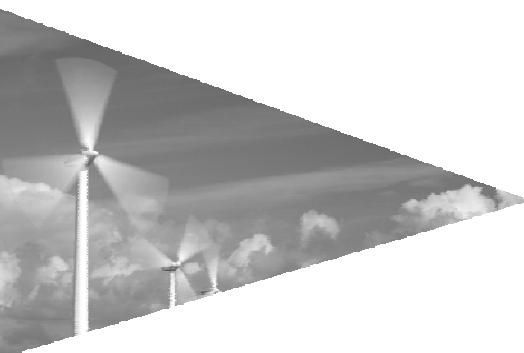


# Renewable energy country attractiveness indices



## Global highlights

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A revolution is under way. As policy-makers scramble to prevent recession from once more tightening its grip across many major economies, demographic changes and surging economic growth in emerging markets now appear to be the driving force behind renewable energy investment. While developed countries remain focused on slowing demand and cutting costs, an insatiable hunger for energy is coursing through the rapid growth markets. The global economy is changing and, as a result, the renewable energy industry is adapting to a world transformed.

This new global framework is reflected by the arrival of five emerging markets in this issue of the Country Attractiveness Indices (CAI). Geographically diverse they may be, but Argentina, Hungary, Israel, Tunisia and Ukraine all share an acute need for more renewable power. With eight other countries having been added to the CAI in the past year, the balance of power is clearly shifting. Eastern Europe, the Middle East and North Africa, South east Asia and Latin America, now represent the immediate future for renewable energy. Some of these markets, such as China, South Korea and Taiwan, are even taking over strategic manufacturing sectors and increasing their exports, leading to friction with some more established markets.

In this issue, we focus on Brazil, a country that has entered the top 10 for the first time, and Romania, which has risen to number 13, having only joined the CAI a year ago. Both of these countries have fast-growing wind markets and strong energy demands. By contrast, Western Europe and the US markets have been hit by a perfect storm of reduced government incentives, restricted access to capital and increased competition from abroad. The lead article reflects on this challenging situation and also looks at the impact of low-cost shale gas on the outlook for renewables.

Continued commitment to the ongoing development of renewable energy means China still tops the All renewables index. However, the previous exponential market growth has slowed, leading to a fall of one point in the index. A tightened approval process for new wind energy projects is leading to turbine oversupply and manufacturers are already seeking more export markets.

The US has also dropped one point due to the expiration of the national loan guarantee program and continued uncertainty over the future of the Treasury grants program and production tax credits. There has also been a decline in investor confidence in the solar sector following the bankruptcy of three major manufacturers.

The US is now four points behind China and just one point ahead of Germany - which was the only top 10 European country to rise in the index following news that the state-owned development bank, KfW, is to provide more than €100b of funding to ease the country's transition from nuclear to renewables. In the UK, meanwhile, investor confidence has been dealt a blow by a dramatic drop in solar feed-in-tariff (FIT) rates.

In this CAI issue, we have an interview with the CEO of AREVA Renewables, sharing some insights on the offshore and solar CSP industries. Another feature article discusses the challenges and opportunities for financing the offshore sector.

# Overview of indices: Issue 31

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

The CAI take a generic view and different sponsor or financier requirements will clearly affect how countries are rated. Ernst & Young's Renewable Energy Group can provide detailed studies to meet specific corporate objectives. It is important that readers refer to the guidance notes set out on page 31 referring to the indices.

## Long-term indices

The long-term indices are forward looking and take a long-term view (up to five years); hence, the UK's high ranking in the wind index, explained by the large amount of unexploited wind resource, strong offshore regime and attractive tariffs available under the Renewables Obligation (RO) mechanism. Conversely, although Denmark has the highest proportion of installed wind capacity to population level, its score is relatively low because of its restricted grid capacity and reduced tariff incentives.

## All renewables index

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

1. Wind index - 65%  
(comprising onshore wind index and offshore wind index)
2. Solar index - 18%  
(comprising solar photovoltaic (PV) index and concentrated solar power (CSP) index)
3. Biomass and other resources index - 17%

## 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 31).

## Technology factors

These provide resource-specific assessments for each country.

## Long-term wind index

This index is derived from scoring: -

- ▶ The onshore wind index - 70%
- ▶ The offshore wind index - 30%

## Long-term solar index

This index is derived from scoring:

- ▶ The solar PV index - 73%
- ▶ The solar CSP index - 27%

For parameters and weightings see page 31.

## 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.

Please visit our websites [www.ey.com/renewables](http://www.ey.com/renewables) or [www.ey.com/CAI](http://www.ey.com/CAI) or contact either:

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The most appropriate way to access historical information in Bloomberg is from Ernst & Young Renewable Energy - Total Renewable CAI page: {EYRE<GO>}. Each value can be evaluated to reveal history.

**Ernst & Young was ranked the leading project finance advisor in the Americas, Europe, Middle East and Africa between 2001 and 2010 by *Project Finance International***

# The global race for capital and efficiency drives the renewables sector

Ernst & Young guest columnists -

Thomas Christiansen and Phil Dominy

The competition for limited capital and the drive for increased efficiencies have combined to define the renewable energy sector over the past 12 months. Investor hesitation has grown because of conflicting government policy signals, ranging from decreased FITs to a drop-off in loan guarantees. At the same time, these governments are struggling to overcome the dilemma of how to deliver secure, low-cost energy without impeding the market – while also creating jobs. In addition, notable business failures and workforce redundancies are driving public opinion away from the sector in some Organization for Economic Cooperation and Development (OECD) countries.

On the debt side, Basel III and other programs designed to strengthen banks' balance sheets have seriously reduced liquidity in the lending market, and reduced banks' appetite to provide long-dated capital to projects. At the same time, a tightening of balance sheets is being witnessed in the power and utility sector, driven by the need to preserve all important credit ratings. There is therefore an urgent need for new capital to enter the sector, whether from direct investments from institutional capital, or accessing much deeper pools of debt capital via the capital markets.

In the US, expiry of the loan guarantee program and forthcoming deadlines for treasury grants and tax credits by the Federal Government are causing an uncertain policy landscape to evolve. European countries are cutting incentives and narrowing the scope of policy-supported mechanisms. Many are seeking competitive advantages amid the ebbs and flows of the capital markets. Mike Bernier, Ernst & Young Senior Manager, Tax Credit and Incentive Advisory Services said, "Many in the sector are waiting to see who will be the next player to fall, which is impacting the ability to predict future financing."

For project developers, the question is about whether capital will be available to support growth at the pace they would like to expand. They are also wondering how long it will be before they are able to capitalize on their investment – there simply are not a lot of exit alternatives available. Robert Seiter, Ernst & Young Head of Cleantech in Europe, commented that, "If projects are too big, they become difficult to finance. Some of the huge offshore wind farms often require more than US\$1b (€0.7b) in capital to develop – it's difficult to find that level of investment in a limited capital market." He added that many previously available sources of project finance have disappeared, forcing many developers to seek co-investors, which results in increased lead times to market.

Because of this, says Ben Warren, Ernst & Young Energy and Environmental Infrastructure Leader, "Effective capital management has become a crucial part of an infrastructure developer's business. There is a lot more stress in markets driven by capital scarcity. Innovative financing solutions that offer financing certainty and a reliable source of low-cost capital will become an increasing source of competitive advantage in the sector."

Manufacturers are finding it difficult to respond to government policy and customer demand simultaneously. The question for

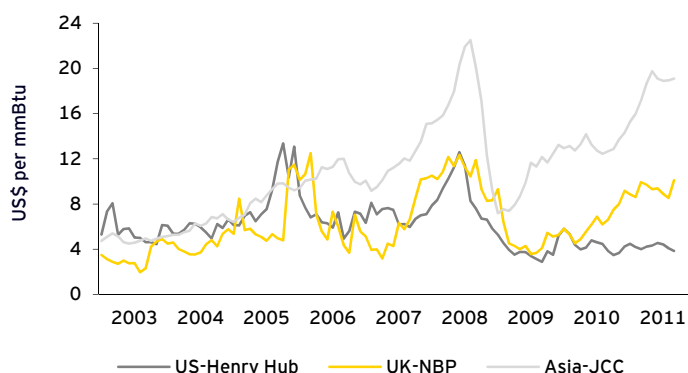
them is who will survive, given the large number of players in the industry. Robert Seiter added, "It is becoming more difficult for supply chains to adapt to rapid changes in the market. Solar manufacturers, for example, need to continuously invest in new technology in order to stay cost competitive, even in depressed markets when they are earning lower margins."

"Those players in the renewables space who can raise capital cheaply will dominate - greater consolidation is coming," said Mike Bernier.

