

Global highlights

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The lead article in this issue discusses this shale gas challenge, as well as commenting on low carbon prices and nuclear rollout or reduction plans – all in the context of painting a picture for renewables through to 2020.

Overview of indices: Issue 36

The Ernst & Young Country attractiveness indices (CAI) score 40 countries on the attractiveness of their renewable energy markets, energy infrastructure and the 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 36 referring to the indices.

Forward-looking indices

The All Renewables Index (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 36).

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 36.

Ernst & Young was ranked the leading project finance advisor in the Americas, Europe, Middle East and Africa (MENA) 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: {ALLX EYRE<GO>}. Each value can be evaluated to reveal history.

Renewables to 2020 and beyond: it's not just the shale gas challenge

Guest columnist: Jonathan Johns

In mature economies, full-blooded growth has yet to replace recession, with China at the top of investment tables

When we suggested in our May 2009 CAI article, "Conceptual framework for navigating a renewables business through the financial crisis" (see an updated version of this framework in Figure 1 below), that the credit crunch and recession would have an adverse effect on renewables until 2013, some commentators suggested that we were too pessimistic and that the climate change imperative and the desire to promote growth through cleantech jobs would protect the sector. Sadly, this has not been the case, with a low margin decade becoming the norm for mature markets.

Nevertheless, the industry overall continues to add capacity and attract investment that is the envy of many other sectors, albeit below the heady growth levels (e.g., 2005-07) anticipated when climate change, rather than the economy, was at the forefront of legislators' minds. Bloomberg New Energy Finance (BNEF) has reported that investment in utility-scale renewable energy investment plants in 2012 was around US\$149b (€113b) – down from US\$180b (€137b) in 2011 but still a very respectable total – and the comments that follow should be interpreted in that context.

As foreseen in our 2009 analysis, the credit crisis and recession have driven public finances to the edge, with the cost of renewable support mechanisms firmly in the spotlight: for the taxpayer or consumer in general, and for the fuel-poor and energy-intensive industries in particular. It is likely to remain so.

In mature economies, full-blooded growth has not replaced recession. The overhang of the banking crisis in Europe continues to restrict the availability of capital for infrastructure, with loan tenors and terms remaining challenging (and only marginally improved on their low point). Unsurprisingly, China now sits at the top of the clean energy investment tables.

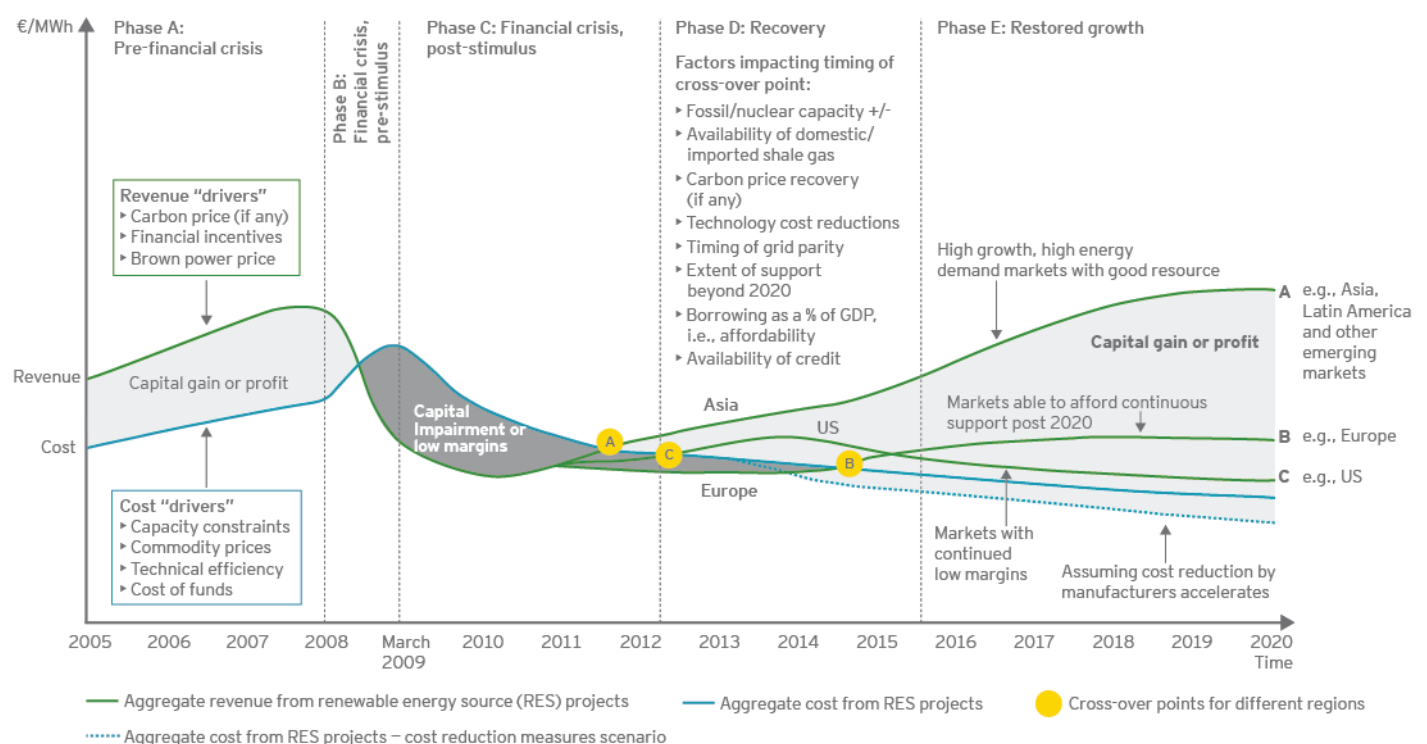
In the West, normal debt service has yet to be resumed

The availability of quasi-government funding has been vital to the closing of many important flagship transactions: whether US Treasury grants during the stimulus period, European Investment Bank (EIB) funding (recently replenished), UK Green Investment Bank monies (likely to be deployed by 2015-16), Australia's AU\$10b (€8.0b) clean energy finance corporation (due to commence operations in July) and, hopefully, US initiatives to set up similar vehicles (e.g., the US\$1b (€0.8b) Green Bank proposed by Governor Cuomo for New York state).

However, in more normal circumstances, there would have been strong banking competition for flagship projects, with quasi-government funds only required for more innovative transactions in less mature sectors.

Even allowing for pre-credit crisis largesse, in the West, "normal service" has not yet been resumed. For example, although the PTC investment market has shown early signs of revival, volumes are highly unlikely to get back to previous levels, with new see through structures, such as real estate investment trusts (REITs), being trialled for regulatory approval.

Figure 1: Renewables to 2020 – a financial framework recast



Renewables to 2020 and beyond: it's not just the shale gas challenge (cont'd)

Large utilities, once unbridled investors in the sector, have undertaken asset divestment programs, as they focus their portfolios on core sectors and redefine their roles as renewables portfolio developers and operators – rather than owners – often divesting substantial equity stakes to specialist renewable energy funds, pension funds, sovereign wealth funds and strategic investors (witness a number of recent transactions by E.ON, Iberdrola, EDF, Dong and Eneco).

Although transactions recycling utility capital are pleasingly increasing in frequency, size and geographic coverage, the new investor influx has yet to become the tidal wave needed to satisfy the huge infrastructure capital demands faced by the sector as whole in the run up to 2020.

There is clearly going to be a slower pathway to growth than that originally envisaged in 2009

Not all projects can have the “blue chip” sponsors favored by many of the new financing entrants who have, on the whole, limited their attentions to large-scale onshore or offshore wind and solar transactions – leaving medium-sized players and arguably the relatively undervalued biomass sector as a whole, out in the cold. BNEF estimates that, in 2012, investment in the biomass and waste to energy sector fell by 27% to US\$9.7b (€7.4b), while solar and wind investment fell less (US\$142.5b (€108.2b) down 9% and US\$78.3b (€59.4b) down 13% respectively). For emerging technologies, such as wave and tidal, prospects are even starker unless a big ticket corporate player can be attracted.

Cleantech venture capital has also been in retreat, particularly in North America where funds have been burned by investments in the solar sector and biofuels, so that next stage technologies have become even more difficult to fund. Even more cautious infrastructure funds have had their setbacks in once core markets, such as Spain – although others have profited by secondary sales of aggregated portfolios to insurance funds or other consolidators.

There is clearly going to be a slower pathway to growth than that originally envisaged in 2009, with some markets yet to come out of recession. Only a few economies such as China (the leading destination for clean energy investment at US\$67.7b (€51.4b), up 20%) have sufficient firepower to use economic stimulus in the renewable sector to raise domestic installation targets radically to compensate for the impact of declining global demand on its solar and wind manufacturing industries.

In the last quarter of 2012, China consumed over a third of the global market for PV modules, thereby supporting indigenous manufacturers in a way that other countries have found difficult to compete with – leading to continued plant closures in the West. In 2013, China plans to more than double its solar capacity by adding 10GW, and increase its wind capacity by 30% adding 18GW. Leaving aside grid connection issues, this is a scale of investment unmatched in other markets: but perhaps insufficient to prevent the need for further structural change in the manufacturing industries.

Many established technology manufacturers have been forced to undergo protracted and difficult negotiations to restructure debt, with the weaker party having to merge or suffer insolvency. The trend toward consolidation and difficult financing discussions is likely to continue; and probably needs to accelerate if industry is to achieve the cost reductions required. Aggressive cost reduction techniques (such as the cross-sharing of platforms common in the auto industry between otherwise competing manufacturers), do not occur readily in the wind industry, for example. It is widely recognized that further shake-up is required in the solar industry, not just in the West.

In the OECD, countries with rapidly growing markets are more of the exception than the rule. Japan, for example, has renewed interest in renewables as a consequence of its aversion to nuclear and exposure to high fossil fuel import costs (total clean energy investment in Japan in 2012 was US\$16.3b (€12.4b), up 75% on 2011), with solar installation likely to be close to 5GW in the year to March 2013.

Nevertheless, the very attractive tariffs used to stimulate the market are likely to reduce by 10% from April onward, reflecting lower system costs. Moreover, while in the short term, prospects remain buoyant as Japan shifts away from nuclear, its high level of government borrowings relative to GDP (over 200%) could in the longer term act as a brake – witness the experience in Spain – particularly if a global market in transported shale gas emerges, although as discussed below this is not a given.

Many established markets are redefining support mechanisms with the flight path to grid parity uncertain

The redefinition of support mechanism is causing investment uncertainty in a number of markets, e.g., in the UK where, despite extensive consultation, concerns remain about the Electricity Market Reform due to its use of a “contract for difference” mechanism to calibrate a new feed-in tariff (FIT).

Even FIT stalwart Germany has been recommended by European Union (EU) energy commissioner, Günther Oettinger, to attenuate its pace of renewable development “either with a quota or a cap” to reduce the impact on energy prices, with the environment minister recommending a subsidy freeze until 2014 and a cap on levy increases to 2.5% thereafter.

In other markets, the previously sacrosanct concept of “grandfathering” (i.e., no retrospective adjustments) has been challenged – in Spain, Bulgaria and the Czech Republic. Spain has gone so far as to introduce an energy tax, partly as a consequence of the deficit built up from its previously strong renewables incentives, recently announcing its intention to freeze inflation uplifts.

Moral hazard risk, whereby support mechanisms are questioned if tariffs lead to windfall gains (or loss of state funds), is very much to the fore. The value for money of support mechanisms is subject to increasing regulator public auditor review, e.g., the debate over support to Solyndra in the US and the recent damning report of the European court of auditors on “the cost-effectiveness of cohesion policy investments in energy efficiency.”

Indeed very favorable mechanisms can be an early indicator of emerging business risk – leading to an increasing need for industry to be responsible for the assistance it requests. Witness the American Wind Energy Association’s (AWEA) sensible suggestion for a gradual step down of the PTC in return for longer-term renewal. While a one-year PTC extension for plants commencing construction before 1 January 2014 pleasingly occurred (with the ability to swap for investment tax credits (ITCs) retained), the long-term economics of the US renewable industry remains subject to perennial and therefore damaging regulatory uncertainty.

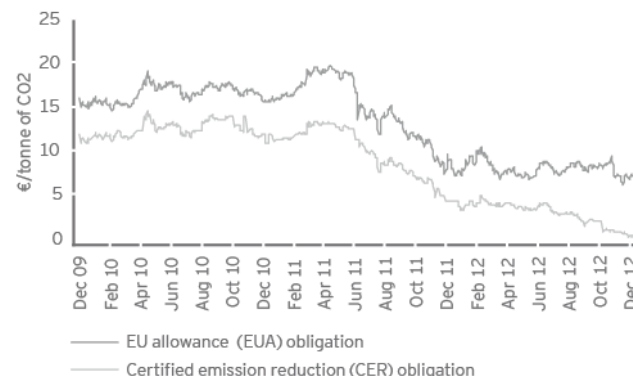
The challenge for legislatures in the established economies is that many appear to be contemplating post-2020 (if not earlier) withdrawal or reduction of existing support mechanisms, certainly for established technologies. Policy-makers are unsure of the “flight paths” required as theoretical grid parity is neared or achieved (if at all). Some are actively considering the origination of green power from nearby territories where costs may be lower (witness the recent memorandum of understanding between the UK and Ireland). It will be interesting to see whether policies focus on harvesting the best resource with the most cost-effective technologies – not always the case to date.

For some markets, shale gas rather than carbon prices is the game changer

The question is whether light touch support will be sufficient to support long-term energy infrastructure investments, hence the call by many for carbon targets for 2030 and beyond to underpin the industry.

The reality is that the renewables industry needs to further radically reduce costs to ensure its own long-term security. It also needs to be clear in the messages it communicates in a particular jurisdiction to support investment. For example, a focus on the impact on domestic GDP (not just jobs) is likely to be a solid counterweight to concerns about cost. However, such arguments need careful formulation if they are to succeed. (See Ernst & Young’s report, *Analysis of the value creation potential of wind energy policies*, September 2012.)

Figure 2: European Emission Trading Scheme (ETS) – carbon pricing



Source: Bloomberg

Certainly, current carbon prices provide little incentive, with EU-ETS values falling below €5 per tonne (at the time of writing) compared with historic levels of €13 to €15. Given the ineffectiveness of the EU’s strategy to deal with the allocation overhang (with the European Parliament querying the strategy of pushing it to later years) and the “wait and see” outcome of Doha, a high carbon price scenario is firmly off the global agenda – for several years to come at least.

Barring catastrophic events (such as Hurricane Sandy), it is difficult to see climate change moving soon to the forefront of the geopolitical agenda. President Obama, in his inaugural address, did not lip sync his commitment to deal with the challenges posed by climate change, but he also said, “The path toward sustainable energy sources will be long and sometimes difficult.”

Rather than carbon price, it is shale gas that is seen as the energy policy “game changer” and not just in the US where its development has led to significantly reduced gas prices and, in regions with access, wholesale electricity prices. This is posing long-term challenges for wind and other renewables in the US – particularly if a successor to the PTC is not found or a gradually reduced renewal granted, and state renewable portfolio standard (RPS) mandates not extended.

Renewables to 2020 and beyond: it's not just the shale gas challenge (cont'd)

















Other countries are also eyeing the shale gas opportunity. The extent to which a jurisdiction is aggressively pursuing shale gas or not (or indeed nuclear) is now a significant factor in evaluating the prospects for renewables (see figure 3 below), together with the more traditional indicators of wholesale electricity price trends, prospects for economic growth, resource quality, ability to afford support mechanisms (by reference to government debt as a proportion of borrowing) and likely timing of grid parity.

But not all countries have the frontier culture that has led to rapid expansion of shale gas in the US

However, in examining the shale gas revolution, a degree of caution: not all markets will have the liberal planning policies or frontier culture that allowed the rapid expansion of shale gas that took place in the US, nor indeed a similar cost base. France currently has a strong aversion to shale on environmental grounds, although the legislature is reopening the question by examining alternative methods to fracking; whereas the UK has recently unlocked the gates, subject to controls, and in China, a significant part of the resource is located in regions with limited access to water or where there is competition with agricultural users.

