppliers of last resort" to purchase RES generated electricity connected to the grid in their area. The latest draft RES has set the minimum price for the electricity sold under the obligatory purchase at PLN198.9 (€46.9)/MWh subject to annual indexation.

The substitution fee payable by those entities who do not meet the government's RES – electricity quotas (evidenced through the presentation of GCs), will no longer be pegged to the price of electricity as per the December 2011 draft REA. The latest draft sets a level of PLN286.74 (€67.7)/MWh with no mention of any escalation mechanism.

4. Small installations

A category of small-scale RES installations (e.g., PV installations <100kW, onshore wind installations <200kW) has been identified and given preferential conditions for development through the introduction of a FIT system.

Wind

Poland's wind sector breathed a sigh of relief when May's revised draft indicated support for onshore wind projects would be cut to 0.9GC/MWh in 2013, compared with the 0.75GC/MWh proposed in December. This is partially due to intense lobbying following the initial draft, with investors complaining that the proposed cuts would erode project finances even further.

Poland's offshore wind sector also looks set to receive a substantial boost in the medium term following the award of five Government permits totaling 4.5GW of capacity. The country's largest power producer, PGE, won approval to build three artificial islands in the Baltic Sea to support installations totaling 3.4GW, while Kulczyk Holding's Polenergia also received a permit for a 1.2GW project.

Interest has grown in the sector following an amendment to Polish maritime law in 2011, which extended the validity of permits from 5 to 30 years. However, while offshore wind potential is estimated at around 10GW, the Polish Association of Offshore Wind Energy claims only 3GW could be connected to the grid by 2025 and is therefore urging the Government to increase grid capacity to facilitate at least 6GW of capacity.

Other technologies

While RES technologies have been slow to develop in Poland to date, it is hoped the new coefficients will make it an attractive market for solar projects in particular. Given the current GC value of around PLN253 (€60) (July average), and proposed PV coefficient of 2.85GC/MWh, solar projects could receive some €171/MWh in 2013 and 14 under the new scheme.

The curtailment of government support for the co-firing of biomass with coal seeks to address the "imbalances in the economy" caused by biomass demand and generate a more diverse renewable energy mix, according to the Ministry.

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Ambitious targets refocus RES growth drivers

Ranking	Issue 34	Issue 33
All renewables index	22	23
Wind index	20	23
Solar Index	32	32

Source: Ernst & Young analysis

Policy

In March 2012, the Danish Parliament agreed a new set of ambitious national renewable energy targets for 2020, and outlined a direction for the country through to 2050. The agreement includes a commitment to increase the share of renewable energy to 35% of the total energy consumption in 2020, and electricity consumption generated from wind power to be doubled relative to the current 25%. The deal also aims to see Denmark cut its greenhouse gas emissions by 34% by 2020 compared with 1990 levels and decrease energy consumption by more than 12% compared with 2006.

The agreement will help Denmark achieve its ambitious goal of supplying 100% of its energy from renewables by 2050, covering electricity, heating, industry and transport. The announcement is even more unusual in that it has won support from across the country's political spectrum.

The new targets have resulted in a new bill, enacted by the Danish Parliament on 8 June, which includes revisions to the onshore wind subsidy system applicable to new onshore projects that are connected to the grid after 1 January 2014. The changes include a new calculation method for FITs, which will secure greater consistency between the electricity production of the wind power installation and the granted FIT.

In addition, the change implies that the fixed FIT of DKK0.25 (€0.03)/kWh will be reduced linearly if the market electricity price exceeds DKK0.33 (€0.04)/kWh. Therefore, the subsidy is eliminated if the market price exceeds DKK0.58 (€0.08)/kWh. These revisions represent a tightening of the existing subsidy legislation, which assumes no upper limit on the granted FIT in case of increasing market prices.

Finance

Denmark's export credit agency, Eksport Kredit Fonden (EKF), has been increasingly active in providing government-backed financial guarantees to support the project financing of renewable energy projects, recognizing that the financial crisis is eroding banks' ability to make the longer-term loans that projects such as offshore wind farms require.

EKF has formed strategic partnerships with Danish pension funds such as PFA Pension A/S and PensionDanmark, as larger loans with longer maturities fit well with pension fund investment decisions. PensionDanmark A/S agreed to make DKK10b (€1b) available for export orders late last year, with wind energy expected to account for the main part.