## Impact of gas prices on renewables and fossil fuels

Another major challenge confronting renewables in some countries (such as the US) involves the reduction in price of natural gas, coupled with an imbalance of subsidies between clean energy sources and fossil fuels. The cost of gas has fallen considerably over the past few years, dropping from US\$10-US\$12/mmBtu (million metric British thermal units) (€7- €9/mmBtu) in early 2008 to around US\$4/mmBtu (€3/mmBtu) in 2011, according to the US Henry Hub prices, as large quantities of shale gas have come onto the US market. Meanwhile, gas prices have increased in European and Asian markets, where they are typically driven by oil prices - which have risen strongly in the past two years.

Figure 1: Global natural gas prices (monthly averages)



Source: *Natural Gas Week* and Thomson / Reuters

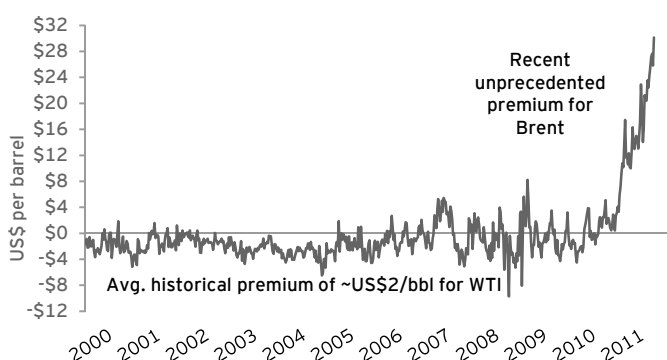
The decrease in US gas prices is creating major issues in M&A and investments in the power generation sector. Laurent Williot, Ernst & Young Executive Director, Transaction Advisory Services said, "Because the gas price is now so low, the cost for electricity has also reduced - which is great for consumers but reduces the value of generators' assets, ultimately determined by power price agreement rates. Combined with the discovery of new sources and technologies for extraction of shale gas - notably in New York State and the UK - adequate supplies may be available to cover approximately 100 years'worth of consumption, if environmental risks can be mitigated." According to *ProPublica*, the process of hydraulic fracturing is used to support extraction of shale gas in 9 out of 10 wells in the US. This process has been under fire by a number of groups who have come out against what they view as a risk to sensitive waterways and other natural resources. They argue that the "true cost" of fossil fuels must now factor in environmental impacts, such as methane leakage, oil spills and supply chain emissions.

# The global race for capital and efficiency drives the renewables sector (cont.)

In a July 2011 study, Shale Gas and US National Security, the Baker Institute reported that, "In both the US and abroad, the promise of growing shale gas production has raised the prospects for greater use of natural gas, an outcome with significant implications for global environmental objectives since lower-cost natural gas can displace fuels associated with higher air pollution and greater carbon intensity, such as coal and oil."

Although WTI (Midcontinent US) oil price has not been directly impacted by increased shale gas, it has been *indirectly* impacted by the application of shale gas drilling technology to oil shales - leading to a regional oil supply excess, and hence lower prices compared with Brent crude - supported by tightness in global markets (loss of Libyan supplies and strong demand in Asia).

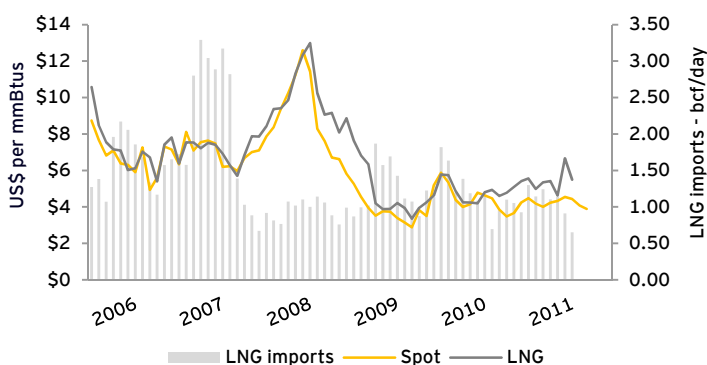
Figure 2: Brent - WTI spot price differentials (weekly average)



Source: US Department of Energy; EIA

The increased shale gas in the US has also impacted the liquefied petroleum gas (LPG) market. There is little demand now for imported LPG (just contractual minimums coming in). Low gas prices have also led to some substitution of coal gas by some utilities.

Figure 3: US natural gas prices and LNG imports



Source: Natural Gas Week and Thomson; Reuters

An additional concern has been due to an imbalance of government subsidies to fossil fuels in relation to renewables. In an October 2011 report by *Bloomberg*, the International Energy Agency (IEA) stated that fossil-fuel subsidies may reach US\$660b (€485b) in 2020. This increase of more than US\$250b (€184b) from 2010 levels contrasts dramatically with the renewable market subsidies that they estimate will total US\$110b (€81b) in 2015. This disparity is likely to have a negative impact on worldwide efforts to combat climate change, which will no doubt be discussed during the COP17/CMP7 in Durban, South Africa, starting in late November.

## Overcoming the challenges

According to Alexis Gazzo, Ernst & Young Cleantech Leader for France, there have been a lot of large M&A deals over the past several months. He said, "There has been an increasing number of large companies which are making serious plans about switching to renewables before the forthcoming 'post-peak-oil' era." He added that this is particularly true in the solar thermal market where smaller firms are increasingly backed by large corporates. He added, "This may offer increased confidence that encourages additional engagement in the sector."

Solar thermal has also caught the attention of some Middle East and North Africa (MENA) region governments which are enacting robust policies around clean energy as a means of creating jobs for the long term. Several large projects are in the pipeline in the region, particularly in solar thermal and notably in Abu Dhabi, Algeria, Jordan and Morocco. Alexis Gazzo predicted, "A lot of projects will begin over the next 12-18 months, which will change financier perspectives." Ben Warren added, "Oil-rich nations also see solar as a means of protecting wealth by preserving reserves for export, rather than consuming resources locally."

Ben Warren also commented that renewables are relatively low risk and tend to be good long-term investments for institutional investors, such as pension and life insurance funds, as well as other managed funds that typically have deep pools of liquidity. The challenge here is that many of these investors don't have in-house credit assessment skills and, as such, have tended to invest via intermediary funds. On the debt side, we are expecting the market to look to the structured finance market which has much deeper pools of capital than project finance.

## What does the future hold?

A new paradigm appears to be coming into play whereby multinational companies are adopting a much more proactive stance around energy procurement and resource efficiency more generally. At the same time, cash constrained governments seem to be taking a much shorter-term view, focusing on the immediate affordability of clean energy.

Renewables provide a good opportunity for corporates to manage their exposure to volatile energy costs, as well as reducing their carbon footprint. Heather Sibley, Ernst & Young Global Cleantech Assurance Leader said, "We are seeing corporations becoming a lot more focused on response to customer demand and concern for sustainability and greener products. Many of these changes also help them to reduce