From an investor's perspective, the relatively liberal regime in the US led to oversupply – not only producing low prices, but also leading to significant asset impairment write-offs for late arrivals to the party. This in itself may lead shale industry investors to be more restrained in their exploitation of new markets – particularly where there is likely to be a lot of regulatory or societal supervision.

Figure 3: Top eight CAI countries – appetite for shale gas and nuclear

	Shale gas		Nuclear			
	Technologically recoverable reserves (Trillion cubic feet)	Appetite indicator	2012 estimated capacity	2020 estimated capacity	Target (where specifically announced)	Appetite indicator
China	1,275		14.5GW	67.1GW	40GW by 2015 60-70GW by 2020	
Germany	8		12.1GW	8.2GW	Phase out nuclear by 2022	
US	482		101.2GW	108.3GW	n/a	
India	63		6.7GW	19.8GW	20GW by 2020	
France	180		63.1GW	66.6GW	50% of electricity by 2025 (down from current 75%)	
UK	20		10.4GW	8.2GW	n/a	
Canada	388		13.9GW	7.6GW	n/a	
Japan	Negligible		15.5GW ¹	25.2GW	Phase-out announced but no specific policy target set	

¹Japan's nuclear capacity in 2010 was an estimated 48.4GW, dropping dramatically to around 6.6GW in 2011 following the Fukushima nuclear disaster, when most reactors were shut down. The increased forecast for 2012 reflects the fact that some reactors have been brought back online, and the 2020 forecast projects further plants will become operational, though still far below the capacity prior to the Fukushima disaster.

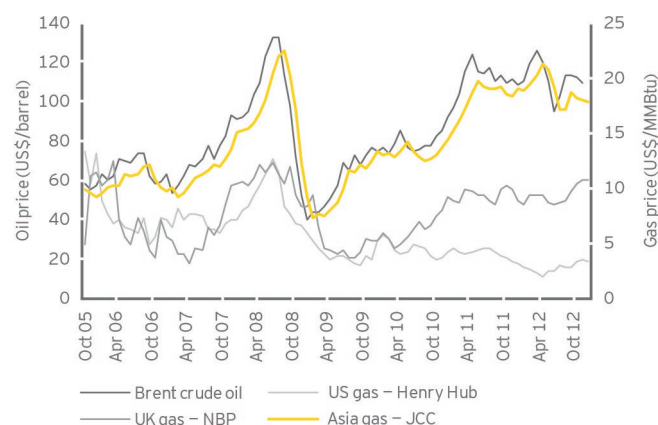
Source: Ernst & Young analysis; Business Monitor Online (2012, 2020 nuclear estimated capacity); US Energy Information Administration (EIA) "Annual Energy Outlook", 2012 and 2011

This compares with a more modest reduction of 5% for the world as a whole; though the effects could be greater if support measures weaken. Shale gas is already showing signs in some jurisdictions of competing with renewables for regulatory and energy policy “air time.” It will also provide significant competition for scarce infrastructure investment funds – to build new pipelines for example.

A three-tier world energy market is emerging, with the greatest opportunities for renewables in Asia

Shale gas is already leading to the emergence of a three-tier world gas market, breaking the historic linkage of electricity prices with conventional gas and oil. In the US, prices are very much at the lower end of the spectrum, with Europe at an intermediate point and Asia at the higher end – exacerbated not only by its lack of indigenous resource but also by its high economic growth rate.

Figure 4: Oil and gas commodity pricing



Source: EIA; Energy Intelligence group “Natural Gas Week;” Thomson; Reuters

Even if international trade in shale gas becomes common (by no means certain, as the US manufacturing industry is lobbying hard to retain resource for domestic consumption), many commentators believe that Asian prices would only settle closer to European levels rather than descend to those currently found in the US. There is already an indirect impact from US shale gas in Europe – which now receives liquefied natural gas (LNG) from the Middle East originally intended for the US. The development of substantial shale gas reserves in Poland and the Ukraine could certainly have an impact on European prices in the medium term.

Although there are significant reserves of shale gas and very high levels of coal bed methane in China, these are likely to be retained for domestic use in that rapidly growing energy market – merely reducing the huge growth required in coal fired power. In the absence of more globalized gas markets, Japan may well need to move to a strong dependency on renewables to avoid significant impairment of its balance of payments position, as it does not have the capacity to develop indigenous gas production. South Korea is in a similar position, and although less nuclear averse with a strong build program, has some reliability issues recently commented on by the IEA.

Consequently, a regional perspective is useful in considering a revised conceptual framework with the greatest opportunities to be had in Asia, Latin America and emerging markets such as South Africa (which had nearly double the investment of Spain last year). These markets benefit from a rapid growth in energy consumption and may well be unaffected by large volumes of domestic shale gas production. For example, Brazil has a well-established conventional gas industry thereby delaying the likely timing of shale gas exploitation.

In the US, prospects are likely to become difficult unless the PTC or equivalent is extended again, whereas in Europe, the overhang of high levels of state borrowing and the likely low levels of economic growth will restrain renewables – which still benefit from favorable support in some jurisdictions. The diagram at the start of this article provides an interpretation of how trends may evolve.

Globally, cost reduction is vital for the renewables industry, with carbon pricing unlikely to rescue the day

For renewables to 2020 and beyond, shale gas may grab the headlines, but not the whole market. A remorseless reduction of costs is vital for renewables – and if that is achieved, it may be a good thing that the industry and investors are no longer reliant on carbon pricing to provide the competitive edge over fossil fuels. In this scenario, carbon pricing becomes the upside for those who believe the climate change imperative will inevitably re-emerge and quality of resource will be the key.

Global trends in biomass-to-power markets

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

Global biomass-to-power investment has been steady in recent years, showing neither dramatic growth nor great decline. However, these market trends vary by region.

In Europe, announced subsidy cuts in the UK, Italy, and Poland show governments are keener than ever to reduce the cost of renewable energy to the consumer. The current global median levelized cost of electricity for biomass incineration of US\$119 (€90.3)/MWh makes it competitive with other forms of renewable generation, but subsidy cuts and tightening regulation are causing some announced projects to be delayed. Nonetheless, a new interest in large biomass conversions using imported feedstock means that Europe will continue to be a growth market.

Europe

Biomass-to-power is experiencing a renaissance in the UK, Denmark, the Netherlands, Belgium and Poland as some older coal power stations are planning to convert completely to wood pellets. Biomass conversion plants add significant renewable baseload capacity to the grid, often in excess of 500MW per project. The transition from coal to biomass is driven by favorable subsidies, an aging coal plant fleet threatened by tighter emission standards and the expected costs of carbon prices when using coal as a fuel.

Country targets for renewable generation under the European 2020 plan also play a role, as biomass conversion plants can use existing infrastructure and help quickly bulk up a renewable portfolio. As the technology needs either subsidies or a strong government mandate in order to be economically viable, biomass conversions are limited to EU-27 countries that actively endorse them.

Biomass conversion plants use wood pellets, a compressed premium feedstock produced to tight specifications. Local supply of wood is often not sufficient to meet demand, which has opened up new markets for international biomass trade. Wood pellets for industrial use are produced in Eastern Europe and the Baltic states, but the majority of supply is now being imported from Canada and

the US. The European wood pellet trade has expanded rapidly as contract and quality standards converge, and the high growth in traded volume seen in 2012 is very likely to continue in 2013.

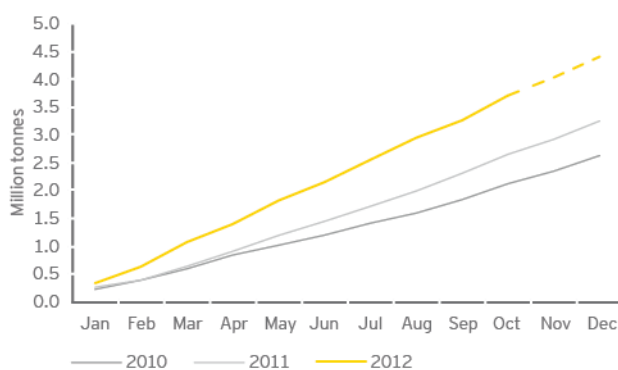
Meanwhile, cheap and abundant local feedstock is becoming scarce, leading to a renewed interest in using agricultural residue in smaller plants. Given the current pipeline of announced projects, between 3.6GW and 6.8GW of additional new utility-scale biomass capacity could be commissioned in the next four years in the EU-27.

North America

The “dash for gas” in the US has left many biomass plant operators struggling to make money. As a form of baseload power, biomass competes directly with gas and coal generation and a drop in the cost of gas generation has pushed biomass down the US power merit order. Unlike other forms of renewable energy, feedstock costs are a significant factor in biomass-to-power plant operating expenses. Volatility in feedstock costs can easily lead to losses, especially when margins are tight. Off-peak electricity prices are expected to remain low in the medium term and inflexible power purchase agreements (PPAs) have diminished the ability of operators to offset volatility in feedstock cost. Even a record amount of coal plant retirements in 2012 has not eased the pressure, and many facilities have been mothballed or decreased generation.

Meanwhile, biomass producers in the US are looking toward Europe to export industrial wood pellets to European utilities. Domestic demand for wood has flagged as the pulp and paper sector is in decline and the US housing market has flagged over the past years. Especially in the US Southeast, production capacities and export capabilities are quickly being ramped up, with the industry looking forward to a booming year in international biomass trade.

Figure 1: EU-27 wood pellet imports, 2010-12



Note: Includes intra and extra EU trade

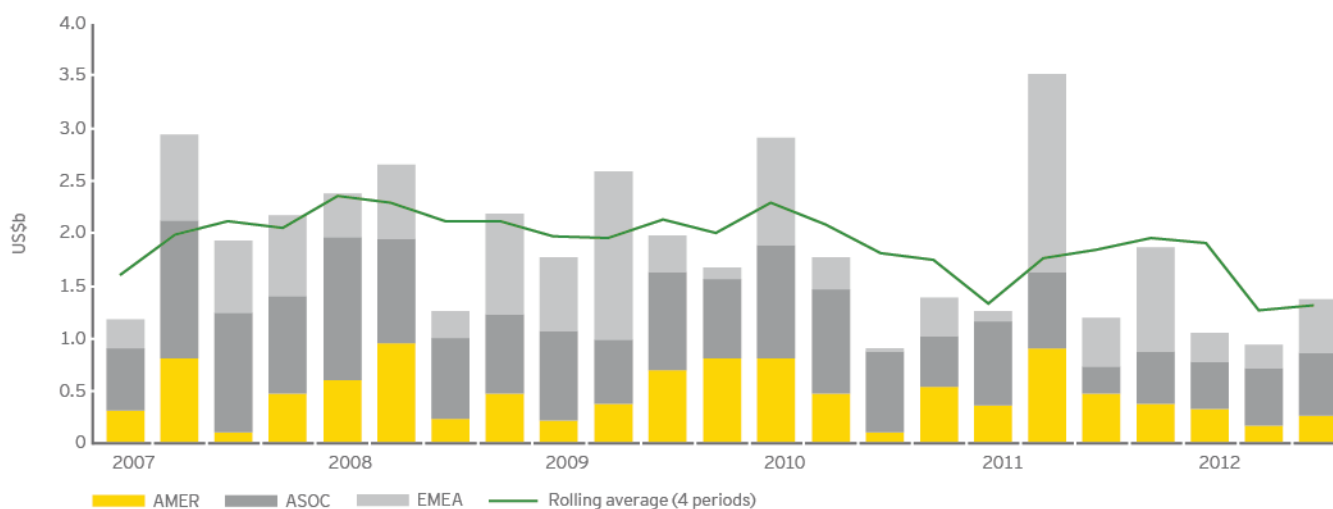
Source: BNEF

Other notable markets

China continues to churn out a steady string of medium-sized biomass incineration plants, most of which use local agricultural residue as a feedstock. While the deal flow began to ebb slightly in H2 2012, strong government targets will continue to drive market growth. India, which has similarly ambitious targets of 10GW biomass capacity by 2020, has yet to chart out a road map for support that is attractive for developers.

Brazilian sugar and ethanol production also provide other biomass opportunities, as residues that can be used in electricity generation are created throughout the production process. Biomass could provide an additional source of extra revenue for sugarcane plants, many of which currently use inefficient boilers. While cane mills have been under bid by wind developers in recent electricity generation auctions, mill operators that export electricity to the grid have continued to successfully secure bilateral PPAs.

Figure 2: Global biomass-to-power asset finance investment, Q1 2007-Q3 2012



Note: Grossed-up values based on disclosed deals for new build assets and exclude acquisitions and refinancing.

Source: BNEF

Large corporations – a new driving force behind renewable energy

Corporates have become more energy efficient

As well as the clear brand benefits of reducing carbon emissions, an increasing number of large corporates are also taking steps to minimize their exposure to energy and carbon price rises and volatility. For many, this has already begun through a focus on energy efficiency – rolling out programs across their estate to minimize wasted energy: electricity, gas and other fossil fuels. Encouraging employees to change their behavior is a key starting point, then installing smart meters and building management systems, coupled with more efficient lighting, insulation, heating, ventilation, air conditioning and refrigeration equipment.

Recent case studies include McDonalds and 3M:

- ▶ McDonalds – reduced its energy intensity by 20% in the UK since 2007: investment program of £9k (€11k) per restaurant has yielded an average payback just over two years and annual savings in energy spend in excess of £5m (€6.1m).
- ▶ 3M – energy use has fallen 20% between 2000 and 2010: a Pollution Prevention Pays program has saved US\$1.4b (€1.1b) through 8,100 projects that have typically had paybacks of two years or less.

For some companies, a 20% cut in energy costs represents the same bottom line benefit as a 5% increase in sales – hence the importance of energy efficiency programs. However, leading corporates are now broadening their energy and carbon efforts.

Corporates are switching to a renewable supply

To achieve further significant carbon reductions (at least in a Scope 1 (direct emissions from operations) and Scope 2 (indirect emissions from imported energy) sense), a corporate needs to switch its power to a renewable source. Historically, this has taken the form of purchasing green tariffs, renewable energy certificates (RECs) or carbon offsets. However, more recently, these instruments have become increasingly controversial in justifying carbon reduction and they do not provide any price security.

The recent shale gas boom in the US and improving economics of fuel cells are also offering a low (but not zero) carbon option in countries with a heavy coal-based grid mix. This may be a viable short-term option in a few markets, but as grid mixes lower generally, this path will become more difficult to defend.

Investment in renewable assets is on the rise

Due to significantly reduced capital costs, a significant trend has emerged in the last few years for large corporates to invest equity directly with renewable energy generators – both onsite and offsite generation: onsite for increased energy security and offsite for increased scale.

Two of the highest profile examples of investment include:

- ▶ Google – has already invested more than US\$1b (€0.8b) in renewable energy, mostly in wind and solar projects across the US, such as US\$200m (€152m) in a 161MW wind farm in January 2013.
- ▶ Ikea – has recently doubled its planned spending on renewables to US\$2b (€1.5b) by 2015 and US\$4b (€3.0b) by 2020. The retailer already has 43MW of PV and 180MW of wind.