In late June, this collaboration led to PensionDanmark providing funding of €44m to the 216MW Belgium offshore wind farm Northwind, backed by a financial guarantee from EKF. The funding secured export of 72 Vestas Wind Systems turbines.

Wind

The March 2012 agreement includes an increased focus on onshore wind, with a projected new capacity of 1.8GW until 2020. This will result in a net increase in onshore capacity of around 500MW, due to the repowering of old wind farms.

Offshore wind is also expected to receive a boost as a result of the new targets. Sixteen potential near shore wind farm locations, evaluated by the Danish Energy Agency, are currently in public consultation. This includes some 500MW near-shore wind turbines to be installed before 2020. The hearing process will end on 26 August 2012 and selection announcements are expected later this year.

In addition, the Danish authorities are currently planning two major offshore tenders, which include the 600MW wind farm at Kriegers Flak and a 400MW offshore wind farm at Horns Rev (Horns Rev III), the latter being the next wind farm to be made available for a public tender.

The tender processes are expected to be initiated in 2013 and completed in 2015. Preliminary environmental investigations are yet to be finalized in respect of these two sites before the tender process can be initiated.

In the near term, the construction of the 400MW offshore wind farm at Anholt is proceeding as planned, with expected completion in 2013. The first wind turbines will be operational half way through the year, following the recent completion of the grid connection to the wind farm.

Grid

Given Denmark's wind ambitions, there is a growing need for strong interconnectors to transport wind power to the load centers, as the areas best suited to wind power generation are often distant from the points of consumption. The country's long-term plans include a potential power cable between Denmark and the UK to help the two countries manage the flow of intermittent renewable energy. The countries' respective grid operators will publish an initial interconnector study by the end of this year, detailing potential landing points, capacity and how a cable could integrate into a North Sea "super grid" to connect offshore wind power.

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Draft law seeks to create more sustainable growth

Ranking	Issue 34	Issue 33
All renewables index	29	30
Wind index	32	31
Solar Index	21	21

Source: Ernst & Young analysis

Policy

Amendments to the Green Tariff Law, adopted on 4 July in the first reading by Parliament, have provided strong indications of the Ukraine's long-term renewable energy objectives. The draft law proposes changes to FITs applicable to solar, hydropower and biogas and waste to power projects in a bid to diversify the renewable energy mix and avoid the solar sector volatility that has been seen across some other European countries as a result of dramatic tariff reductions. The law also proposes some minor changes to the domestic content requirements that mandate developers to employ locally produced equipment in order to secure FIT eligibility. The draft law is expected to be adopted later this year.

1. Revisions to FITs

The draft law proposes FIT cuts of 16%-27% for solar projects commissioned after 2013. The table below sets out the proposed FIT rates that result from the revisions to the underlying coefficient rates set out in the draft.

	Previous coefficient	Proposed coefficient	Old FIT €/MWh	New FIT €/MWh
Ground mounted	4.8	3.5	465.3	339.26
Rooftop >100kW	4.6	3.6	465.3	348.95
Rooftop <100kW	4.4	3.7	426.5	358.64
Rooftop/integrated <16kW	n/a	n/a	n/a	287.72

Meanwhile, FITs for small-scale hydropower installations have increased and, for the first time, are broken down by capacity, as follows:

	Previous coefficient	Proposed coefficient	Old FIT €/MWh	New FIT €/MWh
Micro <200kW	1.2	2.0	77.5	193.86
Mini >200kW/<1MW	1.2	1.6	77.5	155.09
Small >1MW/<10MW	n/a	1.2	77.5	116.32

It is hoped that the revisions under the new draft will help make the country's renewable energy development more sustainable across the various technologies, by diversifying the focus of investors through phased adjustments to the potential returns for different types of projects.

2. Domestic content requirements

Ukraine's current Local Content Regulations are in force for all plants commissioned after January 2012. While requirements for wind and solar projects will remain unchanged (15% in 2012, 30% in 2013 and 50% onwards), the draft law proposes the removal of the current local content requirements in respect of solar modules (both as a proportion of total project value and also in terms of value of the solar modules used). Biogas and hydro plants will not be subject to local content requirements until 2015, from which point, the proportion of domestically produced equipment must be at least 50%.

The removal of the solar module local content requirement highlights the challenge of creating an efficient supply chain of producing silicon in the Ukraine and then exporting it to the module producer only to be re-imported back into the country. Ukraine does have some manufacturing capacity: Austria's Active Solar produces polycrystalline silicon for PV panels and cells, while Germany's Furlander is producing 2.5MW wind turbines in the country. However, this supply chain will need to be expanded further to ensure limited availability of domestically produced equipment does not hinder project development where FIT eligibility relies on it.