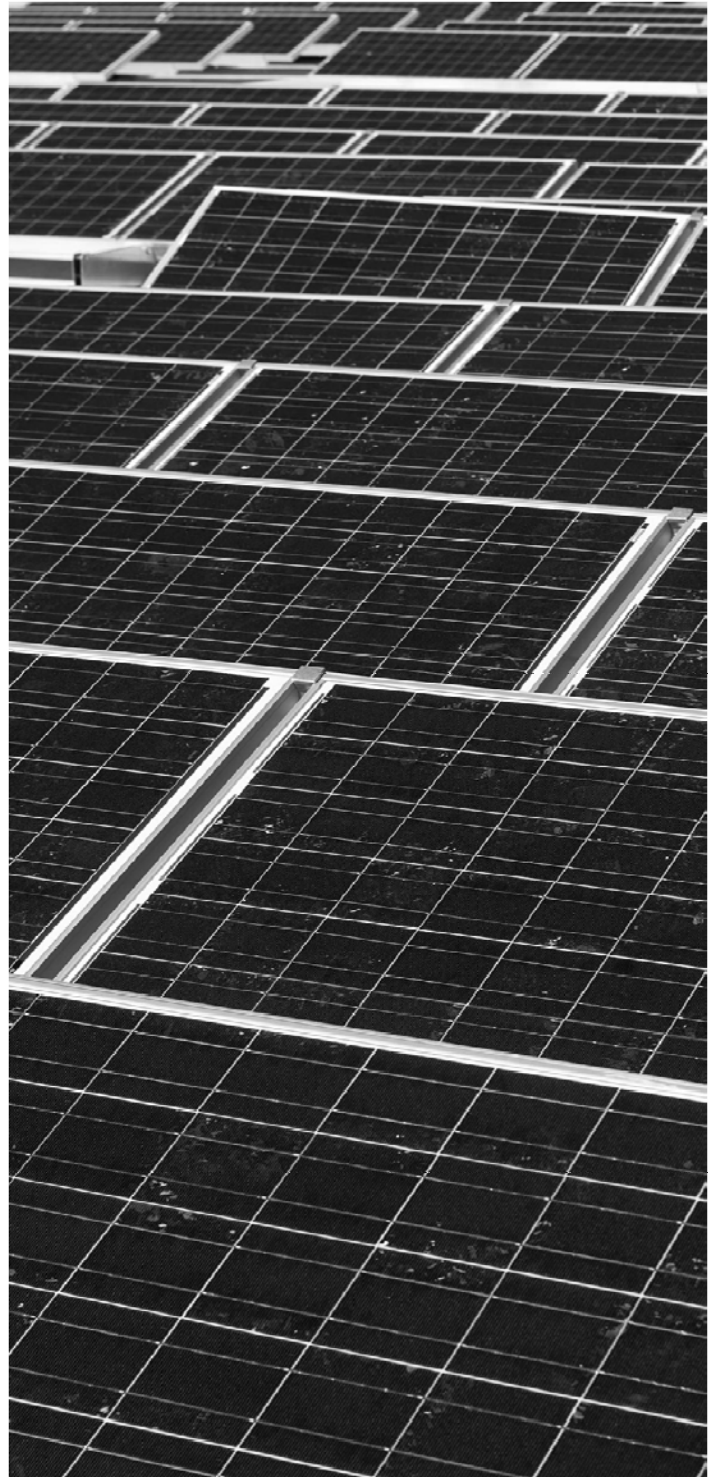


# The global race for capital and efficiency drives the renewables sector (cont.)

operational costs and increase productivity." Perhaps efficiency will help to attract investment to these capital-hungry organizations.

The future will also see growing support for renewables in emerging markets. Such countries with a strongly growing energy demand are seizing this opportunity to leap frog fossil-fuel generation to secure a low carbon future in renewables. Fifteen emerging markets have been added to the CAI in the past two years, with Ukraine, Tunisia, Argentina, Hungary and Israel added in this issue.

The question becomes whether the capital challenges inherent in the renewables market represent a threat or an opportunity for the sector. Governments need to play a major role in ensuring a stable policy framework. They can provide more comfort for investors by offering guaranteed mechanisms to manage some of the risks. There are many success stories available that demonstrate how governments have helped to foster growing industries - for example, US Government support to the burgeoning railroad industry in the 19<sup>th</sup>/20<sup>th</sup> centuries or the impact of deregulation in the telephone industry in the 1970s/80s that ultimately led to mobile phone proliferation. This support should work equally well for renewables, allowing innovation and efficiencies to drive investment and growth in the sector. In the end, access to cheap financing will be one of the major challenges to overcome.



# Industry insights - AREVA

Company: AREVA

Interviewee: Mr. Anil Srivastava, CEO, AREVA Renewables

Interviewer: Alexis Gazzo, Ernst & Young

Date: 11 October 2011



## What are AREVA's current position and competitive advantages in the renewable energy market?

Renewable energy technologies are integral to the low carbon solutions for power generation offered by AREVA, alongside nuclear power. Committed to renewable energy since 2005, the group has acquired advanced technologies, particularly in offshore wind and CSP to constitute a diversified, complementary portfolio.

AREVA's goal is to become a major player in the international markets by supplying competitive technologies. We are present in the fastest-growing renewable energy segments, such as offshore wind. AREVA was one of the first companies to enter the offshore wind market, and with the Alpha Ventus wind farm has provided proof that the technology works. Today, AREVA has over 600MW in confirmed pipeline and 1GW under negotiation. This places us in second position in Europe behind **Siemens**, and in the top three of the industry globally.

We are the leader in bioenergy, with almost 3GW installed and an expanded market position (from a pure engineering, procurement and construction (EPC) provider to technological solution provider).

AREVA Solar's Compact Linear Fresnel Reflector (CLFR) CSP technology is delivering direct, superheated steam at the Kimberlina power station in Bakersfield, California. Several large-scale projects are being constructed in Australia.

Our strong balance sheet and our ability to provide performance guarantees will also be a strong asset. Most utilities are working with established industry players that can deliver performance guarantees and ensure long-term partnerships. Major energy players such as **AREVA, ABB, Alstom** and **Siemens** that have entered the CSP industry have an in-depth understanding of the power sector, the ability to get up to industrial scale and offer turnkey industrial capacity and project execution capability.

## What is your perception of the offshore wind market dynamics in Europe?

For European Union (EU) Member States committed to meeting 20% of final energy consumption from renewable energy by 2020, offshore wind is becoming a viable and reliable part of the energy mix. In this context, AREVA Wind's operations have grown to encompass design, manufacture, assembly and commissioning of high-power wind turbines specially adapted for marine use, notably the M5000.

## Interviewee biography

Anil Srivastava joined AREVA group in January 2009 as Senior Executive Vice President and CEO of AREVA Renewables. Anil is also a member of the AREVA Executive Management Board.

Anil has more than 20 years of experience with enterprise market leaders, managing key operations across the United States, Asia Pacific, Europe, Middle East and Africa regions. He has focused on articulating vision and delivering value of technology applications for enhanced corporate profitability and efficiency. Anil holds a Master's degree in Engineering from the National Institute of Technology in India and a Master's of Business Administration in Finance from the US-based Wharton School of Business.

## How would you describe your company?

AREVA supplies solutions for carbon-free power generation. Its expertise and know-how in this field are setting the standard, and its responsible development is anchored in a process of continuous improvement. As the global nuclear industry leader, AREVA's unique integrated offer to utilities covers every stage of the fuel cycle, nuclear reactor design and construction and related services. The group is actively engaged in developing its renewable energy offering to take the lead in low carbon solutions, creating a worldwide reference for market leadership in renewable energy technologies - wind, solar, bioenergy, hydrogen and energy storage - to be one of the top three in this sector worldwide in 2012.

# Industry insights - AREVA (cont.)

## What are the main challenges faced by offshore wind today?

Offshore wind is currently a high-risk/high-reward market. The industry is going through an optimization phase, both in terms of costs and better wind harvesting, mainly with bigger blades. While, for onshore wind, there is a limit to the size of blades due to logistical constraints, for offshore, we expect much bigger blades in the future. We have anticipated this evolution and for this reason this led us to acquire a blade factory (AREVA 'Blades'). With the combination of cost cutting and improved wind harvesting, we will drive down the levelized cost of energy (LCOE) of wind offshore. The industry expects the LCOE to be around €0.10-€0.12/kWh in the next four to five years.

The risk component is related to the construction risk, which is high in a marine environment. How to de-risk the construction phase is therefore one of the major issues that needs to be addressed to support the development of offshore wind. For the moment, many financiers would like to see a full EPC-wrap model for offshore wind; however, a wrap-around guarantee could be very costly. Our position is that a good consortium can be a solid alternative, if we manage to bring together technology providers, wind and marine construction specialists. At the moment this is difficult, as specialists of marine construction have no experience in wind. This is what we are aiming at, through our partnerships with Beluga Hochtief and Vinci for instance.

Support from governments is critical for the market to realize its potential. This support can come in various forms. Germany provides a good example of combining stable policy with a strong financial support from the state-owned development bank (KfW), both of which are key factors for large-scale deployment of wind offshore.

Facilitating or de-risking the financing of offshore wind is an aspect where the involvement of policy-makers will be critical; for example, through the creation of dedicated funds or green banks. For instance, a number of projections consider that 18GW of offshore wind will be built in Europe by 2020. This would require €50-€70b along with the public-private schemes.

We think 2013 will be a turning point, as the industry will reach a first maturity period, with around 3GW of installed capacity (half of which in shallow waters). It will be a defining moment for the industry as it moves from being high risk to a "manageable risk" industry. We will also need at this stage to move to deeper waters, incurring higher costs but with stronger wind conditions.

## How do you perceive opportunities in the French market?

In the context of the French Government's call for bids for the development of five offshore wind farms (3GW), AREVA has entered into a strategic partnership with the city of Le Havre and the Upper Normandy region. The group plans to locate two new sites on the Le Havre port where it will assemble wind turbine nacelles and manufacture blades, which will generate up to a thousand jobs locally.

AREVA is set to propose its M 5000 wind turbine to equip the five government-selected areas along the French coast. With this in mind, the group signed two exclusive contracts and will work with **GDF Suez** and **Vinci** for Dieppe-Le Tréport, Courseulles-sur-Mer and Fécamp farms, and with **Iberdrola** and **Technip** for Saint-Brieuc and Saint-Nazaire.

With regard to the tendering process, we expect that the Government will engage in a direct discussion with the winning bidders in order to adjust the proposals based on technical studies which will be carried out after the contract award (around March-April 2012).