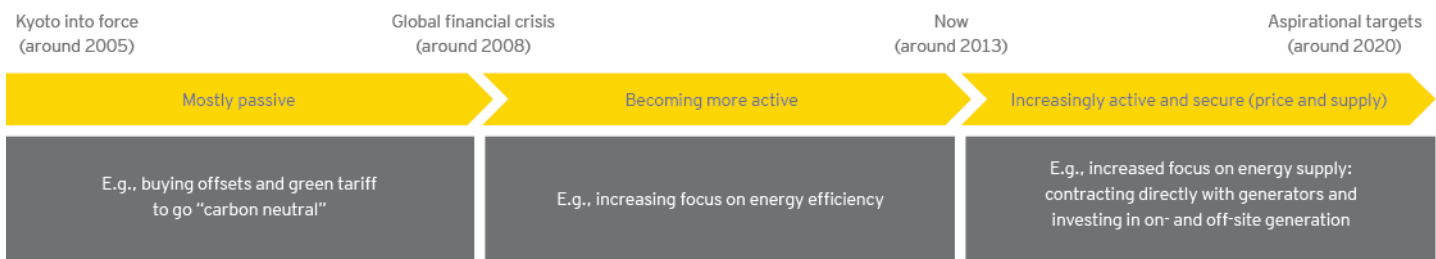
Many other global corporates from multiple sectors have also started out on the renewable energy journey: Nike, HSBC, Volkswagen, Nestle, BT, Mitsui, PepsiCo, Cemex, Renault, Sumitomo, BMW and Apple – are but a few of the brands moving into this space.

Another interesting recent development has been the trend in emerging markets for corporates to club together on large projects to secure competitively priced zero carbon power. For example, the 164MW Bii Stinu wind farm in Mexico, where Walmart and Arcelor Mittal Steel (and three Mexican corporates) have signed up to a 15-year PPA.

Investment in non-core assets does bring its challenges, which have to be worked through. Often, corporates financial hurdle rates (e.g., pay-back period) and contractual constraints (e.g., contract length) have to be flexed to cater for the “back-ended” return profiles for capital-intensive projects. Providing equity for a project can lead to various other benefits, including speeding up the development or construction process, “iconic” reputational benefits and a natural power price hedge through the dividend stream. There should also be a greater degree of flexibility around the corporate’s power offtake agreement.

This important new source of capital for renewable energy projects has been warmly welcomed by the industry, which is currently severely capital constrained. Recently the renewables supply chain has sought to exploit this trend by reaching out to large corporates with an appetite for investment – proposing attractive partnerships and innovative funding structures.

Figure 1: Increased focus on corporate energy mix optimization



Source: Ernst & Young analysis

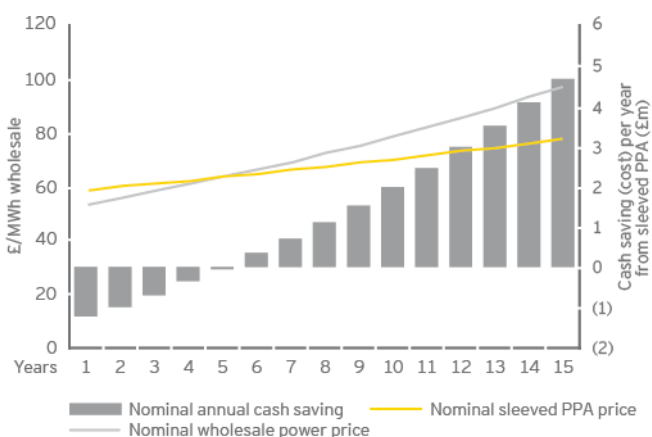
Long-term PPAs are becoming more popular

Another significant trend in the past couple of years, led by large corporates, is for consumers to contract for energy directly with renewable energy generators. Some corporates prefer to adopt a PPA contract procurement-led strategy to secure renewable power rather than tying up capital in non-core assets. “Sleeved” PPA structures are now being adopted in a number of countries, allowing large consumers to purchase renewable power directly from large offsite generators.

PPAs can take many different forms, depending on the consumer’s requirements: it may need a fixed price, it may need an indexed price, it may take some market risk through “cap and collar” limits, or it may take a form of stepped price.

In the UK, recent known examples include: Sainsbury’s, Tarmac and Marks & Spencer. A sleeved PPA may be more expensive than a standard grid tariff initially but if, as anticipated, grid electricity prices rise in real terms, savings are likely to accrue in the longer-term, giving rise to a positive overall net benefit versus the “status quo” option.

Figure 2: Indicative UK sleeved PPA pricing and annual nominal cash benefit/(cost)



Source: Ernst & Young analysis

Ernst & Young Energy & Environmental Finance Team

We are able to provide large corporates with a full suite of services in their low carbon transition: from initial strategy formulation through to the transactions themselves.

For example, we can challenge existing strategies and propose potential new energy and carbon targets; we can prioritize countries based on the corporate’s operational footprint and our knowledge of the local renewable markets; we can recommend suitable technologies and propose appropriate delivery mechanisms; we can model the business case for senior management and present the implementation plan; we can deliver the final deal – be it PPA or equity based.

We have experience with global corporates across multiple industries and help ensure any strategy rollout considers all relevant internal stakeholders such as procurement, legal, tax, financial reporting, communications, sustainability and treasury.

Large corporates are not the only new players to the PPA market, with recent announcements by the US military and the UK Government Procurement Service wishing to sign up to long-term renewable PPAs directly with assets. Such new entrants into the PPA markets are both welcome from an independent power producer perspective and also raise interesting challenges to the traditional role of the power utility in interfacing between generation and supply. We expect this increased competition to stimulate a resurgence in utility engagement across the wholesale to retail electricity landscape and potentially a raft of new and more competitive service and product offerings.

Large corporates and government organizations with healthy credit ratings are potentially attractive to project finance lenders requiring credit-worthy counterparties for long-term contracts. It is envisaged that these new offtakers will bring increased liquidity to PPA markets.

Mandatory carbon reporting is on the horizon

In June 2012, the UK Government announced that all quoted companies must report their greenhouse gas emissions from 2013. This may be as early as April, or could be delayed until October, depending on the results of a recent consultation. It is likely that other countries will follow suit, creating another imperative to source renewable power. In fact, the Johannesburg Stock Exchange in South Africa has already introduced “integrated reporting” – corporate reporting on financial and non-financial information in a single document, capturing corporate responsibility and sustainability aspects as well as standard financial records.

However, to claim the carbon benefit from renewable energy investments or procurements, the corporate needs to be able to demonstrate that it has played a material role in bringing additional capacity on line and that it can provide evidence of the supply. The investments and PPAs already discussed can be structured in ways to justify claiming the benefits in terms of Scope 2 emission reductions. Currently, the World Resources Institute and other organizations are working on clarifying the greenhouse gas accounting guidelines, with recommendations expected in the next few months.

Energy mix strategies are now board priorities

Energy investments and long-term procurements are now a board-level decision for many large corporates, due to the significant shareholder value at stake. The fear of rising and volatile costs and brand risk has elevated energy strategy from a tactical and technical challenge to a strategic and financial necessity.

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Global trends in geothermal power

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

Geothermal power has continued to grow steadily, with eight plants globally coming on line in 2012 for a combined total capacity of 0.3GW, a little more than double the 0.15GW added in 2011. This brings the global total to 11.3GW. Given the lead times for developing geothermal projects – typically four to seven years and sometimes longer – these plants represent some of the final pre-recession projects to materialize.

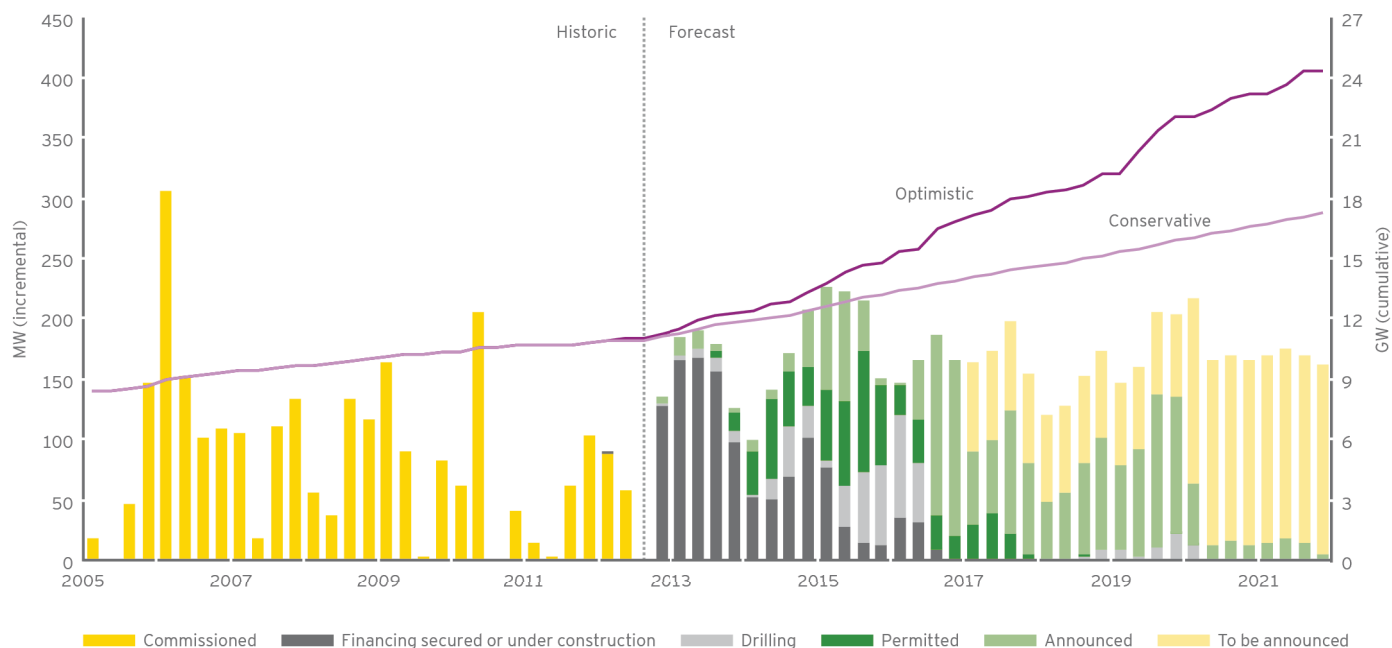
The impact of the global financial crisis will not, however, result in a dip in new capacity over the next few years. In 2009, the sector began a major expansion and shift in focus toward new markets, largely in emerging economies. A record US\$4.8b (€3.6b) influx of new-build capital into the sector in 2010-11 has set numerous projects in motion. The first of these should be commissioned in 2013, followed by consistent new capacity growth each year over the next decade.

The global project pipeline currently totals 13.4GW from 273 projects in 56 countries. About 16% (1.9GW) of this is currently under construction, compared with 68% (7.9GW) that is in the planning stages. About 26% (3.6GW) of projects in the pipeline have moved beyond announcement, having obtained permits or begun drilling.

Discounting for resource, country, technology and company risks, our 10 year forecast is for an additional 6GW-13GW of net additions to the current installed base (under “conservative” and “optimistic” scenarios respectively) to reach 17GW-24GW in total by 2022 (Figure 1). This new capacity would require approximately US\$18b-US\$24b (€13.7b-€18.2b) of investment for the conservative scenario for net additions, and for the optimistic scenario, US\$39b-US\$52b (€29.6b-€39.5b).

In our current forecast, six markets account for 78% of development over the next decade – namely Indonesia, New Zealand, US, Kenya, Philippines and Mexico. Indonesia will be the most active of the top markets, making up 28% (1.8GW) of the 6.4GW we expect to come on line during that period (under the conservative scenario). But we also expect considerable growth in Japan, Ethiopia, Turkey and parts of Latin America as markets form or re-form in those regions.

Figure 1: Quarterly historical and expected global capacity additions, incremental and cumulative capacity, 2005-22



Note: Expected quarterly capacity additions are based on current project pipeline. Trendlines extending beyond 2016 do not entirely reflect projects currently in the pipeline and are continuations of forecast trends.

Source: BNEF

In the longer term, there is a strong set of global resources available for potential geothermal projects. Estimates of high-grade conventional resources total well over 100GW globally. About half of this is located in countries that currently have no capacity on line. At least 15 countries could meet 100% of their electricity demand with geothermal. And several countries – most of them emerging economies – are looking to their indigenous geothermal resources to power economic growth or displace fossil or nuclear generation capacity. Examples of these include:

- **Indonesia** continues to dominate our short-term forecast, accounting for 32% (1GW) of the 3.1GW we expect to come on line globally over the next five years. On 22 August 2012, the Minister of Energy signed a regulation establishing a geothermal FIT priced – depending on the region – from US\$100 (€75.9) to US\$170 (€129.0/MWh) per MWh. While this price is generous, there are several uncertainties in the framework for the tariff and, as written, it will struggle to drive development. If these issues cannot be resolved soon, our forecast will be at least an order of magnitude lower.
- In **East Africa**, electricity demand is increasing by approximately 7% annually in all countries in the region and could rise further, especially if recent oil and gas finds accelerate already rapid economic growth in Kenya, Tanzania and Uganda. Kenya hopes to add 5GW by 2030.
- **Japan** launched a FIT on 1 July 2012 priced at an unprecedented US\$330 (€250) to US\$500 (€379) per MWh. A key motivation behind this is to utilize Japan's existing geothermal resources – estimated at over 20GW – to help plug the gap in the loss of nuclear capacity. The Government expects on line geothermal capacity to grow from the current 0.5GW to 1.1GW by 2020, and to 3.1GW by 2030. To facilitate new developments, it has eased development restrictions on the estimated 11.4GW of geothermal resource areas located on national park land, expanding the maximum accessible resource potential to 15.7GW.

The remit of development finance institutions (DFIs) coupled with the competitive rates they can offer developers is accelerating the industry's migration toward emerging markets. DFI investment accounts for 46% of the US\$12.8b (€9.7b) new-build asset financing that closed during 2003 to Q1 2012, spread across 131 projects. Highlighting a fragmented market and representing just 15% of the DFI investment, the EIB was the top lender during this period with seven deals totaling US\$850m (€645.2m).

In the near term, DFIs will increase their footprint on the sector, with an emphasis on early drilling to prove new resources. This high-risk, high-cost early stage is the single largest obstacle to development, currently leaving tens of gigawatts stranded or untapped – and is an area where DFIs can have a strong impact, consistent with their role. A key focus in 2013 will be to devise and implement a risk reduction mechanism – most likely a global fund – to move projects past the first few high risk wells.

Recent and impending industry growth is drawing in a continuous flow of new turbine suppliers and engineering, procurement and construction (EPC) contractors – resulting in more intensive competition that is driving down power plant construction contract prices for developers. Before the global financial crisis, turnkey combined steam turbine and EPC project costs averaged US\$2m (€1.5m)/MW. In 2012 this has fallen to an average of US\$1.4m–US\$1.5m/MW (€1.06m–€1.13m/MW) and we expect to see some contracts hit as low as US\$1m (€0.8m)/MW in the coming year.

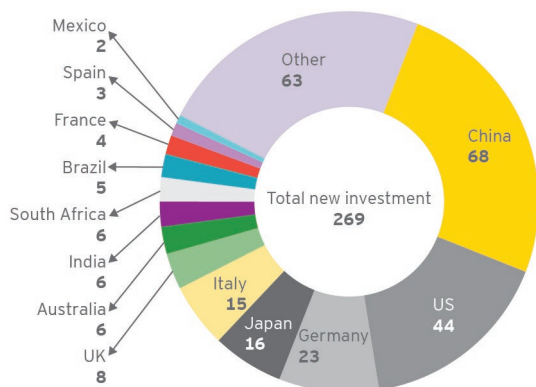
Attempting to gain an edge in securing contracts, a growing number of turbine manufacturers and engineering contractors are jumping in as early-stage project equity investors or late-stage construction debt providers. We expect this trend to grow as such transactions can be mutually beneficial – developers receive capital for the risky and hard to finance exploration drilling, and suppliers secure their customer.

Transactions and finance

Tough 2012 transformed deal environment

Global clean energy investment in 2012 totaled US\$268.7b (€203.9b), a decrease of 11% on the record level seen in 2011. Only China, Australia and Mexico saw an increase in total investment, according to BNEF, with the majority of markets experiencing a decline on 2011 figures.