Tax and finance

On 1 April 2012, legislative changes in relation to the exemption from corporation tax of profit derived from the sale of RES electricity came into force. Companies generating electricity from both traditional and renewable energy sources are no longer eligible for the exemption in a government attempt to incentivize utilities to focus solely on RES energy.

The European Bank for Reconstruction and Development has provided debt finance for its first RES project in the Ukraine under the USLEF program. The €13.3m loan to the Eco-Optima wind project is an important milestone in showing the country can attract international bank finance for RES projects.

Solar

The Government hopes that the proposed revisions to the Green Tariff Law will create a more sustainable growth platform for the country's solar sector and avoid the "boom-bust" pattern that has been plaguing other European markets struggling to cope with higher than expected demand.

However, the CEO of Active Solar GmbH, the Austria-based solar developer that is responsible for installing around 90% of Ukraine's solar capacity to date, claims that growth in the sector is also being challenged by the ability of companies to access capital. Despite the 30%-40% fall in system costs since the start of 2012, the cost of funding has reached 15%-20%, and banks are offering funding with no more than five years duration. Further, the current election year is making it difficult to attract foreign investment.

However, all is not lost. In June, it was announced that Activ Solar had secured debt financing for a 100MW project already built, after overcoming a number of legal constraints that have traditionally hampered the development of project finance in the country. Activ Solar, which completed another two solar projects totaling approximately 74MW in Q2, aims to develop more than 200MW in solar capacity by the end of the year and has previously used Russian debt to finance its solar projects in the Ukraine.

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Commentary – guidance notes

Long-term index

As stated on page 1, the individual technology indices, which combine to generate the All renewables index, are made up as follows:

- ▶ Renewables infrastructure index – 35%
- ▶ Technology factors – 65%

These guidance notes provide further details on the renewables infrastructure index and the technology factors.

Renewables infrastructure index

The renewables infrastructure index is an assessment by country of the general regulatory infrastructure for renewable energy.

On a weighted basis, the index considers:

- ▶ Electricity market regulatory and political risk (29%) – markets that are fully deregulated score higher, as they have experienced the “market shock” on underlying wholesale prices that this transition August exert. This parameter also considers the relative level and consistency of political support for renewable energy, including national targets and financial incentive schemes.
- ▶ Planning and grid connection issues (42%) – favorable planning environments (low failure rates and strong adherence to national targets) score highly. Grid connection scoring is based on the ease of obtaining a grid connection in a cost-effective manner. The score also takes account of the degree of grid saturation for intermittent technologies.
- ▶ Access to finance (29%) – a market with a mature renewable energy financing environment, characterized by cheap access to equity and good lending terms, will score higher. The access to finance parameter incorporates sovereign credit ratings and sovereign credit default swaps in conjunction with qualitative analysis.

This generic renewables infrastructure index is combined with each set of technology factors to provide the individual technology indices.

Technology factors

These comprise six indices providing resource-specific assessments for each country, namely:

1. Onshore wind index
2. Offshore wind index
3. Solar PV index
4. Solar CSP index
5. Geothermal index
6. Biomass and other resources index

Other renewable energy resources include small hydro, landfill gas and wave and tidal technologies. Energy from waste is not considered. Each of the indices consider, on a weighted basis, the following:

1. Power offtake attractiveness (19%) – this includes the price received, the potential price variation and length of PPAs granted. Higher scores are also achievable if a government guarantees the power offtake rather than merchant offtakers.
2. Tax climate (11%) – favorable, high-scoring tax climates that stimulate renewable energy generation can exist in a variety of forms and structures. The most successful incentives and structures have been direct renewable energy tax breaks or brown energy penalties, accelerated tax depreciation on renewable energy assets and tax-efficient equity investment vehicles for individuals.
3. Grant or soft loan availability (9%) – grants can be available at local, regional, national and international levels, and August depend on the maturity of a technology as well as the geographical location of the generating capacity. Soft loans have historically been used in pioneering countries of renewable energy technologies to kick-start the industry. High scores are achieved through an array of grants and soft loans.
4. Market growth potential (18.5%) – this considers current capacity compared with published targets. Higher scores are given if ambitious targets have been set and policy framework is in place to accelerate development. The realism of targets is taken into account as well as the seriousness with which they are being pursued (e.g., penalties in place for non-compliance).
5. It should be noted that the market growth potential score is based on a view taken of a range of business analysts’ forecasts and Ernst & Young’s own market knowledge. There is significant variation between analysts’ views on each market and the forecasts used are a market view only – the scores in no way guarantee that the forecast capacity will be built.
6. Current installed base (8%) – high installed bases demonstrate that the country has an established infrastructure and supply chain in place, which will facilitate continued growth and, in particular, encourage the repowering of older projects.
7. Resource quality (19%) – for example, wind speeds and solar intensity.
8. Project size (15.5%) – large projects provide economies of scale and a generally favorable planning environment, which facilitates project development financing.