## What are the main development prospects for Areva Solar ?

AREVA took the decision to enter the solar thermal market through investing in CLFR technology, as we considered that this technology offered more cost reduction potential than parabolic trough and fewer risks than tower technology. The main advantages of the CLFR are its relatively low cost, its modularity and the fact that it is easy to assemble (which is a significant advantage as most markets are in developing countries), using mostly components which are available off the shelf. The labor requirements during the plant's construction can also be an important source of local jobs.

In order to realize its potential, we think that CSP needs to deploy via four strategic platforms:

- ▶ Solar steam for stand-alone power generation
- ▶ Solar steam to augment power generation at existing fossil-fired power plants
- ▶ Thermal storage and solar hybrid plants to offer full dispatch ability to meet growing energy demands and to help offset energy shortages
- ▶ Solar steam for industrial process applications, such as mining, steel manufacturing, food processing and desalination

We focus on the markets which combine strong capital markets, good solar conditions and a clear regulatory regime. Our main areas of development today are Australia, India and the US, but we are also looking at Saudi Arabia, South Africa and Morocco.

# Industry insights - AREVA (cont.)

## How does CLFR compete with other solar thermal technologies and with PV?

Our technology provides constant steam quality, with variable temperatures which can be adjusted unit by unit. It can easily be combined with a fossil-fueled plant (as a booster), with cogeneration and desalinization facilities. If we look only at the market for “solar boosters”, it is a huge opportunity. There are a huge number of thermal plants located in places with good direct normal irradiation (DNI) levels, for example in India and South Africa. Developing solar booster capability for a small share of these plants could represent several GW of solar capacity, and large quantities of avoided CO<sub>2</sub> emissions.

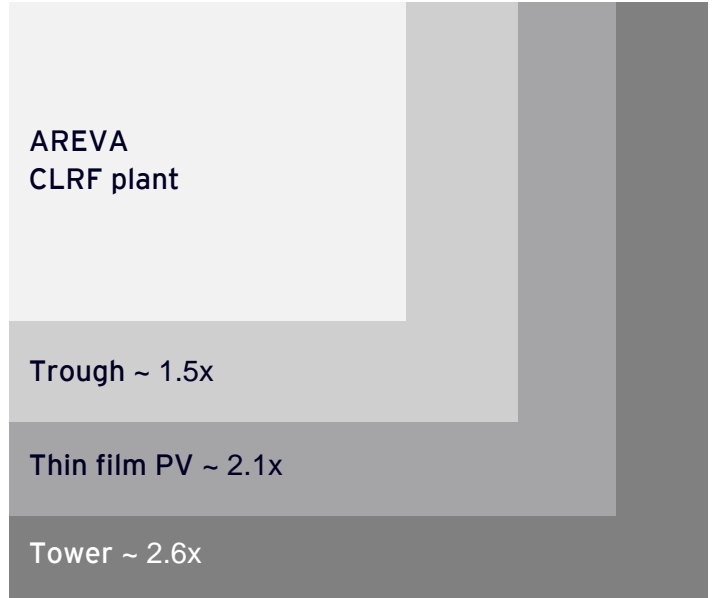
In comparison with PV, the CLFR technology uses much less land (in some cases four times less), and has a built-in storage of 30 minutes due to steam inertia (which can cover to some extent the passing of clouds). For the moment, steam is our preferred storage medium but we are also looking at phase-change materials. We don't think large-scale storage will be necessary, but short-period storage (two hours) can enable coverage of peak load hours. Obviously, for some market segments, PV is not an option. This is the case for booster and hybrid projects which generate steam at temperatures and pressures high enough to boost power at existing fossil-fired plants.

With significant projects coming into the pipeline, 2013 will be a turning point for our technology, and by then we expect to complete the Cogan Creek 44MW solar booster' project and the 250MW solar thermal gas hybrid Solar Dawn project, both in Australia.

## To what extent will the current turbulence in the financial sector impact the deployment of renewables?

A challenge for the financing of renewable energy will be to attract new investors, and in particular pension funds, which usually seek long-term assets, such as real estate. Compared with renewable energy, real estate has less construction risk, but probably more market risk. There is clearly a case for renewable energy generation, which can generate significant amounts of cash flow. In the current economic turmoil, many investors are rethinking on their purchasing strategies. As government bonds and real estate assets are losing their attractiveness, this might be an opportunity for renewable energy projects.

Figure 4: CSP reference plant - 250 Mwe CLFR + 890 acres + 360 hectares\*



Source: Daggett, CA, weather and radiation data



# Financing offshore - where are we now and where is it all going?

With great expectations placed by Germany and the UK - among others - on a significant offshore wind rollout to meet their 2020 targets, we examine some of the funding issues faced by project sponsors and how this may affect their financing model going forward.

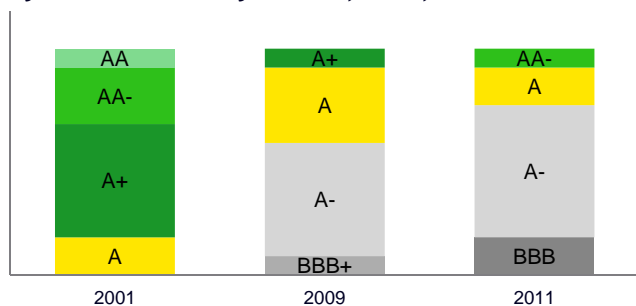
## Balance sheet no longer

Tens of billions of euros are envisaged to be required to build offshore wind power generation infrastructure over the next decade or so across Europe. With much of the project pipeline owned by a few utilities and other oil and gas majors, and a relatively immature contracting environment making it difficult to accommodate lenders' requirements, most have had to rely on the strength of their balance sheet to finance the construction of these projects. This includes increasingly taking the option of re-financing post-construction to free up capital and capture a premium for taking out the construction risk.

In that environment, many expectations are being placed toward attracting large capital from long-term yield-based investors who are now showing interest, often on the back of highly structured tailored investments backed up by the balance sheet and expertise of credible sponsors.

Over the last decade; however, we have observed a gradual deterioration of the credit ratings of such utilities (see Figure 5 below). In 2001, leading European utilities had predominantly high investment grade ratings (A+ and better). But now, these same utilities are mostly at or below the A- level that utility treasury departments view as a crucial ratings floor, beyond which coupons on new bond issuance can increase materially. Furthermore, half of these ratings are currently on negative outlook.

Figure 5: Credit ratings of Europe's top utilities



Source: Standard & Poor's

In this context, we foresee an increasing level of scrutiny placed by boards toward allocating large quantum of capital or balance sheet commitments to this sector at a time where liquidity might be tight and their own cost of capital is increasing.

The issue then becomes - where might true non-recourse third-party financing come from? And more importantly, what will it require from both sponsors and the industry as a whole?

## Project finance outlook

Much has already been written about the effect of Basel III and the future of project finance, including pessimistic announcements of the imminent demise of this funding model, followed by counter arguments that it will last.

Certain European banks may or may not close their project loan businesses - there is no real way of knowing. However, one

thing is certain: project finance loans will become more expensive leading up to full implementation of Basel III in 2018.

The three salient aspects of Basel III are the net stable funding ratio, liquidity coverage ratio and new capital requirements. Combined, these aspects are highly likely to lead to fewer long-term loans, fewer or more expensive credit facilities and letters of credit, and higher loan charges. Cumulatively, the effect of Basel III is to lower banks' return on equity in their project finance businesses. Fewer deals may be underwritten but, more likely, is simply an increase in the cost of project loans. Using corporate banking as a benchmark, we may have reference to **Standard & Poor's** (S&P) recent estimate that, for investment grade corporates, Basel III may increase loan costs by 70 basis points (assuming banks target a 15% return on equity).

## Structured finance to the rescue?

The emergence of a structured finance market for offshore wind projects would help to counteract the negative effects of Basel III on the cost and availability of project finance loans. This is because banks would have refinancing opportunities: making their loans more liquid and providing them with potential gains (the spread between project loan rates and the lower coupons on structured notes).

It seems extremely unlikely; however, that structured finance opportunities could arise for the offshore wind sector in the absence of material credit enhancement from quasi-public bodies such as the European Investment Bank (EIB) or Green Investment Bank (GIB).

An examination of two very different structured finance transactions is illustrative: Andromeda (solar) and Breeze III (onshore wind).

Andromeda is a recent securitization of project loans used to fund construction of two Italian PV plants. The transaction closed in July 2011, with issuance of two series of €97.6m notes maturing in 2028. Series A1 benefits from two levels of credit enhancement to achieve an "AA-" credit rating. First, the Italian export credit agency has guaranteed debt service on the A1 notes. Second, the EIB purchased the subordinated B1 series, rated "BB+," with a coupon below that of series A1 (i.e., at non-commercial rates).

Further supporting the credit quality of the transaction was the very nature of the technology: static, low operating cost, relatively simple and modular construction, predictable energy yield, and with solutions to construction and maintenance issues that are comparatively easy to implement.