Figure 1: Global clean energy investment in 2012 (US\$b)



Source: BNEF

It is widely acknowledged that 2012 was a tough year for both the global economy and the renewables market in particular: decade-low natural gas prices in North America, aggressive European environmental regulations, continued Eurozone economic uncertainty and over-leveraged balance sheets of some of the larger European players, all contributed to a tougher landscape. Attempts to address these challenges made 2012 a year of transformation in the deal-making environment.

Putting the fall in investment in context

However, we should not look back on 2012 with too much gloom – it could have been worse. Further, figure 2 shows that the volume and value of new build asset finance transactions rose in Q4, as did the value of acquisitions and the total level of new clean energy investment, indicating better fortunes for the year ahead. It should also be remembered that total investment in 2012 was still five times higher than that in 2004.

The fall in investment through 2012 was also partly driven by falling technology costs. According to BNEF, the cost of running and maintaining wind farms has fallen 38% in four years, while the cost of solar panels and equipment continues to tumble, partly driven by overcapacity in the market. Lux Research estimates that supply currently outstrips demand two to one, and forecasts that the price of modules will fall from US\$0.70 (€0.5) per watt to as low as US\$0.48 (€0.36) per watt in 2017.

Divest, divest, divest

The “transformation” of the deal landscape in 2012 was also driven by increasing trends around divestment, market re-structuring and the entry of new investors into the sector.

Divestment and privatization programs in Europe emerged as the strongest contributor to 2012 deal activity, with utilities and large energy corporates busy restructuring and optimizing their portfolios in an effort to reduce balance sheet debt and free up capital for deployment in emerging markets and technologies.

The weak macro environment also prompted buyers to focus on lower-risk, lower-value transactions and internal cost reduction programs. This resulted in utilities and financial buyers finding greater value in buying operational plants than investing in plant construction. However, we are starting to see companies such as E.ON take on construction risk and invest earlier on. We also expect an increasing number of billion-dollar deals coming out of European utility divestment programs.

The last 12 months also saw the increasing influence of financial buyers, with several private equity, infrastructure and pension funds coming to the fore to acquire assets, seizing the opportunity to invest in assets with predictable cash flows.

2013: more of the same creates deal opportunities

Despite the challenges of a weak global economy, we anticipate this trend of divestment and portfolio restructuring to continue, generating a robust transaction environment in 2013. As debt pressures still hang over many European utilities and US utilities seek to rebalance their holding in favor of regulated businesses, further divestments across the energy market are expected to create transaction opportunities for the whole sector.

It is anticipated that capital will continue to flow from Asia and from a wide range of institutional investors, including pension funds, sovereign wealth funds, and even high profile corporates. Google, for example, invested around US\$200m (€151.8m) of equity in a 161MW wind project in Texas, adding to the US\$1b (€0.8b) already invested in clean energy to date.

Outbound investment – the new project finance?

The end of 2012 also saw an increase in cross-border funding, and in particular, significant outbound investment by China and Japan. Chinese state-owned power and utilities and Japanese trading houses continue to seek out attractive assets across a range of markets and technologies, from offshore wind in Germany (e.g., Mitsubishi Corp. is investing US\$765m (€426m) to help TenneT Holding BV connect offshore installations to the power grid), to Chinese solar panel factories in Turkey. Australia has also established itself as a particularly attractive renewables market for such investment, and capital flows from Asia are expected to generate significant transaction activity in the year ahead.

However, funding is also coming from some unexpected sources. The Abu Dhabi Fund for Development has offered US\$350m (€266m) of concessional loans over seven funding cycles, to support government-led or government-backed renewables projects in developing countries. The International Renewable Energy Agency (IRENA) is overseeing the applications process, which closed in mid-January.

Wind sector looks to regain its momentum

Investment in the global wind sector fell 13% to US\$78.3b (€59.4b) in 2012, with few big ticket deals outside a handful of major offshore wind financing transactions. However, activity is expected to pick up through 2013 – the majority is forecast to come from Europe, with developments in Q4 potentially indicating the type of deals we can expect to see in the year ahead. In December, Italy's ERG Renew finalized a €859m deal to acquire an 80% stake in GDF Suez's Italian and German wind power assets, totaling 636MW, now making it Italy's largest wind power producer.

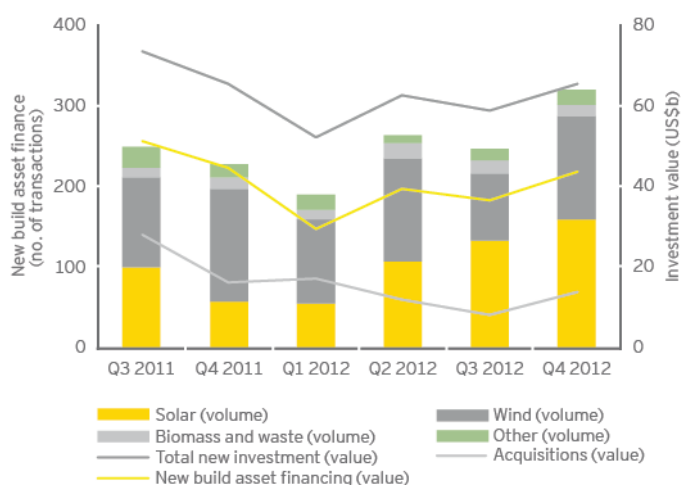


Figure 2: Global clean energy sector investment Q4 2012

Source: BNEF

We are also starting to see supply chain companies take a more active role in wind market transactions. In December, Iberdrola announced it had reached an agreement to sell its French renewable energy unit – including a portfolio of 32 operating wind farms totaling 321.3MW – to a consortium comprising EDF Energies Nouvelles, MEAG (the asset manager of Munich RE and ERGO) and GE Energy Financial Services, for an estimated €350m.

The end of 2012 also saw activity in the US wind market, with prominent deals including the US\$888m (€674m) acquisition of a 51% stake in four US wind farm projects by Canada's Algonquin Power & Utilities Corp. Indeed, the extension of the PTC in the US should trigger an upturn in wind sector deals through 2013 – while the revised eligibility provisions only require construction to have begun by the end of the year, the deadline is still expected to generate a surge in financing and acquisition activity.

Growing offshore pipeline gets an insurance boost

Offshore wind is likely to be a key growth area for investment and transactions in 2013, with an estimated 100GW of capacity in the pipeline according to Navigant Consulting. It expects the sector to expand by an average of 81.8% per annum to 2016, and 15.6% per annum through to 2021. The growing maturity of the sector has started to attract an increasingly diverse investor base, including industrial conglomerates, private equity groups, pension funds and private sector corporates, and this diversity is expected to grow as more capacity is built out.

Late 2012 also saw an interesting development in the insurance market, which is likely to boost investor security and facilitate the financing of major offshore projects. Munich RE has become the first insurance group to offer serial loss cover for the repair or replacement of defective turbines or components, as well as other special cover measures. The cover currently applies to turbines being installed in the North Sea by Germany's Repower, but is expected to reduce the perceived risk-profile of the technology more broadly.

Mixed solar outlook in Europe and US

For the second year running, solar represented the biggest proportion of new investment, though still a 9% drop to US\$142.5b (€108.2b). Transactions across Europe and China in particular mainly reflected a period of consolidation, with larger companies – especially manufacturers – absorbing smaller or distressed firms. This is likely to continue through 2013 as the solar market adjusts to oversupply, falling prices and trade protectionism measures across the global market.

The outlook in the US market is perhaps more positive, and while the solar sector does not have the same ticking time-bomb over subsidies – with the ITC not expiring until 2016 – we still expect to see healthy levels of activity this year if developments in Q4 are anything to go by.

Notable deals included the acquisition by MidAmerican Energy Holding Company, of two adjacent solar projects totaling 579MW, with an estimated deal value of US\$2.5b (€1.9b) and slated to be the world's largest PV development. Also in Q4, General Electric, Metlife, Citi and Union Bank each acquired stakes in the 143MW Catalina Solar Project in California's Mojave desert, expected to be commissioned by EDF Renewable in the second quarter of this year.

Renewable deployment triggers activity elsewhere

The increased deployment of renewables is also having a knock-on impact across other areas of the power sector. For example, while demand-side management and energy efficiency activity increased through 2012, we anticipate 2013 will see a significant step-up. It is not feasible to keep pouring capital into more resources on the supply side: the sector needs to invest further in efficiency, and this will undoubtedly influence deals.

Discussions are also centering on the introduction of capacity markets to protect thermal generation and address increased intermittency resulting from the massive amount of renewable generation coming on line at near-zero marginal cost. As things stand, capacity payments are either present or in the pipeline in the five largest EU economies. Policy commitment is needed to strengthen the single energy market, otherwise there is a risk of breakdown into 27 national systems.

The power market as a whole is already starting to see significant infrastructure deals, such as E.ON's €3.2b sale of Open Grid Europe. However, there will inevitably be increased investment to address infrastructure challenges hindering the deployment of renewable energy, such as aging and capacity-constrained grids, and cross-border interconnections.

We therefore expect to see increased transaction and financing activity across these areas, as part of the wider global investment in a low-carbon economy.

"Chinese utilities and Japanese trading houses are continuing to seek out attractive assets across a range of markets and technologies. Capital flows from Asia are expected to generate significant transaction activity in the year ahead."

Arnaud Bouille, Energy and Environment Director, Ernst & Young LLP

All transaction and finance data from publicly available data or Ernst & Young insights.

All renewables index (ARI) at February 2013

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	70.1	76	78	69	65	67	47	59	50	73
2	(2)	Germany	65.6	68	65	80	61	70	0	68	58	72
3	(3)	US ³	64.9	63	65	56	70	69	73	61	67	58
4	(4)	India	61.8	61	66	39	65	67	52	59	43	60
5	(5)	France	57.3	59	60	56	55	59	30	58	35	59
6	(6)	UK	54.7	62	59	78	42	48	0	57	35	64
7	(8)	Japan	53.2	51	53	45	61	65	29	43	49	59
8	(7)	Canada	53.1	62	66	45	40	45	0	50	35	64
9	(9)	Italy	52.4	53	54	45	53	55	37	49	57	44
10	(11)	Australia	51.0	50	53	39	54	54	54	44	58	52
11	(10)	Brazil	50.5	52	55	40	48	50	33	54	24	51
12	(12)	Sweden	49.5	55	55	54	38	43	0	58	36	57
13	(13)	Romania	48.6	54	57	39	41	46	0	45	42	48
14	(14)	Poland	48.1	55	57	44	40	45	0	45	23	49
15	(15)	South Korea	47.5	48	47	54	49	52	30	41	37	47
16	(17)	South Africa	47.4	51	55	37	45	44	52	37	35	53
17	(16)	Spain	46.2	44	47	35	51	51	55	43	26	37
18	(18)	Belgium	45.2	51	50	58	38	43	0	40	28	52
19	(19)	Portugal	44.6	46	48	35	46	47	36	38	26	39
20	(21)	Mexico	44.2	45	46	40	44	44	41	39	55	41
21	(23)	Ireland	43.4	53	54	52	27	31	0	44	24	51
22	(20)	Greece	43.3	44	47	33	46	48	33	34	25	32
23	(25)	Morocco	42.9	41	44	26	50	49	57	38	21	43
24	(22)	Denmark	42.8	47	45	57	35	40	0	46	33	52
24	(24)	Netherlands	42.8	49	49	47	36	41	0	37	21	42
26	(26)	Turkey	41.8	43	45	33	42	43	29	36	42	39
27	(27)	Norway	40.4	48	49	45	26	30	0	45	31	52
28	(28)	Taiwan	40.3	43	44	38	37	42	0	37	38	43
29	(29)	Egypt	40.0	42	45	32	39	38	45	35	24	33
30	(29)	Finland	39.8	46	48	39	25	28	0	54	26	47
31	(29)	Ukraine	39.7	39	41	27	40	46	0	46	32	41
31	(32)	New Zealand	39.7	47	50	37	27	31	0	34	52	47
33	(33)	Austria	39.0	33	40	0	45	52	0	51	34	53
34	(34)	Tunisia	36.7	36	38	27	44	43	47	20	27	40
35	(35)	UAE	36.6	35	37	22	48	47	50	18	18	44
36	(38)	Chile	36.5	38	41	24	37	38	31	29	38	43
37	(36)	Israel	36.4	33	38	14	45	46	39	27	29	39
37	(37)	Saudi Arabia	36.4	38	40	27	48	48	49	0	0	49
39	(40)	Argentina	35.5	38	41	22	33	35	17	32	27	34
40	(39)	Bulgaria	35.2	35	38	23	35	40	0	35	34	39

Source: Ernst & Young analysis

Notes:

1. Previous ranking in issue 35 is shown in brackets.
2. Combines with each set of technology factors to produce the individual technology indices.
3. This indicates US states with RPS and favorable renewable energy regimes.

China has risen a point in the ARI following its announcement of ambitious capacity targets for 2013, pending legislation on national renewable energy quotas for grid companies and the strategic nature of its outbound investment in international wind and solar projects. While the outflow of government-backed funds and manufacturing capability to other parts of the world – Latin America in particular – may indicate that domestic activity has been abandoned on the presumption of a saturated market, nothing could be further from the truth as this quarter's wind and solar developments show. Further, this outbound activity appears to be part of a wider strategy to support the sector during this challenging period by "bundling" finance packages with Chinese equipment and broadening the country's manufacturing base outside China.

Germany remains in second place ahead of the US but its score is broadly unchanged this issue. While the Government is continuing to be proactive in expanding the country's grid infrastructure, approving in Q4 the construction of three new "power autobahns," the shock announcement in late January that it intends to freeze the levy charged to consumers to cover the cost of renewable energy has put the sector firmly in the firing line. The announcement included various measures to rein in support for clean energy projects and an accelerated timetable for implementation. The offshore sector, however, fared better, with new legislation unblocking stalled projects by creating greater long-term certainty for project developers and investors.

The **US** score remains unchanged overall this issue. While the eleventh-hour extension of the PTC and a number of offshore developments have given the wind sector a much needed boost, the pull back from the "fiscal cliff" in the short term does not fully offset ongoing battles over long-term energy strategy and, in particular, the impact of cheap shale gas on the renewables market.

India's lead over France has narrowed due to a two-point decrease in the ARI, as a result of concerns that poor trading performance on the REC market indicates broader issues around compliance with national renewables obligations. In the wind sector, ongoing uncertainty over the reintroduction of subsidies and tax breaks continues to stall activity, despite clear recommendations being submitted. In the solar sector, a new government target and plans for a central government auction this year were partly offset by news that around half of the US\$1.4b CSP project pipeline is likely to be delayed and some scrapped altogether.

Meanwhile, **France** increased two points in the ARI as its six month national energy "debate" got underway, expected to result in legislation setting out a clear energy strategy later this year. This year will also see important government auctions in both the offshore and solar sectors, with the country also doubling its target for installed solar capacity in 2013 to 1GW.

The **UK** remains neutral in the ARI this issue, as policy-makers continue to fail to provide the sector with the long-term certainty it requires. While the latest draft of the Energy Bill did provide some additional clarity, the delay of a decarbonization target until 2016 and mixed messages about the future of the onshore wind sector threaten to generate investor apathy over opportunities in the UK market.

Japan has again leapfrogged its nearest rival, this time, Canada, to take seventh place in the ARI. While there are some underlying concerns that the re-election of the pro-nuclear Liberal Democrat Party in December could take the spotlight off the clean energy sector, current levels of market activity – mainly driven by the attractive FITs introduced last July – indicate that both the public and big business are fully behind the country's renewables boost. In particular, Q4 saw the offshore sector take a giant step forward, with the Government announcing plans to construct a 1GW offshore wind farm off the coast of Fukushima by 2020, with construction slated to start in July this year.

Meanwhile, **Canada** has fallen a place in the ARI. Q4 saw the country's largest wind project – the 212MW Gros-Morne wind farm in Quebec – become operational and an influx of Japanese funding for GDF Suez's wind and solar projects. However, such developments were overshadowed by the ruling that Ontario's FIT subsidies for clean energy producers that use local technology are in breach of World Trade Organization (WTO) regulations. While the province will likely appeal the decision, the ruling may well hinder the development of renewable energy, given the importance of clarity over financial incentives to investor confidence.