For more details on the CAI and previous issues, please visit www.ey.com/CAI

Glossary

Abbreviation	Definition
ARI	All renewables index
b	Billion
BNDES	Brazilian Development Bank
BNEF	Bloomberg New Energy Finance
CAI	Country attractiveness indices
CEO	Chief executive officer
CEC	Clean Energy Council
CEFC	Clean Energy Finance Corporation
CJEU	Court of Justice of the European Union
CO ₂ -e	Tonne of carbon dioxide equivalent
CSP	Concentrated solar power
DA	Distribution Automation
DC	Direct Current
DECC	Department of Energy and Climate Change
EBIT	Earnings before interest and tax
EC	European Commission
EMEIA	Europe, Middle East, India and Africa
ETS	Emissions Trading Scheme
EU	European Union
FDIR	Fault, detection, isolation and recovery
FIT	Feed-in tariff
GC	Green certificate
GDP	Gross domestic product
GW	Gigawatt
GWEC	Global Wind Energy Association
HVDC	High Voltage Direct Current
ICT	Information and communications technology

Abbreviation	Definition
IEA	International Energy Agency
IPO	Initial public offer
IPP	Independent power producer
ITC	Investment tax credit
KfW	Germany Development Bank
kW/kWh	Kilowatt/Kilowatt hour
m	Million
M&A	Mergers and acquisitions
MW/MWh	MW/MWh
Mtoe	Million tonnes of oil equivalent
OEM	Original equipment manufacturer
PPA	Power purchase agreement
PPP	Public-private partnership
PROINFA	Programa de Incentivo às Fontes Alternativas de Energia Elétrica
PTC	Production tax credit
PV	Photovoltaic
REA	Renewable Energy Act
REC	Renewable energy certificate
RES	Renewable energy sources
RET	Renewable energy target
ROC	Renewable obligation certificate
RPS	Renewable portfolio standard
TWh	Terrawatt hours
VVO	volt/VAR optimization
VAT	Value added tax
WTPI	Wind turbine price index

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Ernst & Young services for renewable energy projects

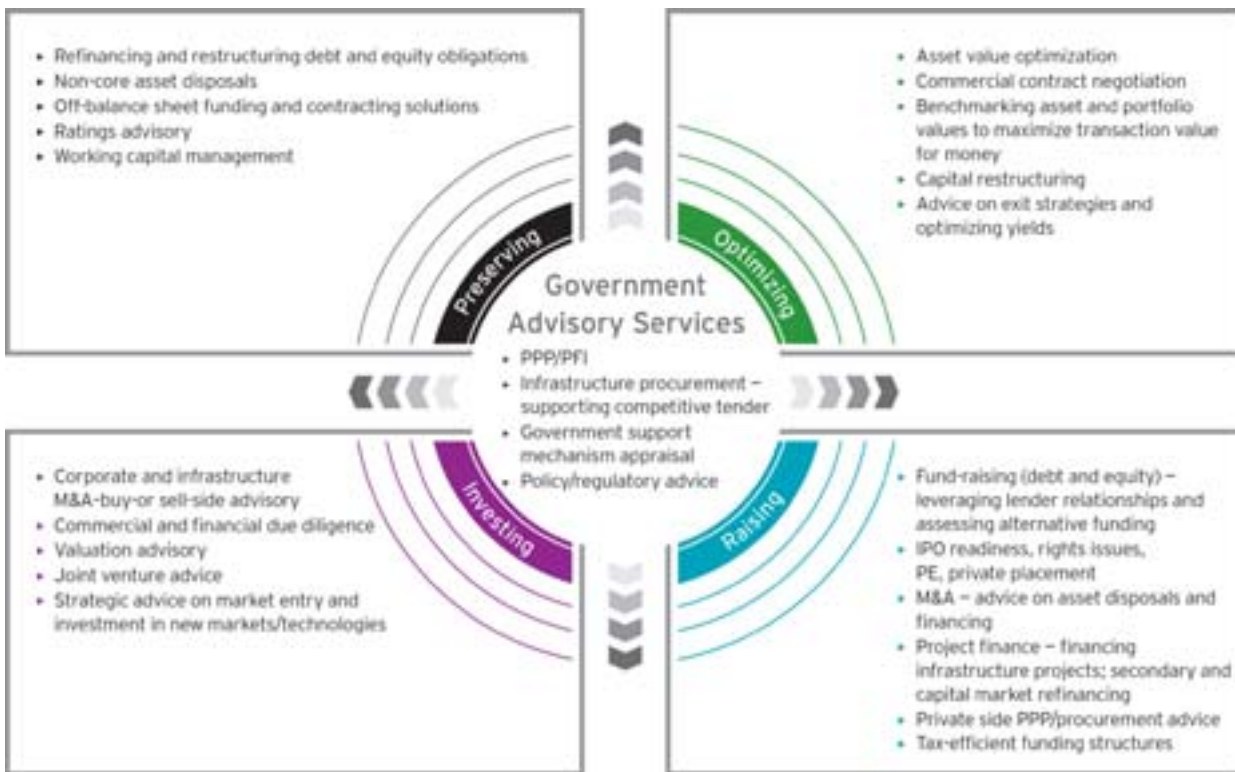
Ernst & Young provides in-depth knowledge and proven expertise for a range of services related to renewable and clean energy technologies. Our offerings can be broadly categorized under four services:

- Government advisory
- Project finance
- Infrastructure mergers and acquisitions (M&A)
- Corporate M&A

We work with many businesses and governments worldwide to address the renewable energy issues of today and anticipate those of tomorrow. Our experience spans over more than 20 years, covering every renewable energy technology, energy from waste and decentralized energy generation and energy efficiency.

Our unique expertise and unparalleled track record of delivering successful transactions, enables us to connect buyers and sellers, funders and sponsors, and lenders and borrowers across all corners of the globe.

The diagram below summarizes the key cross-border service offerings provided by the Energy and Environment for renewable energy projects.



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Map highlighting CAI countries and their respective Issue 34 rankings



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Utilities Unbundled (June 2012)

This issue explores how ongoing economic and political uncertainty are impacting power and utilities investment and planning. It also looks at how the sector can keep capital flowing for renewables, the major challenges that China's rapid urbanization is creating, and how volatile markets have caused European utilities' generation assets and goodwill to lose value.



Cleantech Annual Report 2011

Annual publication providing insights into transformational growth strategies, incentives for clean technologies, financial benchmarks, key trends in cleantech value chains, electric vehicle adoption, solar energy and innovation, among others.



Cleantech matters: moment of truth for transportation electrification

In 2011, our annual Ignition Sessions in Bonn, Detroit and Beijing with over 100 decision makers and experts again focused on the burgeoning electric vehicle industry. Synchronized and sustained investment, involvement and execution are imperative for shifting from concept to product in this moment of truth for the industry.



Ocean energy: Opportunities in the French market

This report looks at France's many advantages that could lead to a competitive position in marine technology, but also acknowledges these technologies are not only an energy-related issue, but also an industrial, economic and social opportunity.



Cleantech matters: IFRS in the solar industry (2nd edition)

This guide is intended to help solar companies identify and address the IFRS accounting issues relevant to them. It also draws attention to potentially unforeseen accounting consequences that should be carefully considered when planning transactions.



Growing beyond: the cleantech growth journey from product development to global market leadership

Report from our first annual Cleantech CEO Growth Journey retreat. Developed with BNEF, the cleantech sector brought together nearly 50 CEOs in our retreat to address the industry's capital, partnership and expansion challenges.



Six growing trends in corporate sustainability

An Ernst & Young survey in cooperation with GreenBiz Group, revealing how financial considerations are driving sustainability activities of leading companies. Conducted in late 2011, the survey had responses from 272 CSOs across 24 industry sectors employed by companies generating revenue greater than US\$1b (€0.8b).



Can the market economy function without environmental transparency?

Authored by the Economist Intelligence Unit, the article concludes that free market economies rely on transparency and information and that there is a need to incorporate environmental impacts into the price system. This report stems from a panel discussion at the January 2012 Ernst & Young Global Sustainability Summit in Madrid.

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