Breeze III stands in unfortunate contrast to Andromeda. A portfolio of mostly German onshore wind turbines, the project was exposed - like Andromeda - to construction risk. Senior notes were rated "AAA" in 2007, benefiting from the credit enhancement provided by subordinated notes (series B and quasi-equity). However, the appearance of every manner of operational problem, combined with energy yields well below forecasts, led to a series of rating downgrades. By 2011, the Breeze III notes were "BB-," and maintained on a negative outlook (by Fitch Ratings).

Given the Breeze III experience, investors are likely to be extremely cautious about securitization of offshore wind project loans. The construction and operational risks are greater than

# Financing offshore – where are we now and where is it all going? (cont.)

onshore wind, and the sector is so new that no significant project has seen its financing package fully amortize. There is simply no track record; in this context, it is hard to envision how one can become established without public or quasi-public sector involvement.

Furthermore, credit markets must recover from the current turmoil before any offshore wind deals can be contemplated. This will take several years at the very earliest.

## Implications for the industry

In addition to renewed quasi-public interventions, and continued policy support, we envisage a couple of trends over the short-to-medium term that will underpin the success of the sector: (i) the “professionalization” of the industry, which, with much greater planning, improved project management and delivery capabilities, will reduce construction risks and (ii) the “industrialization” of the industry, which, through volume, a more competitive supply chain and much improved delivery capabilities, will drive cost reductions.

## Implications for project sponsors

The conclusion we may draw is that, in the next five years, sponsors will allocate balance sheet and project financing to their best (most technically and financially feasible) projects. This will leave an overhang of consented but un-built megawatts potentially waiting for nothing more than affordable capital and an “industrialized” version of the industry we know today. To get there may require some market makers to go beyond their core business activities – just in the same way as some utilities have had to invest and create their captive supply chain – to drive the professionalization of the sector. As such, we envisage, (i) a significant level of highly structured refinancing with large institutional investors as current project sponsors seek to capture a premium as they recycle their capital; and (ii) strategic frameworks and other strategic M&A activities among key equipment and service providers, capital providers and project sponsors as they seek to, collectively, create the demand pull to justify hefty R&D and capability building commitments. Along this journey, of course, the sector will need to have continued faith in the regulatory framework around which their industry might develop. The UK’s recent renewable obligation certificate (ROC) banding review has been a good signal for the offshore sector similar to Germany’s recent commitments. For policy-makers, increased scrutiny will be placed toward “value for money” and with it, the benefit in terms of job creation.



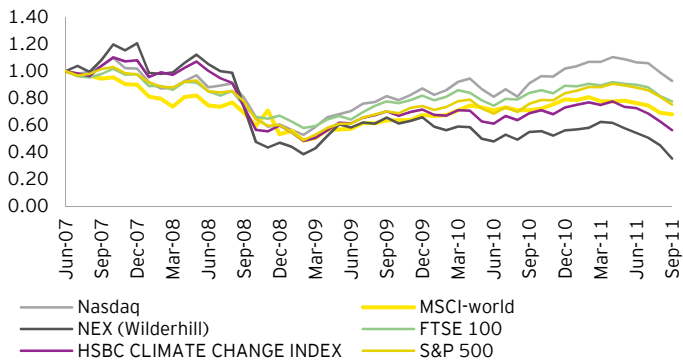
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# Equity trends - renewable energy and indices performance

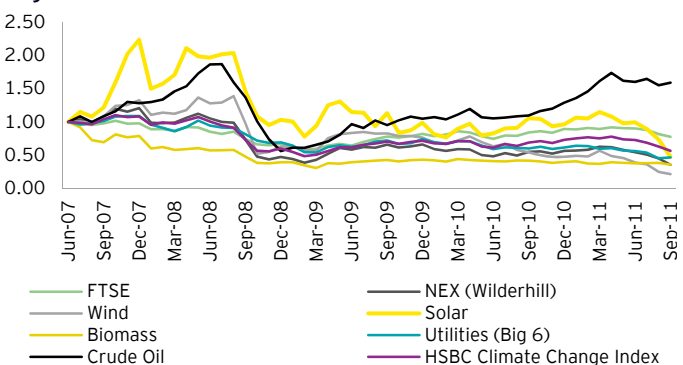
Figure 6: Share price indices



Source: Ernst & Young analysis

What a difference six months can make to the stock markets! At the end of March, share prices were recovering and it looked as if the global economy had escaped a double-dip depression. However, most markets peaked in April and, since then, all have lost significant value. Sovereign debt concerns across Europe and the US have restricted growth forecasts. The renewables-based NEX index has dropped 43% since March, while the HSBC Climate Change index has not been impacted as much due to its heavier weighting of Asia-based companies, though still lost 28%.

Figure 7: Market indices



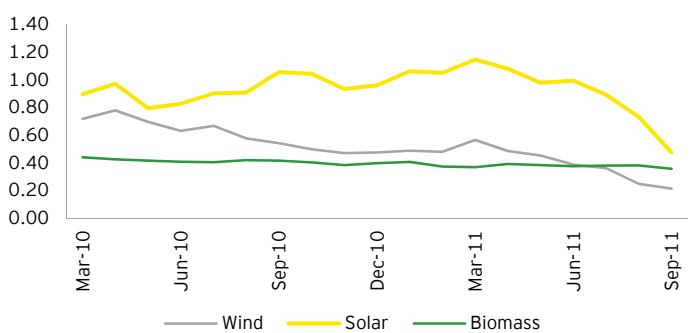
Source: Ernst & Young analysis

In the six months to April 2011, Brent crude oil prices rose significantly, but the more recent economic slowdown and lessening demand has leveled prices at around US\$115 (€85) per barrel. Generally, increasing fossil-fuel prices leads to renewables becoming more competitive in the medium term. However, Ernst & Young CAI research has indicated that, when oil prices exceed about US\$90 (€66), this can lead to increased short-term risk of financial incentives for renewables being reduced or withdrawn, due to greater competitiveness with fossil fuels and governments' desire to avoid high power prices that can result in fuel poverty for some households.

The harsh trading conditions are clearly seen by the level of flotations over the past quarter. Ernst & Young's Q3 Global Initial Public Offering (IPO) update shows that the total value of IPOs is down 57% compared with Q2 (and 46% lower than Q3 2010), while the volume of deals is down 26% from Q2 (and 6% from Q3 2010).

These uncertain economic times have significantly impacted investor confidence and renewable companies' share prices in the past few months.

Figure 8: Renewables sector indices

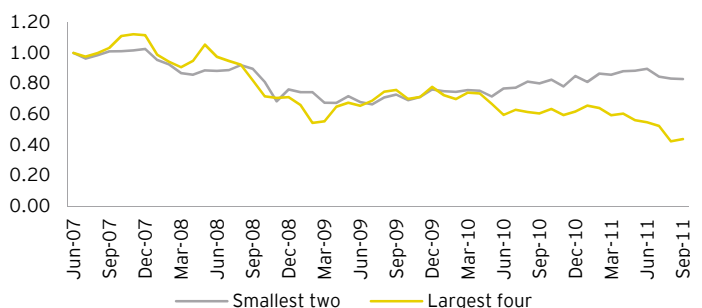


Source: Ernst & Young analysis

The graph above shows relative share prices for an aggregation of companies on particular sectors baseline is end June 2007, pre-credit crunch. Most noticeable is the sharp decline in the solar sector in the last six months, but also a decline in the wind sector. The Eurozone and US debt crisis, coupled with reducing government support and increased competition from Asian manufacturers, have caused a perfect storm. This is most noticeable across solar and wind manufacturers, where a reduction in prices is not being matched by reductions in raw materials, leading to squeezed margins or even losses.

Several companies have announced profit warnings while others have filed for bankruptcy - such as **Solyndra**, **Evergreen Solar**, and **Spectrawatt**. However, demand has remained relatively strong in US and European solar markets. Solar capacity may double this year in the US compared with last year, while Italian installations are booming. European and US policy will need to provide attractive FITs and grants into 2012 to avert severe setbacks.

Figure 9: "Big six" European utilities' share price indices



Source: Ernst & Young analysis

The volatility in finance markets, nuclear power concerns and government pressures are even affecting traditionally defensive stocks, such as the "Big six" European utilities: **EDF**, **EON**, **RWE**, **Iberdrola**, **Centrica** and **SSE**. With equity markets subdued, utilities need to raise capital from the credit markets, but this can impact their credit ratings. A feature article in the May 2011 CAI explained how credit ratings for all of Europe's top utilities have steadily fallen for a decade, mostly due to a major expansion in investment. Utilities clearly have a vital role to play in funding renewable energy in a capital constrained world, and hence may need to restore confidence with investors to attract further equity capital.