Australia has increased a point in the ARI, taking it to 10th place above Brazil, which saw few significant market developments in Q4. Meanwhile, Australia is becoming a preferred destination for Chinese companies in particular, and is now the second-biggest overseas market for Chinese company wind installations after the US. Investors are also undoubtedly attracted by the AU\$10b (€8.0b) Clean Energy Finance Corp. Fund, which will start making loans in July, and an additional AU\$2.2b (€1.7b) fund program launched in Q4 by the Australian Renewable Energy Agency.

ARI at February 2013 (cont'd)

South Africa has taken 16th place from Spain after 2012 ended on a high note for its national renewable energy procurement program; agreements for the 28 projects awarded under the first round back in December 2011 – totaling some 1.4GW – were finally signed in early November, paving the way for construction to start in 2013, and for round three to be held in May. The successful, albeit delayed, procurement program has firmly established the Government's support for clean energy and presented opportunities for investors and developers around the world.

Spain's renewables sector, meanwhile, continues to be hit by severe austerity measures as its economy attempts to recover from the European debt crisis and reduce its escalating tariff deficit. In Q4, the Spanish Parliament passed an energy law that will impose a 7% flat tax on all electricity generation, including from renewable sources, taking effect from 1 January. This final rate is higher than the 6% set out in earlier drafts.

Ireland has risen two places in the ARI this issue, partly as a result of Greece losing points in the index but partly also thanks to a pact signed with the UK, which could formalize the export of energy from Ireland's renewables sector – and wind projects in particular – to help boost the UK's energy supply and ability to meet its 2020 targets. A memorandum of understanding signed in late January saw the two countries agree to investigate ways to achieve cost-efficient use of resources and it is anticipated that an intergovernmental agreement covering energy export arrangements could be on the cards for 2014.

Greece has slipped two places to 22nd following confirmation in November that the Government has passed a new round of austerity measures, which include a tax on the revenue of existing renewable energy plants, in a bid to reduce a deficit created by subsidy payments to the industry. The tax will reduce the revenue for all PV plants by 25%-30%, while other technologies will pay 10%. Inevitably, the measure is expected to deter investors and cause cash flow problems for many solar projects.

The expansion of **Morocco's** project pipeline indicates it is still on track to meet its target of installing 4GW of wind and solar capacity by 2020, resulting in a two-place jump up the rankings in the ARI (also impacted by a fall for Denmark). In Q4, the Government agreed a US\$1b (€0.8b) PPA for the first 160MW phase of its flagship Ouarzazate CSP plant, and is looking to award work on the second phase by the end of this year. It also announced plans for another 400MW-500MW solar tender for a different site in 2014. Meanwhile, Morocco's National Electricity and Water Office selected six bidders to participate in a public tender for an 850MW wind project comprising five separate wind farms.

Denmark has experienced an uncharacteristic fall from grace this issue, dropping to 24th place behind Morocco. This follows the news that transmission grid company, Energinet.dk, has delayed the planned 700MW power cable connecting the Danish grid with the Netherlands to 2017. Such cross-border interconnections are deemed to be a critical part of the country's target to generate 100% of electricity from renewables by 2050, given the need to balance supply and demand and address increased levels of intermittency. This, combined with connection delays for the offshore wind sector, risks Denmark losing its previous first-mover advantage and falling behind the rest of Europe.

Chile is continuing to attract attention as a rising star in South America and, as a result, has risen two places in the ARI. The country will this year seek bids to build a 50MW solar plant in the Atacama Desert – currently slated to be South America's biggest – mainly funded by a combination of government grants and loans totaling US\$429m (€326m). Q4 also saw a plethora of high profile international players receive approval for various wind and solar projects, with many more requests in the pipeline. Australia's Pacific Hydro was granted approval for a US\$250m (€190m) 108MW wind power project in central Chile, while Ireland's Mainstream Renewable Power Ltd. won approval to build its 70MW El Aguila solar farm in the north. In early January, US solar manufacturer, First Solar Inc., acquired Solar Chile SA, a Chilean developer with more than 1.5GW of PV projects planned, as part of First Solar's expansion into Latin America.

Argentina has hauled itself off the bottom spot this issue, replacing Bulgaria in 39th place. While utility-scale developments on a national scale remain scarce, there are signs of innovation that suggest an increasingly active private sector. Renewables developer, Genneia, for example, is to hold Argentina's first tender when it auctions off wind power generated by its own facility, in order to raise US\$50m (€38m) to fund the expansion of its other wind projects. Meanwhile, Neuquen Province intends to meet a portion of the power demanded by oil rig drill sites by installing around 200MW of wind turbines close by, to be funded by oil companies. Q4 also saw Spanish engineering company, Grupo Isolux Corsan SA, receive US\$261m (€198m) from the China Development Bank to fund roughly half the cost of its two Argentinean wind farms, totaling 200MW.

Wind indices at February 2013

Rank ¹		Country	Wind index	Onshore wind	Offshore wind
1	(1)	China	76	78	69
2	(2)	Germany	68	65	80
3	(5)	US ²	63	65	56
4	(5)	UK	62	59	78
4	(3)	Canada	62	66	45
6	(3)	India	61	66	39
7	(7)	France	59	60	56
8	(8)	Sweden	55	55	54
8	(8)	Poland	55	57	44
10	(10)	Romania	54	57	39
11	(12)	Ireland	53	54	52
11	(11)	Italy	53	54	45
13	(12)	Brazil	52	55	40
14	(15)	South Africa	51	55	37
14	(14)	Belgium	51	50	58
14	(15)	Japan	51	53	45
17	(17)	Australia	50	53	39
18	(18)	Netherlands	49	49	47
19	(18)	South Korea	48	47	54
19	(18)	Norway	48	49	45
21	(22)	New Zealand	47	50	37
21	(18)	Denmark	47	45	57
23	(23)	Finland	46	48	39
23	(23)	Portugal	46	48	35
25	(25)	Mexico	45	46	40
26	(25)	Spain	44	47	35
26	(25)	Greece	44	47	33
28	(28)	Turkey	43	45	33
28	(28)	Taiwan	43	44	38
30	(30)	Egypt	42	45	32
31	(31)	Morocco	41	44	26
32	(32)	Ukraine	39	41	27
33	(33)	Saudi Arabia	38	40	27
33	(34)	Argentina	38	41	22
33	(35)	Chile	38	41	24
36	(35)	Tunisia	36	38	27
37	(37)	Bulgaria	35	38	23
37	(38)	UAE	35	37	22
39	(39)	Israel	33	38	14
39	(39)	Austria	33	40	0

Source: Ernst & Young analysis

Notes:

1. Previous ranking in issue 35 is shown in brackets.
2. This indicates US states with RPS and favorable renewable energy regimes.

China has risen a point in the onshore wind index thanks to the country's newly announced target of installing 18GW of wind power by the end of 2013 and new project approvals at the end of 2012. However, a fall in the offshore index leaves the overall wind index unchanged, as the tightening of environmental rules governing the use of offshore sites further delays the sector's expansion in the medium term, notwithstanding the completion of a 150MW project in Q4.

Germany's offshore sector received a much-needed boost in Q4. After many high profile projects had earlier been postponed or scrapped pending greater clarity over grid connection liability caps, measures approved in Q4 established a grid connection plan that sets out timetables through to 2030, and confirmed that operators will be compensated for 90% of lost revenue resulting from grid connection delays. Such clarity is now expected to help the sector regain momentum.

The **US** has risen a point in the index following the welcome extension of the PTC on 1 January and confirmation that the Government will launch the first competitive offshore wind tender in 2013. While the tax credit extension is only for one year, the change in eligibility rules to include projects under construction by 31 December 2013 (as opposed to only operational) increases the impact of the extension, although the main capacity increases are not likely to be felt until 2014.

In late November, **Denmark** launched a new bidding round for the construction of 450MW of offshore wind capacity across six sites, plus 50MW capacity for the testing of new turbines. However, this news came as a revised connection timetable was released for existing pipeline projects, which showed delays of more than a year for at least 1.5GW of offshore capacity, specifically the 600MW Kriegers Flak and 400MW Horns Rev projects, plus 500MW of nearshore capacity. These persistent delays, combined with broader grid issues, threaten the country's ability to meet its ambitious wind energy targets, resulting in a fall down the rankings in the wind index.

While **Egypt's** renewables market has been slow to regain momentum following political turmoil through 2011-12, Q4 saw the first signs of recovery with the announcement that the country plans to hold an auction for the right to use land in the Gulf of Suez to build wind power plants with capacity up to 600MW. As a result, Egypt has risen a point in the onshore wind index.

Solar indices at February 2013

Rank ¹		Country	Solar index	PV	CSP
1	(1)	US ²	70	69	73
2	(2)	India	65	67	52
2	(3)	China	65	67	47
4	(4)	Germany	61	70	0
4	(5)	Japan	61	65	29
6	(6)	France	55	59	30
7	(6)	Australia	54	54	54
8	(6)	Italy	53	55	37
9	(9)	Spain	51	51	55
10	(10)	Morocco	50	49	57
11	(10)	South Korea	49	52	30
12	(14)	Saudi Arabia	48	48	49
12	(12)	Brazil	48	50	33
12	(12)	UAE	48	47	50
15	(14)	Greece	46	48	33
15	(16)	Portugal	46	47	36
17	(17)	Israel	45	46	39
17	(17)	Austria	45	52	0
17	(19)	South Africa	45	44	52
20	(19)	Tunisia	44	43	47
20	(19)	Mexico	44	44	41
22	(22)	UK	42	48	0
22	(22)	Turkey	42	43	29
24	(24)	Romania	41	46	0
25	(24)	Ukraine	40	46	0
25	(24)	Canada	40	45	0
25	(27)	Poland	40	45	0
28	(27)	Egypt	39	38	45
29	(29)	Belgium	38	43	0
29	(29)	Sweden	38	43	0
31	(32)	Chile	37	38	31
31	(29)	Taiwan	37	42	0
33	(32)	Netherlands	36	41	0
34	(34)	Bulgaria	35	40	0
34	(34)	Denmark	35	40	0
36	(36)	Argentina	33	35	17
37	(37)	New Zealand	27	31	0
37	(37)	Ireland	27	31	0
39	(39)	Norway	26	30	0
40	(40)	Finland	25	28	0

Source: Ernst & Young analysis

Notes:

1. Previous ranking in issue 35 is shown in brackets.
2. This indicates US states with RPS and favorable renewable energy regimes.

China has risen a point in the solar index following the announcement of government subsidies for some 2.9GW of projects under the country's Golden Sun Program. Q4 also saw FITs approved for rooftop installation, while expansion of manufacturing capacity into countries such as Turkey evidences China's proactivity in maintaining supply chain momentum during this period of domestic consolidation.

In **Australia**, despite a strong performance overall in the ARI, some challenges remain for the country's solar sector, resulting in a fall to seventh place. Q4 saw AREVA abandon plans for its AU\$1b (€0.8b) 250MW Solar Dawn CSP project after failing to get government funding. Australia's Infigen and China's Suntech also scaled back their ambitions from 150MW to 35MW for a new solar PV project after missing out on funding.

Romania's solar market has continued to show high levels of market activity, reinforcing the attractiveness of the sector and supporting projections that indicate it will experience strong growth through 2013. The national energy regulator estimates 500MW-1,000MW will be installed by the end of the year. EDP, Portugal's largest utility, has chosen Romania to develop its first solar parks worldwide, with 39MW planned for Q1 2013. While the Government may reduce the level of solar subsidies during a review this year, they are likely to remain attractive.

While **Poland's** clean energy sector has been a little downbeat following October's draft of the much-awaited renewable energy law and signs that policy-makers' appetite is moving toward shale gas and nuclear, the country's solar sector is not deterred and is starting to show signs of a "solar buzz" in anticipation of a surge in installations once the new law takes effect, given the favorable subsidies proposed. Had the law taken effect in January as expected, estimates suggest installations could rise to 400MW from just 3MW by the end of the year, though this is likely to be revised given the delay in the legislation.

Turkey has risen a point in the solar index following confirmation in Q4 that China Sunergy Co. has opened a 150MW solar module factory in Istanbul with Turkish partner Seul Energy Investment Corp, and also plans to build a 100MW solar-cell facility in March. China Sunergy wants to make Turkey its biggest manufacturing base after China so it can serve Europe better, but the creation of supply chain foundations in the country will also benefit Turkey, which is targeting 600MW by 2015, up from <10MW in 2012.

Saudi Arabia jumps a point in the solar index as a result of news in Q4 that the Mecca Municipality has received bids from two consortiums to build a 100MW solar power plant, which could make it the first city in the kingdom to develop a renewable energy project. In manufacturing news, Saudi's Idea Polysilicon Company (IPC) is planning to reach financial close on the funding for its US\$1.1b (€0.8b) Yanbu project before the end of this year, which aims to produce 10,000 tonnes a year of solar wafers to be used to produce solar panels for the region.

Country focus – China



Ambitious targets send strong signal

Despite a turbulent 2012 for the global renewables market, it seems China's enthusiasm for all things green remains as strong as ever. In early January, the National Energy Administration (NEA) announced that China intends to install at least 49GW of new renewables capacity in 2013 – around 21GW from hydropower, 18GW from wind and 10GW from solar.

Renewables quota legislation on horizon

Given the country's power grid constraints, meeting this target will inevitably also require the application of state-wide renewable energy quotas. In mid-January, China published the final draft of a law that is expected to put pressure on China's two grid operators to absorb up to 15% of their energy from renewables, and particularly wind power. The new rules are expected to be approved this year.

China becoming a global player

There are also signs that China is becoming more willing to join global efforts to promote clean energy, after finally joining the International Renewable Energy Agency in mid-January.

Indeed, there is now no mistaking China's presence in the global renewables market – developments in Q4 showcased the speed and fortitude with which it is able to adapt to changing markets. The country's new capacity targets for 2013 leave little doubt that it is continuing to grow its domestic renewables market, but investment in foreign lands seems to be China's secret weapon in the fight to keep its domestic wind and solar sectors intact.

Government supporting outflow of funds

The Government appears to be encouraging – or at least not discouraging – renewable energy manufacturers and developers to seek growth opportunities abroad in an attempt to keep businesses alive in the face of supply chain consolidation, grid capacity constraints and protectionist measures from the West.

It has, for example, awarded US\$4.8b (€3.6b) of bank finance to China Guangdong Nuclear Power Corporation to advance plans to take its wind energy portfolio abroad. Such plans include an agreement with India's Suzlon to co-develop 800MW of wind capacity in India, South Africa and Brazil.

Outbound investment has strategic edge

However, Chinese investment in international markets is not just about global project finance. The real innovation is in the fine print, with an increasing number of financing deals – often government-backed – stipulating conditions that all or some of the components are provided by Chinese suppliers. This “bundling” is enabling Chinese turbine and solar panel manufacturers to provide both components and financing to establish a foothold in the world's fastest-growing markets, while also offering foreign developers access to finance that is less expensive and easier to arrange than local bank loans.

South America benefits from masterplan

South America is already looking like a hotspot for some of this Chinese outbound activity. In mid-November, for example, the China Development Bank agreed a US\$261m (€198m) loan to Spain's Grupo Isolux Corsan SA, toward its 200MW Loma Blanca wind complex in Argentina, on the provision that it will use 100MW of turbines from China-based XEMC Windpower Co.

Meanwhile, Argentine developer, Geassa, is currently negotiating with the China Development Bank to borrow US\$3b (€2.3b) for its 1,350MW Gastre wind park, and Mainstream Renewable Power Ltd has already announced it will use 105MW of turbines from Chinese turbine giant, Xinjiang Goldwind Science and Technology Co. for its two wind projects in Chile.

Solar players take a step toward Europe

It is not just wind projects that are seeing this Chinese outbound investment. Solar manufacturer, China Sunergy, for example, has opened a 150MW solar module factory in Turkey, and intends to make the country's biggest manufacturing base after China as a means of establishing a better grip on European markets, and possibly even the US.

Domestic solar market still has spark

Notwithstanding all this activity overseas, China's own solar market is not missing out on all the excitement. In December, the Government selected the second batch of projects eligible for capital grants under its Golden Sun program. Around 2.9GW of capacity was awarded across some 100 developers, generating a potential cost to the Government of up to US\$2.5b if the projects are completed by June 2013.

The Government also wants to encourage Chinese citizens and businesses to install more rooftop panels, and recently approved a subsidy range of CNY7.5–CNY9.0 (€0.9–€1.1) per watt for a batch of 126 approved projects.

Wind approvals include mega projects

China's wind sector continues to be challenged by grid capacity constraints, with 2012 seeing the country's first ever decline in new installations. However, there are also signs of improvement: the NEA issued around 29GW of wind farm permits last year, up 8% on 2011, which saw a tightening of wind farm approvals. The country is also planning the wind energy counterpart of its massive Three Gorges dam after the Government gave the green light on a 1.4GW wind complex in Inner Mongolia comprising seven wind farms.

Mixed fortunes for offshore sector

The end of 2012 also saw China Longyuan Power Group Corp. bring its 150MW offshore wind farm on line, now the country's largest.

However, China's ability to meet its target of 5GW offshore wind capacity by 2015 may be under threat, following news that the State Oceanic Administration (SOA) intends to tighten up the rules governing the use of offshore and coastal areas further due to environmental considerations. SOA regulations have already delayed the launch of China's second offshore wind licensing round, and the four projects awarded in 2010 totaling 1GW are yet to start construction due to access constraints.

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Shock freeze on energy prices hits renewables

As predicted in our previous issue, the risk of voter backlash in the face of rising electricity prices has rattled policy-makers ahead of this year's election, resulting in a series of "emergency" measures being announced in late January. In a bid to shift more of the cost of green energy measures to producers, Environment Minister Peter Altmaier has proposed freezing the renewables surcharge added to consumers' energy bills in 2014 at the current level of €0.0528/kWh, and capping annual increases at 2.5% thereafter.

So how will this levy freeze be financed? Potential solutions proposed by the Environment Minister include a temporary moratorium on FITs for new renewable projects; a one-off depression in FIT levels; a reduction or cap on surcharge exemptions for energy-intensive industries; and a temporary reduction of FITs for existing renewables plants. This last proposal could prove particularly controversial, given reactions to retroactive changes to support levels elsewhere in Europe.

Election drives legislation timetable

The Energy Minister estimates each of these proposals could generate cost savings of €300m-€500m, and hopes some or all of the measures will be passed as legislation by August. While it was previously unclear whether amendments to the Energy Law (EEG) in March would result in a bill before the election in late 2013, these radical announcements for a rapid implementation of measures indicate that the Government is trying to push the issue of rising electricity prices off the election agenda from the start.

Grid challenges remain the hot topic in 2012

Grid infrastructure and power supply dominated Germany's political agenda for much of 2012. The country's decision to bring forward the phaseout of nuclear power, combined with the fact that most of its renewable capacity lies in the north while key areas of energy demand are in the south, has turned the spotlight on the country's aging transmission network. However, it looks like these debates will pay off in 2013, following key policy approvals at the end of last year.

Approvals spark grid expansion

In Q4, Germany's energy regulator, the Bundesnetzagentur, approved three "power autobahns" representing around 2,800km of new transmission lines running between the north and south of the country by 2022, and the upgrade of 2,900km of existing cables. The regulator's 10-year plan, while welcomed by the energy sector, has scaled down the initial proposals by Germany's four main grid operators, and also falls far short of the 135,000km of new grid capacity required based on a study by Germany's Energy Agency, DENA.

Indeed, the head of DENA has called for a brake on renewables expansion until sufficient grid expansion is in place, describing a situation where solar systems can be installed anywhere by anyone and have the right to be connected as "pure insanity."

Solutions from across the water

However, other opportunities to address grid constraints are also presenting themselves. Q4 saw grid operators in Norway and Germany sign an agreement to build a 1.4GW subsea cable. The project will create greater grid stability for both countries, enabling Norway to act as a kind of "reserve battery" for Germany's power supply using its abundant hydropower, and allowing Germany to export surplus wind power when available.

Solar sector seems invincible against subsidy cuts

Despite the Government's best efforts to curb the pace of solar installations in a bid to reduce its subsidy bill, initial figures from the energy regulator and Environment Ministry indicate that installations climbed 2% to 7.6GW last year.

This made 2012 another record-breaking year, with installed capacity more than double the Government's target of 3.5GW, despite a series of FIT cuts through the year. The high level of installations means the FIT will decrease based on the maximum monthly digression of 2.8%.

Given the decline of module prices and the associated fall in FITs, industry experts are now turning their attention to the outlook for solar in a post-FIT world. The full implications are unclear, but the removal of restrictive criteria governing site selection should increase the size of PV installations. This is likely to be supported by local communities, who will, following a recent change in tax law, now be entitled to 70% of the trade tax on local solar installations.

Offshore wind gets a boost from new legislation

In mid-December, the German Parliament finally approved legislation that set out measures to support the country's offshore sector. Grid connections for projects will be made more transparent and foreseeable by the introduction of an "Offshore Grid Development Plan", which will set out a detailed and reliable timetable for connections over a 10-year period. The plan will be reviewed annually but will be binding on grid operators.

The legislation also confirmed that the offshore grid operator must compensate operators for 90% of resulting revenue loss if the grid connection is delayed or interrupted for more than ten consecutive days. In addition, the legislation clarified the liability mechanisms for grid operators to help limit their risks.

The approval of the law has been critical to the German offshore wind sector, as many high-profile developers and utilities had halted projects or investment plans until the grid liability issue had been resolved. Indeed, there are already signs that confidence is returning to the country's offshore sector, with Mitsubishi Corp., one of Japan's largest trading houses, announcing it will invest US\$765m (€580m) to help grid operator TenneT connect offshore wind farms to the grid.

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Tax credit extension steals the spotlight

Undoubtedly the biggest news for the US renewables sector at the end of 2012 – or 1 January 2013 to be more precise – was the 11th-hour extension of the PTC for wind power projects. There were fears that this specific piece of legislation could slip through the net as a much lower priority given the much broader challenge of preventing the country from tumbling over the “fiscal cliff.”

Unexpected bonus delights wind sector

However, the legislative package not only confirmed a one-year extension of the PTC, but also brought some surprise news that projects only need to be “under construction” by 31 December 2013 to be eligible to receive the US\$22/MWh (€17.0/MWh) credit, as opposed to being fully operational as previously specified.

The policy fine print also confirmed that wind project developers will be able to opt for the ITC on capital expenditure as opposed to the PTC, which will undoubtedly benefit the offshore sector in particular, given the higher capital costs and longer construction period.

2012 boom but 2013 outlook bleaker

The latter half of 2012 saw a rush by developers to complete projects ahead of the anticipated expiry of the PTC. BNEF estimates that wind power now accounts for approximately 6% of total electricity generation in the US, following the installation of a record 13.2GW of wind capacity last year, including 5.5GW in December alone.

However, indecision throughout 2012 on the extension of the PTC meant developers and investors were reluctant to establish a project pipeline for 2013, given that the short-term price of wind power remained unknown. As such, activity levels in the sector in the coming year are likely to be relatively low, with the benefits of the extension not being fully felt until 2014 – especially as the change in the eligibility criteria from operation to construction by December 2013 effectively represents a further one- to two-year extension.

Battle for phased cuts to 2018 continues

However, wind backers in the US are still keen to avoid the return of the boom-bust cycles resulting from last minute decisions and short-term extensions of key financial incentives. As such, bodies such as AWEA are continuing to lobby for the phasing out of the PTC over a longer period. They propose the credit is scaled back to 90% of the current value for projects in service in 2014, reducing by a further 10% each year and ceasing beyond 2018. The proposal will inevitably face resistance in Congress, but AWEA and others claim the policy certainty that accompanies a stable extension is critical for long-term sustainable growth in the sector.

One step forward, two steps back for Obama

However, the renewables sector as a whole is likely to be wondering what is in store for the year ahead, as broader energy issues threaten President Obama’s ability to achieve his “hybrid economy,” in which renewable energy plays a vital role. Oil production and natural gas development are at record highs, with many policy-makers now seeing hydraulic fracturing as a way of rejuvenating the country’s manufacturing sector and increasing security of supply.

It is likely, therefore, that Obama’s second term will need to re-focus efforts on getting agreement over the country’s long-term energy goals and the role renewables has to play. Despite four years in office, the boom in US oil and shale gas production means we are yet to see whether, on entering his second term, President Obama has actually taken one step forward and two steps back as far as establishing his green economy is concerned.

European interest in first offshore wind auction

Despite the broader energy issues currently under debate in the US, there is little doubt that the offshore wind sector is currently riding the wave. In Q4, the Bureau of Ocean Energy Management (BOEM) confirmed that the first-ever competitive tenders for wind energy on the outer continental shelf will be held later this year. Waters off the coasts of Massachusetts, Rhode Island and Virginia totaling 277,550 acres have been split into two wind areas with a combined capacity potential of 4GW.

Early indications are that a number of mature European developers such as Spain’s Iberdrola SA, Electricite de France SA and Ireland’s Mainstream Renewable Power Ltd., will look to participate in the auctions – a sign of increasing confidence in the potential for large-scale US projects. However, unlike in Europe, there is no guaranteed power offtake in the US, creating added pressure for developers to find a buyer willing to pay the higher price for offshore wind.

Increased activity puts 10GW wind target in sight

In other offshore news, the Department of Energy awarded US\$169m (€128.3m) to seven proposed offshore wind projects across six states, while the BOEM issued a request for competing interests in a lease area off the coast of New York, following the New York Power Authority’s proposal for a 350MW-700MW offshore wind project to serve Long Island and New York City.

Also in Q4, Cape Wind Associates LLC saw the approval of a power sales contract with utility Nstar for its 468MW wind farm off the coast of Massachusetts. All of these developments work toward meeting the country’s target of 10GW of offshore wind capacity by 2020.

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Mixed renewables picture

The fourth quarter of 2012 saw mixed fortunes for India's renewable energy market, with the wind sector continuing the agonizing wait for news on incentives while solar developers now have a capacity auction on the horizon.

However, if the national market for RECs is to be taken as any kind of barometer on how seriously the country's power companies are taking their clean energy obligations, the picture is less rosy.

REC market performance disheartening

In December, there were only 173,000 buyers compared with 859,000 REC offers, according to the Indian Energy Exchange. The credits sold for just INR1,500 (€20.1) each – the floor price set by the regulator – compared with INR 3,900 just 18 months earlier. It is claimed that failure by the regulators to enforce the clean energy targets is one of the key reasons companies have abstained from trading.

However, the December statistics still represent a recovery on November's poor performance, likely in part to be due to the general increase in buying in the second half of the financial year as companies look to meet their fiscal targets.

Extension of REC validity could impact prices

The slight improvement may also reflect the start of a rush to buy up credits given that the Central Electricity Regulator is currently deciding on whether to increase the validity of RECs beyond one year. Such a move could push up prices in the future if sellers tend to hold on to credits.

However, regardless of the reasons, December's performance was hardly anything to shout about, and the regulator cannot afford to ignore the apparent apathy of the power distributors to meet their renewable purchase obligations for much longer.

Wind sector holds its breath for subsidy news

The wind sector continued to rally its spirits in Q4 as more details emerged regarding the Ministry of New and Renewable Energy's recommendation to reintroduce both the "accelerated depreciation" (AD) and "generation-based incentive" (GBI) schemes. GWEC estimates that the country is likely to have installed less than 1.9GW in 2012, compared with a record 3GW in 2011, in large part due to the expiry of these incentives last March.

The ministry's recommendations include a 60% increase in the GBI from INR500/MWh (€7.0/MWh) to INR800/MWh (€11.12/MWh), and expanding the cap on the total capacity eligible to claim the subsidy before 31 March 2018, from 4GW to 15GW.

Grid still a barrier to 89GW wind potential

The sharp fall in installations last year is also undoubtedly due to a lack of grid connections. The southern state of Tamil Nadu, which has 40% of the country's wind resource, is now having to force farms to stop generating electricity due to an over-congested grid. It has installed 7.1GW of wind energy but is unable to transport this to other regions in the absence of sufficient connectivity. Infrastructure investment therefore remains key if the country is to get anywhere close to developing its 89GW of generating capacity potential reflected in the latest GWEC projections.

Government auction boosts solar sector

The solar sector was quite literally the shining star of Q4 for India's clean energy sector. In early December, the Government released a draft policy that set out its target to install 9GW of solar power by 2017, 30% of which will be generated from CSP and the remaining 70% from solar PV.

The policy also outlined plans for a central government auction in FY13 involving 1,650MW of PV capacity, and for the first time, solar projects will receive direct grants covering as much as 40% of the upfront cost of building projects.

This is particularly critical for projects in India, as higher interest rates and short-term lending can add as much as 32% to the cost of renewables projects compared with Europe and the US, according to a report by the Climate Policy Initiative and the Indian School of Business. However, the grants will be paid against project milestones to prevent developers from bidding too low and neglecting plant performance.

Individual states have key role to play

Of the targeted 9GW, around 60% will be made the responsibility of the individual states across India. Historically, investors have preferred centrally run solar programs over reliance on state programs because of the greater willingness of banks to lend. However, the increasing pro-activity of some states should instil greater confidence in the investment community.

For example, the state of Tamil Nadu plans to auction 1GW of solar power capacity early this year, offering 20-year PPAs provided plants are built within 10 months. It has also doubled the amount of power that companies will have to generate from solar energy by January 2014, from 3% to 6%.

External factors hit CSP projects

However, CSP fared less well in Q4 with the news that around half of the US\$1.4b (€1.1b) project pipeline is likely to be delayed and some scrapped altogether, due to US supplies being delayed and dust-storms disrupting solar output. The Government estimates that, of the 500MW of projects due to be completed between February and May, only a third of that capacity may be ready on time.

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Country focus – France



National debate puts energy in the spotlight

Late November heralded the beginning of a six-month long “national debate” which will see policy-makers in France review all things energy-related, culminating in new legislation – expected in the second half of 2013 – which should provide the country with a comprehensive energy roadmap for the decades ahead.

This government-led debate stems from a pledge by President Francois Hollande to cut the country’s reliance on nuclear power to just 50% of the total energy mix by 2025, down from the current 78%. The energy review is also likely to determine how long leading power utility, Électricité de France SA (EDF) is allowed to operate existing reactors and whether more will have to shut by the end of the decade; Hollande decided in September to shut EDF’s oldest reactor at Fessenheim, in 2016.

Roadmap will carve out role for renewables

The debate will also inevitably focus heavily on the role of renewable energy. Growth in France’s clean energy sector has slowed in recent years due to the global economic crisis, falling subsidies in the solar sector and bureaucracy across the wind industry. Renewable energy currently makes up around 13% of the total energy mix, well short of the country’s 2020 target of 23%.

Cost of renewables being addressed

Regardless of the outcome of the debate, the sector is likely to need a significant amount of capital investment over the next decade if it is to come even close to meeting its target. Financing of renewable energy subsidies will therefore inevitably form part of the energy debate. One possible answer might be the newly established government-backed Public Investment Bank (Banque Publique de l’Investissement), which regroups several existing agencies and aims to spur economic growth and innovation by lending to small- and medium-sized enterprises.

Energy efficiency measures to ease demand

In addition to the cost of renewable energy subsidies, a recent report by Réseau de Transport d’Electricite estimates around €15b will need to be invested in France’s power grid by 2020 if it is to reduce its reliance on nuclear power. However, there are also signs that the country is looking toward energy efficiency technologies and initiatives to help ease the burden on the power grid.