# M&A activity

## Introduction

The renewable energy sector is expected to see a 72% increase in M&A activity in the year ahead, according to a report <sup>(1)</sup> which surveyed 100 senior M&A practitioners, 67% of which still expect to see significant M&A activity across Europe.

While this indicates positivity and confidence in the sector, it remains to be seen what impact the current economic turmoil in Europe and perceived regulatory uncertainty in particular European countries will have on the current and future deal pipeline.

Asia Pacific countries also fared well in the survey with 62% of respondents indicating that the region will witness significant M&A activity in the sector. In particular, Japan is considering alternative forms of energy after the Fukushima disaster and the introduction of a renewable energy bill, designed to encourage investment in the sector, is expected to bolster renewable energy M&A activity.

There is also huge potential in emerging countries with China doubling its installed wind capacity year on year and statistics show that the nation's renewable energy capacity is now increasing at a faster pace than that of its coal plants.

## General renewables

French utility, **EDF SA** has acquired the 50% that it did not already own in **EDF Energies Nouvelles** for (€5.5b). The company specializes in the production of renewable energy and EDF considers the acquisition strategically important to strengthen its position in the renewable energy sector.

## Wind

Backing up mergermarket's report findings about Europe taking the lead, this quarter, **ACS Actividades de Construccion y Servicios SA**, Spain's largest construction company, has been busy divesting its 1,757MW renewable energy portfolio. **ACS** has sold its stakes in nine wind farms to two funds directed by **Canepa Asset Management** for €223.4m. They have also sold a further 11 wind assets for €596.5m totaling 443MW of capacity to **Bridgepoint**, a European private equity firm.

**Marubeni Corporation**, the Japanese trading company, has agreed to acquire a 49.9% stake in a 172MW offshore wind farm in the UK, from **DONG Energy AS** for £200m (€230m). The deal would increase Marubeni's renewable energy capacity to 450MW. The deal was completed on 1 November. This is indicative of a current trend for Asia Pacific companies to acquire European assets, not only for the attractive financial returns but also to target renewable energy knowledge and expertise.

**CBD Energy Ltd.**, an Australian developer of renewable energy, acquired a planned 100MW wind-power project in New South Wales state from **RES Group**. The joint venture (JV) plans to develop AU\$6b (€4b) of renewable-energy projects over the next eight years.

**Hansen Transmissions**, the Belgium-based wind turbine gearbox maker, agreed a £444.8m (€519.1m) takeover bid from German company **ZF Friedrichshafen**. The bid came in at a premium of 96% to Hansen's share price, though 80% below the peak share price reached in mid 2008.

<sup>(1)</sup> "M&A in Renewable Energy: Global Outlook", Rödl & Partner and mergermarket, 2011

## Solar

According to the latest quarterly report from **Mercom Capital Group**, M&A activity in the third quarter could signal the start of a period of consolidation within the PV industry. Venture capital funding in the solar sector has increased from last quarter to US\$372m (€274m).

In August, **NRG Energy Inc.** completed the purchase of a 290MW solar project under construction in Arizona from **First Solar Inc.** Agua Caliente is the world's largest solar PV project currently under construction and is expected to be completed by 2014.

**SunEdison LLC**, the solar energy subsidiary of **MEMC Electronic Materials Inc**, has acquired a 100% stake in **Fotowatio Renewable Ventures Inc** for US\$134.9m (€99.2m). **Fotowatio** is a leading global developer and operator of 28 solar power projects and this acquisition should boost **SunEdison's** solar portfolio to 1.4GW in the United States.

**RREEF Infrastructure** has signed a sale and purchase agreement with German concentrating solar power specialist **Solar Millennium AG** and Spanish Construction Company **Obrascon Huarte Lain SA** to acquire 49% of a 50MW solar power plant project - the Arenales project in Andalusia. The plant will be **Solar Millennium's** fifth solar power plant in Spain and has received funding from eight European banks.

**Foresight Group LLP's** FORVEI venture acquired three Italian solar plants from **Spain's OPDE Group** with a total capacity of 13MW. According to Federico Giannandrea, a partner at Foresight, the €55m deal is the largest lease financing arranged by a single bank for a solar deal in Italy. As part of the agreement, in October FORVEI bought another 20MW of Italian solar farms developed by the OPDE which will bring its solar portfolio to about 40MW.

## Hydro

**Green Planet Group Inc** has acquired a 100% stake in **Arizona Independent Power LLC**, a pump storage energy technology firm. Green Planet has introduced a pump storage project which will have a maximum generating capacity of 800MW at a total cost of approximately US\$1.2b (€0.9b).

**Renewable Power International**, a Spanish producer of renewable energy, has been acquired for €230m. The management buy out was backed by **Demeter Partners** and infrastructure fund **Cube**. **Renewable Power** owns 17 small hydro plants in Spain and Portugal with a combined installed capacity of 85MW.

This is a sample of the main global M&A transactions in the renewables sector over the past quarter.

## Sources

All information relating to M&A activity in the sector is obtained from publicly available sources.



# IPO activity

## Introduction

Global IPO activity has fallen sharply in Q3 2011.<sup>(2)</sup> A total of 284 deals raised US\$28.5b (€21.0b), which is a decrease of approximately 26% in number and 57% in capital raised compared with Q2 2011.

Mark Heesen, president of the National Venture Capital Association (NVCA) says, "While the IPO market has screeched to a halt this quarter, the acquisitions market has continued to move forward. Current economic instability could reduce the number of high return acquisitions while keeping new IPOs at a seriously low level for the remainder of the year."

In light of the current market uncertainty arising from the Eurozone crisis, investors are becoming more risk averse and are being very selective. Equity investments in renewable energy infrastructure have been very disappointing. In particular, we have seen the solar industry slump but there is hope that recovery might occur as tumbling valuations are likely to spur demand from investors.

## General renewables

**Mainstream Renewable Power** could seek an IPO within two years, according to one of the company's co-founders. The company is a fast-expanding renewable energy project developer with an interest in wind and solar energy projects across the world. The company is considering a listing in Hong Kong which would be strategically important in gaining greater access to the rapidly growing Chinese market.

## Wind

**PGE Energia Odnawialna (PGE EO)**, the renewable branch of Polish power company **PGE**, has suspended its IPO on the Polish Stock Exchange. The €250m IPO was originally scheduled for October but was postponed due to "uncertain market conditions".

## Solar

Asia Pacific solar companies have featured strongly in the IPO arena this quarter.

China's stock markets have been struggling this year but the renewable energy sector has still managed to attract strong investor interest. Beijing-based solar equipment manufacturer, **Beijing Jingyuntong Technology Co Ltd** has raised CNY2.52b (€0.29b) via an IPO on the Shanghai Stock Exchange. This was almost three times its initial target of CNY900m (€103m). Jingyuntong sold 60m shares in the IPO and the money raised will be used to finance the first phase of development of a silicon industrial park in Beijing.

In southern China, **Jiangsu Akcome Solar Science & Technology Co Ltd**, a solar PV modules manufacturer, has raised CNY800m (€92m) in an IPO on the Shenzhen Stock Exchange. The company issued 50m shares at CNY16/share (€2/share) in August. The company will use the money raised to construct PV cell border and junction box manufacturing lines.

In October, the Seoul-based company **Nexolon Co Ltd** raised KRW85.5b (€0.1b) via an IPO on the Korean SE Stock Exchange after selling 21.4m shares for KRW4000/share (€2.4/share). Nexolon plans to use the proceeds to build a factory and purchase equipment to boost annual output capacity. "The IPO price was set way below the company's original target, giving price attractiveness to some investors," said Kim Dong Jun, an analyst with **Shinhan Investment Corp**.

In the US, activity was sluggish, with several IPOs on hold. The IPO market was not been helped with the news that several publically listed companies such as **First Solar** and **SunPower** missed profit forecasts as well as wider market volatility.

## Other

**Sinohydro Group Ltd** which built China's Three Gorges Dam, raised CNY13.5b (€1.6b) through an IPO. Three billion shares were sold at a price of CNY4.5-CNY4.8 (€0.5- €0.6) each. The proceeds will be used to purchase equipment and to fund clean energy projects including one in Cambodia. China's stock market is at a low but this is the first major deal in mainland China's IPO market this year since wind turbine maker **Sinovel Wind's** CNY9.5b (€1.1b) offering in the beginning of the first quarter.

This is a sample of the main global IPO transactions in the renewables sector over the past quarter.

### Sources

All information relating to IPO activity in the sector is obtained from publicly available sources.

<sup>(2)</sup> "Global IPO trends 2011", Ernst & Young, 2011

# All renewables index at November 2011

Rank <sup>1</sup>	Country	All renewables	Wind index	Onshore wind	Offshore wind	Solar index	Solar PV	Solar CSP	Biomass/ other	Geo-thermal	Infra-structure <sup>2</sup>
1 (1)	China	70	76	78	70	61	66	47	58	51	75
2 (2)	USA <sup>3</sup>	66	66	69	55	72	71	74	61	67	61
3 (3)	Germany	65	69	65	78	51	70	0	65	57	70
4 (4)	India	63	63	71	42	64	69	53	59	45	66
5 (5)	Italy	58	59	62	51	58	63	42	53	62	59
6 (5)	UK	57	64	60	78	34	48	0	57	36	65
7 (7)	France	55	58	59	55	48	55	29	57	33	55
8 (8)	Canada	53	60	65	46	32	45	0	49	35	63
9 (9)	Spain	51	50	54	39	58	56	63	46	30	47
10 (11)	Brazil	50	53	57	40	42	46	32	51	23	49
10 (10)	Sweden	50	54	54	53	30	42	0	56	35	55
12 (12)	Australia	47	47	50	37	53	52	54	42	56	45
13 (16)	Romania	46	51	55	38	33	45	0	44	41	45
13 (12)	Poland	46	52	56	41	30	42	0	42	22	47
15 (14)	Ireland	45	53	53	52	22	30	0	44	24	49
15 (19)	Japan	45	45	47	39	51	61	26	37	46	52
15 (14)	Belgium	45	51	49	57	30	42	0	38	27	50
15 (16)	South Korea	45	47	45	52	43	49	28	40	35	41
19 (16)	Portugal	44	46	50	34	45	49	35	39	25	38
19 (21)	Denmark	44	48	44	58	29	40	0	45	33	52
21 (19)	Netherlands	43	48	48	49	30	42	0	36	21	41
21 (21)	Greece	43	44	48	33	46	51	33	34	25	32
23 (26)	South Africa	42	44	47	35	42	39	47	36	33	46
23 (23)	Norway	42	48	48	46	21	29	0	45	30	51
23 (23)	Mexico	42	42	43	39	42	43	40	38	54	38
26 (23)	Finland	41	45	48	39	20	28	0	52	26	47
27 (26)	New Zealand	40	46	49	36	22	31	0	34	51	46
27 (26)	Egypt	40	41	45	32	41	39	45	35	25	34
27 (31)	Taiwan	40	43	45	38	31	44	0	35	38	42
30 (29)	Turkey	39	41	43	32	37	40	28	34	41	37
30 (29)	Morocco	39	38	42	25	48	47	52	35	21	42
32 na	Ukraine	37	37	41	27	33	46	0	43	32	41
33 (32)	Austria <sup>4</sup>	35	32	39	0	36	50	0	48	33	49
34 na	Tunisia	34	35	38	27	45	44	48	19	27	41
34 (33)	Bulgaria	34	35	39	24	31	42	0	33	34	39
34 na	Argentina	34	35	40	22	30	35	17	31	27	34
37 na	Israel	33	31	37	14	45	48	38	25	28	38
38 na	Hungary <sup>4</sup>	32	31	39	0	26	37	0	41	40	40
39 (34)	Chile	31	33	36	23	30	34	19	27	36	39
40 (35)	Czech <sup>4</sup>	30	31	38	0	26	36	0	30	23	46

Source: Ernst & Young analysis

## Notes:

1. Ranking in Issue 30 is shown in brackets.
2. Combines with each set of technology factors to produce the individual technology indices.
3. This indicates US states with renewable portfolio standard (RPS) and favorable renewable energy regimes.
4. Technology weightings have been adjusted for landlocked countries to reflect the lack of offshore potential.

China maintains its position atop the All renewables index for another quarter, scoring 70 points. There were no big news stories emerging from China this quarter, although rules were tightened for approval of new wind energy projects as China looks to manage its growth in the sector more closely. Construction of all new wind farms now need to be endorsed by the National Energy Administration (NEA) in Beijing before provincial authorities can give projects the go-ahead. China also increased subsidy levels for small hydro plants, and is looking to Iceland for expertise in geothermal technologies as it rolls out a five-year US\$10b (€7b) district heating plan.

In the US, the production tax credit (PCT) system is due to expire at the end of 2012, which is likely to cause a decline in market growth in the wind sector. Furthermore, there has been a decline in investor confidence in the solar sector following the bankruptcy of three major solar manufacturers. The national loan guarantee program expired recently, and there is uncertainty as to whether new legislation will renew it. As a result, the US drops one point to 66 in the All renewables index, placing it four points behind China and one ahead of Germany.

# All renewables index at November 2011 (cont.)

It was announced in Germany that the state-owned development bank, **KfW**, is to provide more than €100b of funding over the next five years to ease the country's transition from nuclear power to renewable energy sources (RES). In contrast to many other European countries that have reduced scores, this positive news has taken Germany up a point in the All renewables index to 65, putting it just one point behind the USA.

India's renewable energy credit (REC) market experienced a surge in activity through Q3 after a relatively cautious initial seven months. By late October, RECs were selling for double the floor price set by the Government. Furthermore, in August, the regulator extended the floor price of INR1,500 (€22) through to March 2017 to help create certainty in the market. The increase in activity is likely to be evidence of the market's concern over future energy price increases, which are estimated to increase by up to 18% next year. Such indications are fueling interest in power-saving technology, and will likely support the country's goal of 15% of green electricity by 2020. India increases one point to 63 in the All renewable index.

In the UK, there was disappointing news on two fronts from a subsidies perspective. Firstly, the provisional ROC banding proposals were released, in which the majority of technologies saw reductions in levels from 2015-16 onward. Secondly, the solar FIT has provisionally been reduced by 55% to £0.21/kWh (€0.24/kWh), for installations less than 4kW in size. This has dented investor confidence, and caused the UK to lose a point in the All renewables index, now placing it sixth below Italy. Nevertheless, there was positive news that Scottish Power plans to invest £3b (€3.5b) to upgrade its high-voltage transmission electricity network in Scotland over the next 10 years. The investment will connect up to 5GW of renewable energy to the grid.

France drops one point to 55, though remains at 7<sup>th</sup> place. New rules have been introduced such that it will take significantly longer to get wind permits in France. It could now take up to eight years to secure permits, in contrast to four-and-a-half years on average elsewhere in Europe.

Brazil increases one point and moves up a place to 10<sup>th</sup>, on the back of successful power auctions for wind and other renewable energies. There were at least four power auctions providing opportunities to reshape the country's electricity market in which it became apparent, for the first time, that the price of wind power has fallen below the price of electricity generated by natural gas.

Australia maintains its position at 12<sup>th</sup>, despite new planning rules in Victoria state giving landowners more say and restricting potential wind sites, which could result in a loss of more than US\$3.1b (€2.3) in investment.

Romania continues to make strides up the All renewable index, moving from 16<sup>th</sup> to 13<sup>th</sup> place. This is due to a new Law in respect of electricity from renewable energy sources (RES-E) which was approved by the EU after a two-year wait, increasing green certificates (GCs) for each technology, and creating one of the most favorable incentive schemes in Europe.

Denmark increases one point and moves up two places to 19<sup>th</sup>. The country is the first to set out a clear plan and timetable for ensuring that 50% of its energy needs are satisfied by renewable energies by 2020, and 100% by 2050, with a clear focus on significant offshore wind expansion.

In South Africa, the Government continues to make progress with its competitive bidding process for renewable energy capacity, which will replace the FIT scheme. There has been a large response to the tender for the first 3.7GW of RES capacity, due by 2016, with the price caps seen to be set at attractively high levels. The tender is expected to attract investment of US\$10-US\$12b (€7- €9b). South Africa increases one point and three places to 23<sup>rd</sup> in the All renewables index.

Meanwhile, there has been a severe slowdown for renewable energy in Egypt due to political turmoil and a lack of parliament. The country drops one point and a place to 27<sup>th</sup>.

Of the additional countries added to the CAI this quarter, Ukraine enters the highest at 32<sup>nd</sup>. Boasting impressive resources (in particular, with respect to wind), a range of tax exemptions, and a target of generating 19% of its energy from RES by 2030, there is significant growth potential; however, the country will need to address its complex permitting procedures and inadequate grid first. Tunisia and Israel both pose large potential for solar energy, while the wind-rich Patagonia region in southern Argentina represents a great natural resource for wind. Hungary boasts strong biomass resources compared with other European countries, and has made impressive strides in this sector having installed 378MW as at the end of 2010. However the country needs a more effective support mechanism, a stronger grid, and simpler permitting process, in order to maximize utilization of potential wind and solar resources.