In late November, it was announced that the EIB will lend €800m to the Aquitaine Region of southwest France to increase the energy efficiency of schools and businesses. The energy minister has also confirmed that the country will start its €4.3b smart meter rollout by the end of 2014, after financing issues stalled the original plans approved by the previous government in September 2011.

Winds of change needed

While it is hoped that the national energy debate will act as a catalyst for activity across the country’s clean energy sector through 2013, the wind sector in particular is struggling to regain momentum after it transpired it had missed annual goals for wind energy development for a second year running. According to the France Energie Eolienne industry group, 650MW-750MW of wind capacity was installed in 2012, around half the 1,300MW targeted for the year.

Uncertainty over FITs and France’s laborious permitting and connection procedures for onshore wind projects have been blamed in part for the low growth levels – some proposed projects have taken up to seven years to secure all the necessary paperwork. The Government has now pledged to simplify the permitting process and clarify the tariff schemes as part of its review process.

Offshore auctions offer beacon of hope

The news has been more positive in the offshore sector, following the launch of tenders for two offshore wind projects at Le Treport and Noirmoutier, totaling 1GW of capacity. The Government has given specifications for the projects to the country’s energy regulator, who will manage the bidding round and announce the winners in January 2014. The tender is expected to generate investment of around €3.5b and secure 10,000 jobs.

Manufacturing in the sector also received a boost in early January, when Spain’s Iberdrola announced its intention to use French turbines manufactured by Areva for its 400MW Wikinger offshore wind farm currently under development in the German Baltic.

Solar sector showing green shoots of recovery

The start of 2013 has also shown signs of recovery for the country’s solar sector, following the announcement that the Government has doubled its target for new solar projects to at least 1GW for the year ahead. In October, FITs for solar projects less than 100kW were increased from €0.175/kWh to €0.184/kWh, and system developers will receive a 10% bonus if panels are sourced within Europe.

January also saw the start of a tender for 400MW of solar power from large-scale roof or ground installations, at least half of which are required to use “innovative technology.” The winners of the tender will be announced by March 2014.

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Energy Bill expectations reach fever pitch

On 29 November, the UK Government unveiled its much-awaited Energy Bill to Parliament as part of its £110b (€134.1b) effort to reform the country's electricity market. The bill will now make its way through various readings and seek royal assent by late 2013. But, after a series of delays, some very public political squabbling, and some heralding it a "once in a generation" chance to reform the UK's energy market, did the bill ever stand a chance of meeting the huge expectations of a sector that has been waiting anxiously in the dock to receive its sentence?

Much as expected ... plus a little bit more

The key provisions of the bill have remained broadly unchanged on previous drafts and overall the package is welcomed by the sector. Though few now see it as "transformative," it is recognized as a framework with long-term commitments, providing increased certainty for investors and introducing measures to support the UK's transition away from traditional sources such as oil and coal.

These measures include the introduction of a capacity market, which will introduce power auctions from 2014 to secure back-up supplies during times of peak demand from 2018 onward, and a price guarantee for low-carbon electricity generators through "contracts for difference" (CFD). The CFD FIT scheme will effectively compensate suppliers where wholesale power prices fall below a specified "strike price," and will be offered as an alternative to the current renewable obligation certification (ROC) regime from 2014, becoming compulsory from 2017.

However, the November bill did see some new proposals, including plans to exempt energy-intensive industries from the levies imposed on suppliers (and subsequently consumers) to fund the cost of the CFDs. However, it will be interesting to see whether Germany's recently announced plans to review its own exemptions in the face of escalating consumer electricity prices could de-rail the UK proposal. The bill also proposed ambitious new energy efficiency measures, which the Government hopes will partly offset the increase in consumer energy bills.

Energy price hike risks voter backlash conundrum

Indeed, the release of the bill has forced the Government to be candid about the numbers. Its measures are expected to triple the annual cost of renewable energy that comes through consumers' electricity bills to £7.6b (€9.3b) by 2020. However, the Government will need to tread carefully to ensure that rising electricity prices do not trigger a voter backlash, such as that currently threatening support for renewables in Germany.

Strike price details struck out

However, for a sector that has been on edge ever since the Government first announced its intention to reform the UK electricity market, the bill still fell well short of expectations. The November release did not provide details of the actual 2013-18 guaranteed CFD strike prices for each technology, instead due later in the year. This lack of clarity over pricing is likely to frustrate developers and continue to dampen investor enthusiasm in the short run.

Gas ambitions leave investors drilling for certainty

The main source of disappointment, however, was confirmation that a decarbonization target will not be set until 2016, casting doubts over the UK's commitment to cut carbon emissions 50% by 2027 and still leaving investors with a sense of uncertainty.

The decision appears to be the result of intense political wrangling, with the Prime Minister and Chancellor leading the Conservative charge against the Energy Secretary's call for increased incentives for renewable energy, instead favoring natural gas and nuclear energy as a cheaper alternative to low-carbon renewables.

So, where previously there were only whispers in dark corners, the Government's "dash for gas" is now out in the open. The Chancellor used the Treasury's December Autumn Statement to announce plans to study tax breaks for shale gas exploration and publish the Government's new Gas Generation Strategy. This also set out plans for as many as 30 new gas-fired power stations with 26GW of capacity by 2030. The Chancellor has pointed to record low shale gas prices in the US as the pillar for success, but environmental groups and businesses are skeptical that such a gas boom can be replicated in the UK.

Solar consultation gives ray of hope

While debates over the merits of the Energy Bill dominated headlines for much of Q4, there were clearer signs of support for the solar sector. Following a consultation, the Department of Energy and Climate Change (DECC) confirmed that building-mounted solar installations will receive 1.7ROCs/MWh from 1 April 2013, while ground arrays will receive 1.6ROCs/MWh, both higher than the 1.5ROCs originally proposed.

Therefore, despite experiencing the wettest summer in 100 years, it seems the sun could still be shining for the sector, with DECC estimating that solar capacity in the UK could reach as much as 20GW by 2020, if technology costs continue to fall. Supporting this, Lark Energy has recently been granted planning permission to develop a 32MW solar park, the UK's largest PV plant.

"Wait and see" cap puts biomass back on track

In response to another consultation concerning biomass schemes, the Government has introduced a cap of 400MW that will trigger the option to hold a consultation on further biomass deployment. The sector has welcomed this "wait and see" approach, as a mandatory cap could otherwise stop investment in its tracks should it be breached. It was also confirmed that new projects will receive 1.5ROCs/MWh in 2013-16, falling to 1.4ROCs in 2016. DECC expects the announcements to unlock investment decisions worth at least £600m (€731m).

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Country focus – Canada



Canada withdrawal from Kyoto becomes official

In mid-December, Canada officially became the first country to withdraw from the international Kyoto Protocol climate change agreement, reflecting government sentiments and years of intense lobbying from major industrial polluters. The Government has pointed to the fact that the US and China – the world's two largest carbon emitters – have never signed to support its repudiation of the treaty, which it announced in December 2011.

Some groups have expressed anger or confusion at the presence of Canada – albeit adopting a relatively low profile – at the UN Climate Change Conference in Doha, negotiating to weaken the second Kyoto, when it will not be participating.

Q4, however, saw increased Asian interest in Canadian renewables assets, perhaps indicating the sector is still very attractive in the global market. The acquisition by Mitsui & Co. of a 30% stake in GDF Suez's wind and solar power projects in Canada, has resulted in more than CA\$795m (€612m) of funding from Japanese banks to support the projects. A further 30% stake in the 640MW portfolio was sold to Toronto-based, Fiera Axiom Infrastructure Inc.

Ontario

Q4 saw a ruling by the WTO which deemed Ontario's local content rules to be in breach of its regulations, following complaints by the EU and Japan. The federal Government will appeal the decision, but there are fears the ruling could damage project development and investment in the short run. The WTO panel report concluded that the province's FIT program undermines competition because it favors domestic products through an obligation to use locally manufactured technology.

Ontario saw further legislative developments this issue, with final FIT 2.0 rules being announced. The market is currently waiting for a new FIT 2.0 application window to open, while developers scour the province seeking partnerships with community, aboriginal or municipal partners to increase their project's point scoring (under FIT 2.0 rules). Additional market uncertainty has been introduced through Ontario Premier Dalton McGuinty's decision to resign as Liberal party leader.

While FIT 1.0 project development continues, the future Ontario market offers stakeholders an uncertain future. This issue did see strong solar sector M&A activity, with Canadian Solar Inc. acquiring SkyPower Limited's portfolio of 16 solar PV projects totaling 190MW-200MW of capacity. The transaction price was around CA\$185m (€142m), payable at certain milestones.

Recurrent Energy LLC, the US unit of Sharp Corporation, sold a majority stake in nine of its solar PV projects to Mitsubishi Corp. and Osaka Gas Co. Mitsubishi and Osaka Gas each bought 45% of Recurrent's Smiths Falls I-VI and Waubesa III-V projects. Recurrent will own the remaining 10%. The projects total about 100MW in capacity, or half of Recurrent's Ontario-based contracted capacity and are expected to be completed in 2013.

Quebec

Former Quebec Premier, Jean Charest announced a call for tenders seeking an additional 700MW of new wind generation. In response to the announcement, Innergex Renewable Energy and the Mi'gmawei Mawiom, being a representative organization for three Mi'gmaq communities in Quebec, announced a partnership for the development of a 150MW wind farm in the Gaspé Peninsula.

Q4 also saw the country's largest wind farm, the 211.5MW Gros-Morne project developed by a joint venture of TransCanada Corp. and Innergex Renewable Energy Inc, come on line in eastern Quebec.

Also in the Quebec wind sector, Montreal-based wind farm developer Eolelectric has succeeded in attracting Fera Axiom, a locally based infrastructure fund, to invest for a 49% share in Eolelectric's 101.2MW Vents du Kempt project. This deal established a framework for future projects, allowing Fera Axiom to invest in future projects as certain milestones are reached.

Maritime provinces

Renewable energy in Nova Scotia continues to grow with new project contracts being released. Since Issue 2, one new tidal project and 14 new wind projects have been awarded a contract. The 54 approved projects remain heavily skewed toward wind energy (89%), with tidal and biomass at 9% and 2% respectively.

Prairie provinces

Manitoba Hydro is poised to spend CA\$18b (€14m) on new dams and transmission lines over the next decade. The announcement has led to the creation of a CA\$30m (€23m) Energy Jobs Loan Fund to help Manitoba companies bid successfully on local and international renewable energy projects. The loan fund is intended to ensure that Manitoba businesses can take full advantage of the economic opportunities that will come with the biggest expansion of Manitoba Hydro in decades.

Alberta

The Alberta Utilities Commission has approved the construction and operation of Joss Wind Power Inc.'s 34-turbine, 78.2MW Hand Hills Wind Power project near Delia, Alberta. The current PPA market in Alberta makes this an impressive milestone for Joss Wind Power. The project is expected to employ 101 Siemens SWT 2.3MW turbines.

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Renewable energy auction picks up pace

The end of 2012 saw a milestone in the history of South Africa's ambitious renewable energy tender program, as the Government finally signed agreements with the developers of the 28 projects approved during the first round of bidding back in December 2011. The signing on 5 November has now opened up the way for bank financing agreements to be inked. It shows that, notwithstanding the delays that have plagued this complex and uncharted procurement process, Africa's largest economy has finally joined the renewables race.

The South African Government is seeking to reduce its reliance on coal after power shortages caused mines and smelters to halt in 2008. It has since set itself the ambitious target of installing 3,725MW of renewable energy capacity by 2016, to be procured through a series of bidding rounds overseen by state-owned utility, Eskom Holdings SOC Ltd. Approximately 1,500MW will come from onshore wind projects, 400MW from CSP and around 1,000MW from solar PV. The remaining capacity will be attributed to small hydro, biomass, biogas and other small projects.

Round three on the horizon

At the end of 2012, approximately 2.5GW of capacity worth an estimated ZAR120b (€10.5b) had been approved over two bidding rounds, with the 28 projects awarded in December 2011 reaching financial close and the 19 approved in May 2012 yet to formally sign on the dotted line. A third bidding round was scheduled for 1 October, but an announcement in mid 2012 confirmed that this would be delayed until 7 May 2013, so that the Government could focus on helping earlier projects obtain funding.

Finance community struck by green energy bug

Projects awarded under the first round of bidding have naturally attracted a lot of attention from potential funders given the Government's unparalleled commitment to support alternative energy generation.

Standard Bank Group Ltd., Africa's largest lender, is to underwrite ZAR9.4b (€0.8b), or almost a third of the debt for 11 of the 28 projects awarded in the first round, with debt accounting for around 57% of the total ZAR47b. As well as underwriting the debt, the banks will also provide clients with interest and currency hedges, carbon- trading credits and guarantee facilities.

Meanwhile, South Africa's Industrial Development Corp., a state-owned lender, has committed ZAR7.5b to successful projects in the first two rounds of bidding, and earmarked a further ZAR17.5b over the next five years. It has raised ZAR5b (€0.4b) of this commitment by selling bonds in a private placement to the state pension-fund manager.

The Development Bank of Southern Africa has approved 11 loans totaling just under ZAR10b (€0.9b) to fund various projects in the first round totaling 896.5MW.

Round 1 projects get underway

The signing of key financing, power purchase and implementation agreements with the South Africa Government has paved the way for a number of large wind and solar projects to begin construction in 2013.

Ireland's Mainstream Renewable Power plans to build the 138MW Jeffreys Bay wind farm and two solar plants in the Northern Cape totaling 50MW each, requiring a combined investment of over €500m.

Meanwhile, SolarReserve LLC, a closely held US solar-energy developer, closed on US\$586m (€444.8m) in equity and debt financing for the Letsatsi and Lesedi solar PV projects, each with capacity of 75MW. The projects are expected to begin operating in mid-2014 and will provide electricity to Eskom Holdings SOC Ltd for 20 years.

In early November, Abengoa SA, the world's largest solar-thermal developer, began work on its 50MW and 100MW projects in the Northern Cape, the country's first CSP plants. The projects represent a total investment of approximately €1b.

Auctions just the start for wind developers

The country's wind power potential has also been attracting attention. For example, as well as progressing to the preferred-bidder stage on two projects under the renewable procurement program, Australian developer, Windlab, is also exploring a further 14 near-term prospects, which could take its capacity in the country to more than 2GW.

The developer sees South Africa as a key growth engine for its business given the country's abundant and high-quality onshore wind resources, coupled with growing electricity demand and a sound renewable energy procurement process.

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Ambitious targets remain top of the energy agenda

The end of 2012 saw a flurry of activity across Morocco's renewable energy sector, as the Government continued to roll out its major wind and solar programs, both of which aim to install 2GW of electricity capacity by 2020. With no domestic oil reserves, Morocco has set itself the ambitious target of generating 42% of its electricity from clean energy sources by 2020 in order to address its rapidly growing electricity demand – expected to rise by around 7% per annum – and reduce its reliance on fossil fuel imports.

Despite relatively low levels of installed capacity to date across the wind and solar sectors, the country's strong project pipeline, and activity in late 2012 in particular, indicates that this is about to change.

Flagship CSP project clears another hurdle

Morocco's flagship solar project is the 160MW Ouarzazate CSP plant, set to become one of the world's largest when completed. In late November, a consortium led by Saudi Arabia's ACWA Power International signed the US\$1b (€0.8b) deal to supply the Government with power from the country's first CSP plant on behalf of the Moroccan Solar Energy Agency, MASEN. The Government will purchase power from the plant, which is estimated to cost about twice the national average electricity price to produce, for 25 years.

Further expansion plans mean the project is expected to reach 500MW of capacity by the end of 2015, with Morocco's Minister of Mines and Energy looking to award work on the second phase of the project by the end of this year. The bidding phase to develop this second phase – some 300MW of CSP capacity – was launched in late January, with expressions of interest due by 25 March.

The Government also plans to put out a tender for another solar project next year, this time in the city of Oujda, totaling 400MW-500MW.

Funding hopes to bring technology costs down

Morocco's renewable energy sector is starting to attract funding from a variety of sources, including the African Development Bank (AFDB), which has awarded around US\$800m (€607.2m) in loans to support the country's renewable energy programs, such as the Ouarzazate solar project. The AFDB hopes that support for such projects will help bring down the costs of the technology more quickly so that further CSP projects can be rolled out across Africa.

Wind power auction selects lucky six

Morocco's wind sector is also attracting a lot of attention. In late November, the National Electricity and Water Office selected six bidders to take part in a public tender for an 850MW wind farm. The bidding groups, whittled down from a list of 16 that applied to the Government in mid-2012, include major international energy developers such as EDF Energies Nouvelles, General Electric, Enel Green Power and Siemens.

The 850MW project is the second phase of Morocco's wind program – the first being a 150MW site at Taza – and comprises a portfolio of five separate wind farms. It also includes a requirement for the provision of equipment for the 200MW Koudia al Baida wind park being developed by French developer Theolia SA. The winning bidder will be required to enter a public-private partnership with the Hassan II Fund and the Energy Investment Company.

Hub for MENA-EU connections

Morocco remains the only African country with a direct interconnection into Europe, specifically the 1.4GW capacity Gibraltar Strait link with Spain. Other interconnections with Europe, as well as neighboring MENA countries, are also planned as the country is keen to become an energy exporter in the long term.

The MENA-wide Desertec initiative should help Morocco to realize this goal, although the scheme has recently faced challenges such as the exit of founding partner Siemens and a delay by Spain in signing a pact that would have cleared the way to build the first €600m solar plant in a network of projects that will spread across the Sahara Desert and link Morocco with the EU's electricity market.

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Glossary

Abbreviation	Definition
AD	Accelerated depreciation
AFDB	African Development Bank
ARI	All renewables index
AWEA	American Wind Energy Association
b	Billion
BNEF	Bloomberg New Energy Finance
BOEM	Bureau of Ocean Energy Management
CAI	Country attractiveness indices
CEO	Chief executive officer
CER	Certified emission reduction
CFD	Contracts for difference
CO ₂	Carbon dioxide
CSP	Concentrated solar power
DECC	Department of Energy and Climate Change
DFI	Development finance institutions
EIA	Energy Information Administration
EIB	European Investment Bank
EMEIA	Europe, Middle East, India and Africa
EPC	Engineering, procurement and construction
ETS	Emission trading scheme
EU	European Union
FIT	Feed-in tariff
GBI	Generation-based incentive
GDP	Gross domestic product
GW	Gigawatt
GWEC	Global Wind Energy Council
IEA	International Energy Agency
IRENA	International Renewable Energy Agency

Abbreviation	Definition
IPO	Initial public offering
ITC	Investment tax credit
LNG	Liquefied natural gas
m	Million
M&A	Mergers and acquisitions
MENA	Middle East and North Africa
MMBtu	Million metric british thermal units
MW	Megawatt
MWh	Megawatt hour
PE	Private equity
PPA	Power purchase agreement
PPP	Public-private partnership
PTC	Production tax credit
PV	Photovoltaic
REC	Renewable energy certificate
REIT	Real estate investment trust
RES	Renewable energy source
ROC	Renewable obligation certificate
RPS	Renewable portfolio standard
SOA	State Oceanic Administration
UAE	United Arab Emirates
VC	Venture capital

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Ernst & Young services for renewable energy projects

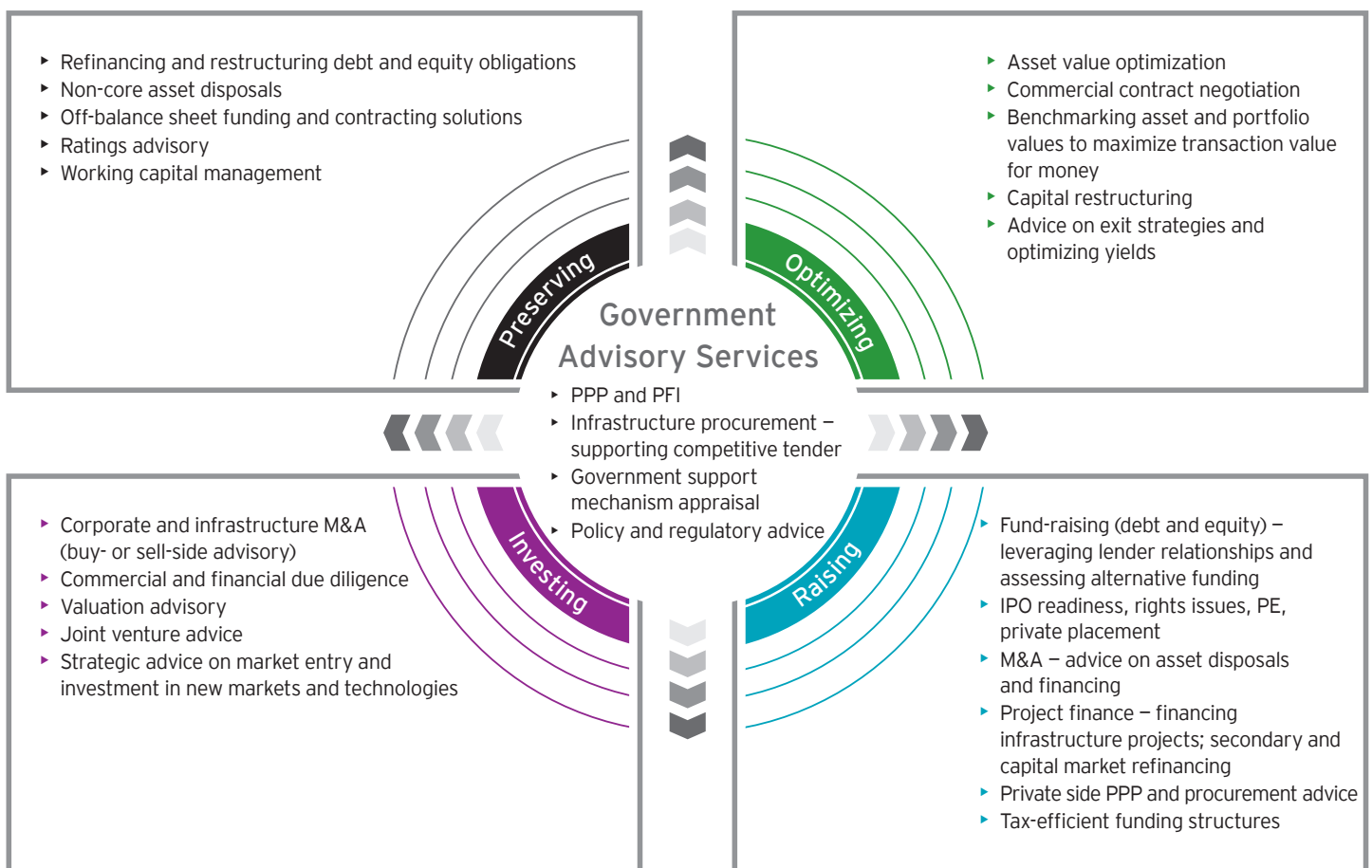
Ernst & Young provides in-depth knowledge and proven expertise for a range of services related to renewable and clean energy technologies. Our offerings can be broadly categorized under four services:

- Government advisory
- Project finance
- Infrastructure M&A
- Corporate M&A
- Energy mix optimization and strategy implementation

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 Ernst & Young for renewable energy projects.



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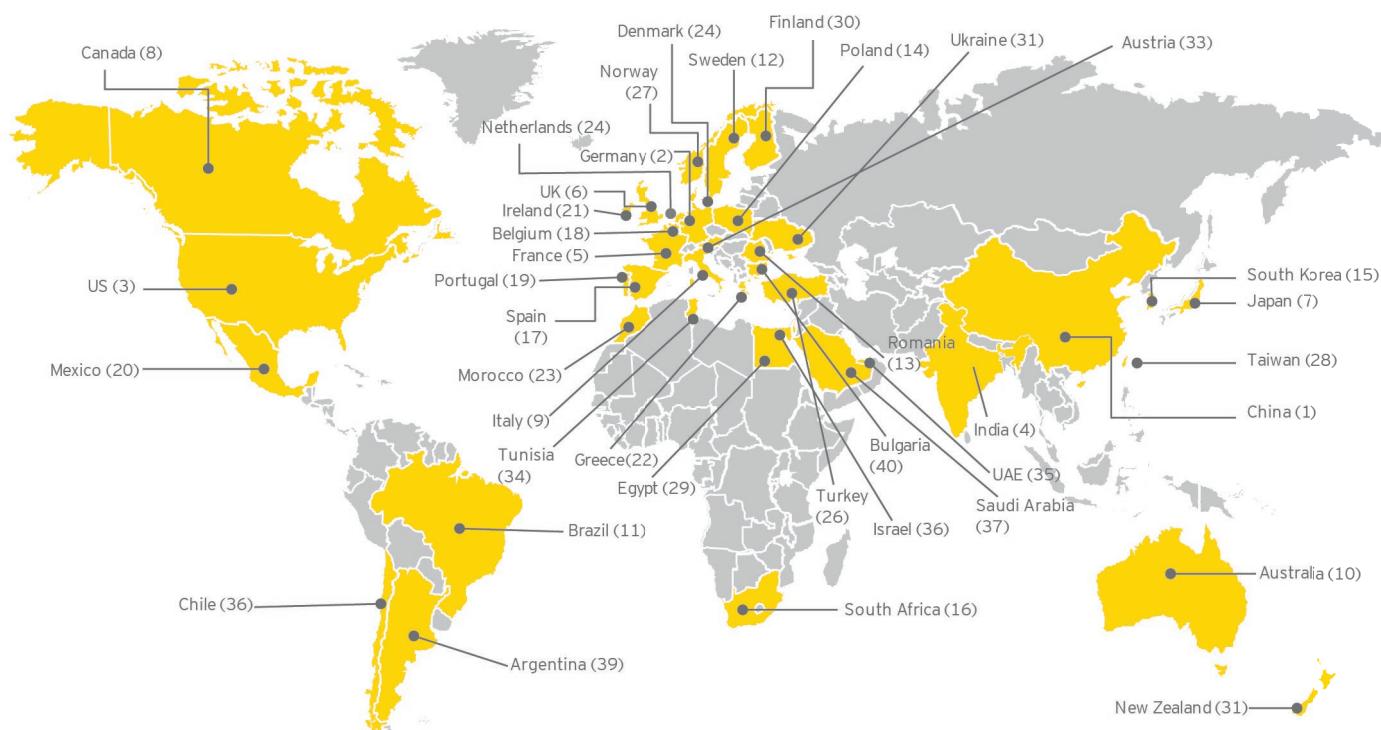
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Map highlighting CAI countries and their respective Issue 36 rankings



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Commentary – guidance notes

As stated on page 2, the individual technology indices, which combine to generate the ARI, 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%) – considers the extent to which markets are fully deregulated and the legislation underpinning the energy sector. 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:

- ▶ Onshore wind index
- ▶ Offshore wind index
- ▶ Solar PV index
- ▶ Solar CSP index
- ▶ Geothermal index
- ▶ 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:

- ▶ Power offtake attractiveness (19%) – this includes the price received, including any technology-specific incentives or obligations, the potential price variation and length of PPAs granted. Higher scores are also achievable if a government guarantees the power offtake.
- ▶ 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.
- ▶ Grant or soft loan availability (9%) – grants can be available at local, regional, national and international levels, and may 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.
- ▶ Market growth potential (18.5%) – this considers current capacity compared with published targets, and other qualitative factors based on quarterly developments that provide strong indications around the growth potential of the technology in that country. In conjunction with the qualitative analysis, the score also incorporates forecast capacity levels over a four-year rolling period, based on data from various market sources.

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.
- ▶ 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.
- ▶ Resource quality (19%) – for example, wind speeds and solar intensity.
- ▶ 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

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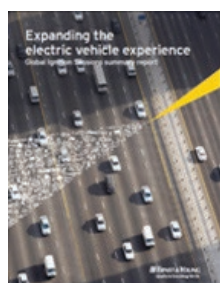
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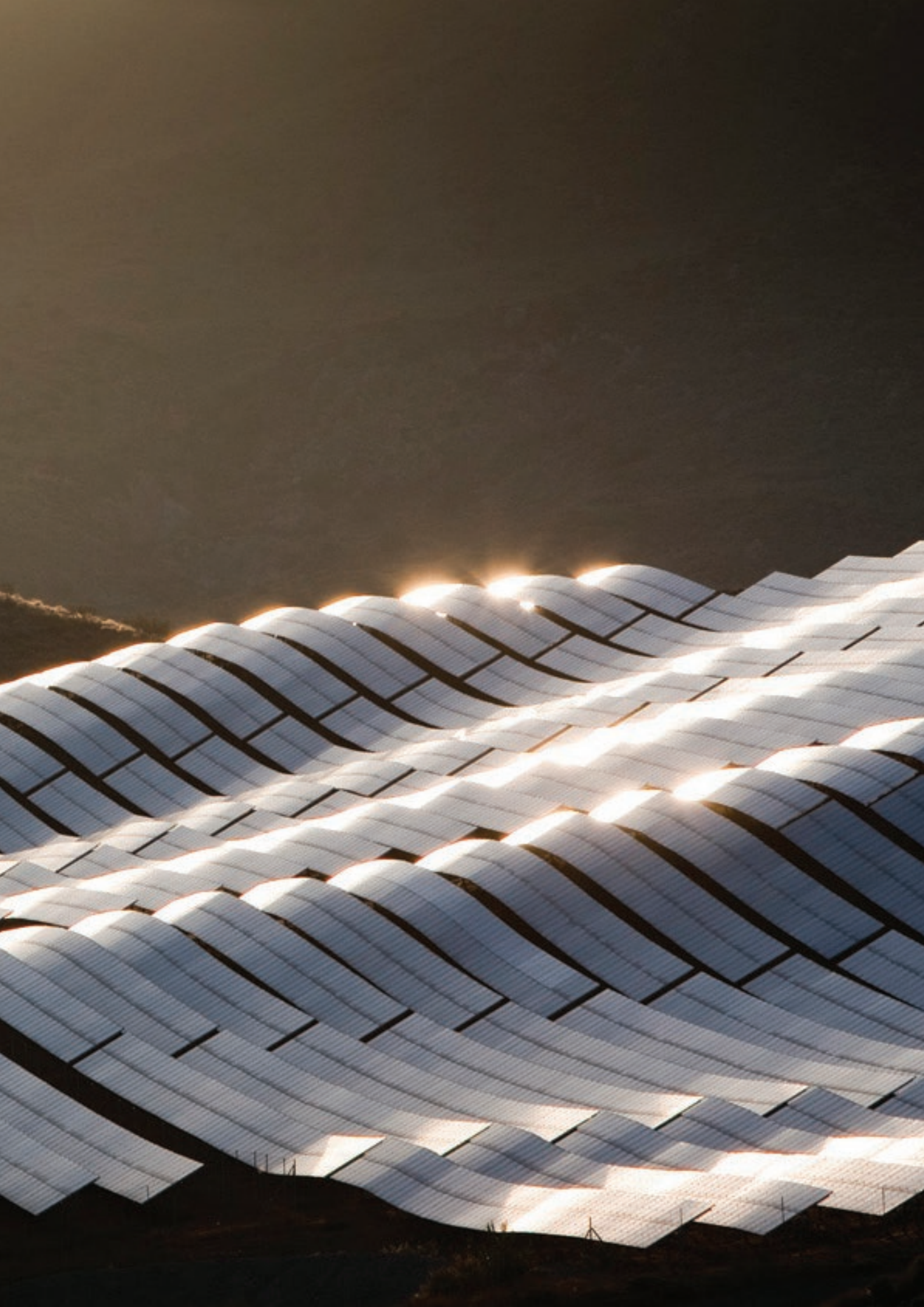
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