# Wind indices at November 2011

Rank <sup>1</sup>	Country	Wind index	Onshore wind	Offshore wind
1 (1)	China	76	78	70
2 (2)	Germany	69	65	78
3 (3)	USA <sup>2</sup>	66	69	55
4 (4)	UK	64	60	78
5 (5)	India	63	71	42
6 (6)	Canada	60	65	46
7 (7)	Italy	59	62	51
8 (7)	France	58	59	55
9 (9)	Sweden	54	54	53
10 (14)	Brazil	53	57	40
10 (10)	Ireland	53	53	52
12 (10)	Poland	52	56	41
13 (13)	Belgium	51	49	57
13 (16)	Romania	51	55	38
15 (10)	Spain	50	54	39
16 (15)	Netherlands	48	48	49
16 (18)	Denmark	48	44	58
16 (17)	Norway	48	48	46
19 (20)	Australia	47	50	37
19 (20)	South Korea	47	45	52
21 (20)	Portugal	46	50	34
21 (18)	New Zealand	46	49	36
23 (20)	Finland	45	48	39
23 (24)	Japan	45	47	39
25 (24)	Greece	44	48	33
25 (24)	South Africa	44	47	35
27 (27)	Taiwan	43	45	38
28 (27)	Mexico	42	43	39
29 (27)	Egypt	41	45	32
29 (30)	Turkey	41	43	32
31 (31)	Morocco	38	42	25
32 na	Ukraine	37	41	27
33 na	Tunisia	35	38	27
33 (32)	Bulgaria	35	39	24
33 na	Argentina	35	40	22
36 (33)	Chile	33	36	23
37 (34)	Austria	32	39	0
38 na	Hungary	31	39	0
38 na	Israel	31	37	14
38 (35)	Czech	31	38	0

Source: Ernst & Young analysis

## Notes:

1. Ranking in Issue 30 is shown in brackets.
2. This indicates US states with RPS and favorable renewable energy regimes.

China maintains its position at the top of the wind index, boasting 44.7GW of installed capacity. Growth in the offshore industry is expected to be substantial as the technology continues to be promoted by the Government. That said, China has recently tightened its rules for approving new wind power projects, which is likely to slow growth.

The US drops one point in the wind index due to an expected decline in market growth in the lead up to the expiry of the production tax credit system at the end of 2012. However, 3.4GW has already been added during 2011, on top of the 40.2GW at the end of 2010.

Subsidy levels in the UK are due to drop for onshore and offshore wind, following provisional updated ROC bandings, though the drops were lower than many had feared. Onshore wind is due to receive 0.9 ROCs from 2014, compared with the present 1 ROC, and offshore wind is due to receive 1.9 ROCs for 2015-16, and 1.8 ROCs from 2016-17 onward, down from the 2 ROCs it currently receives.

India maintains its position at number five on the wind index. The Finance and Renewable Energy ministries plan to end a federal tax break next April, which they claim has encouraged wind projects as a way of cutting tax bills as opposed to generating power. This could result in a US\$540m (€397m) drop in demand. On the positive side, there has been a surge in REC trading activity and values.

Brazil continues to rise up the rankings, moving from 14<sup>th</sup> to 10<sup>th</sup>. This was on the back of auctions which saw wind energy become virtually cost-comparable with natural gas. This makes wind an attractive investment opportunity which, combined with extensive natural resources, should see Brazil become a major player in wind.

Romania once again makes strides up the wind index, moving to 13<sup>th</sup> from 16<sup>th</sup>, on the back of a US\$266m (€196m) loan from the European Bank for Reconstruction and Development and International Finance Corporation.

Spain drops three points on the wind index, placing it 15<sup>th</sup> from 10<sup>th</sup>, due to a draft bill which would reduce revenue for wind energy producers by 40% per year, for wind farms built from 2013. The Government would pay premiums for 12 years instead of the current 20, and premiums would be limited on an annual basis to the first 1,500 hours of operations.

Denmark has increased a point and two places to 16<sup>th</sup>, following a record US\$329m (€242m) received by **Dong Energy** from the Nordic Investment Bank. The loan will help finance construction of the planned 400MW Anholt offshore wind farm.

The Netherlands has dropped two points, and one place to 16<sup>th</sup>, as it emerged that offshore wind could be left under-subsidized following a recent tender showing the technology to be more expensive than others in the renewable sector.

Of the new additions to the CAI, Ukraine achieves the highest score in the index of 37, placing it 32<sup>nd</sup>. With an installed base of only 87MW as at end 2010, but potential of 19-24GW, and an attractive policy environment for wind, Ukraine boasts large market growth potential. Argentina also has high potential for wind energy, with excellent conditions in the wind-rich Patagonia region to the south, and increases in foreign investment over the last few years. With wind speeds of 7-10m/s in its northern regions, Tunisia has an installed capacity of 114MW and an estimate potential of around 1GW.



# Solar indices at November 2011

Rank <sup>1</sup>	Country	Solar index	Solar PV	Solar CSP
1	(1) USA <sup>2</sup>	72	71	74
2	(2) India	64	69	53
3	(3) China	61	66	47
4	(4) Spain	58	56	63
4	(5) Italy	58	63	42
6	(6) Australia	53	52	54
7	(7) Japan	51	61	26
7	(8) Germany	51	70	0
9	(10) Morocco	48	47	52
9	(8) France	48	55	29
11	(11) Greece	46	51	33
12	(12) Portugal	45	49	35
12	na Tunisia	45	44	48
12	na Israel	45	47	38
15	(13) South Korea	43	49	28
16	(16) Brazil	42	46	32
16	(13) Mexico	42	43	40
16	(17) South Africa	42	39	47
19	(15) Egypt	41	39	45
20	(19) Turkey	37	40	28
21	(17) Austria	36	50	0
22	(20) UK	34	48	0
23	na Ukraine	33	46	0
23	(23) Romania	33	45	0
25	(21) Canada	32	45	0
26	(26) Taiwan	31	44	0
26	(22) Bulgaria	31	42	0
28	(23) Sweden	30	42	0
28	na Argentina	30	35	17
28	(23) Netherlands	30	42	0
28	(26) Poland	30	42	0
28	(26) Belgium	30	42	0
28	(26) Chile	30	34	19
34	(30) Denmark	29	40	0
35	na Hungary	26	37	0
35	(31) Czech	26	36	0
37	(31) New Zealand	22	31	0
37	(33) Ireland	22	30	0
39	(34) Norway	21	29	0
40	(35) Finland	20	28	0

Source: Ernst & Young analysis

## Notes:

1. Ranking in Issue 30 is shown in brackets.
2. This indicates US states with RPS and favorable renewable energy regimes.

The US maintains its place atop the Solar Index for another quarter, despite dropping three points from 75 to 72. This drop was due to the bankruptcy of three major solar manufacturers, and the resulting decline in investor confidence. Installed capacity currently stands at just over 2.5GW.

Germany remains by far the market leader in terms of capacity, with over 17GW installed. Despite its large capacity of solar PV, Germany ranks second in the solar PV index, but seventh in the overall solar index due to its inability to support solar CSP. Spain has the second highest solar capacity, with circa 3.8GW installed.

There was positive news in India by way of revamped solar auction rules, which will increase the size and amounts of solar projects that companies can win. Furthermore, Germany's state-owned development bank KfW will lend US\$360m (€265m) to a planned 125MW solar plant in the state of Maharashtra, and the Asian Development Bank is providing a US\$100m (€74m) loan to the Indian state of Gujarat to help roll out solar.

Solar CSP received a boost in Spain, where eight European banks will project finance a thermal plant being developed by **Solar Millennium AG** in the south of the country. The banks have provided a US\$405m (€298m) loan for the 50MW Arenales project near Seville.

Romania has increased by one point in the solar index, on the back of a new RES Law giving solar six GCs at €27-€55/MWh. It is predicted that this will spur investment significantly over the coming years, following relatively minimal development to date.

Solar subsidy levels suffered two decreases in the UK. Firstly, the long-awaited ROC banding proposals were published, such that the number of ROCs large-scale solar receives is due to decrease from 2 to 1.9 in 2015-16, and to 1.8 from 2016-17 onward, if the proposals are finalized in 2012. Secondly, the solar FIT is provisionally to be reduced by 55% from April 2012 to £0.21/kWh (€0.24/kWh), for installations less than 4kW. These two drops in subsidy levels have caused the UK to drop a point and two places to 22<sup>nd</sup> in the index.

Of the five new countries added to the CAI, Tunisia enters the highest at joint 12<sup>th</sup> alongside Portugal. Tunisia boasts excellent resources for both solar PV and CSP, as well as good grant and soft loan availability (over US\$2b (€1b) has been made available) and a favorable tax climate. That said, the solar industry in Tunisia has yet to capitalize on these conditions and there is only 0.6MW of installed capacity. Israel also enters the index at joint 12<sup>th</sup>, boasting good natural resources and favorable subsidies, with FITs of around €0.20/kWh available. Current installed capacity stands at 61MW. Ukraine has a favourable tax climate, FIT of over €0.40/kWh, and 7MW of installed capacity, placing it 23<sup>rd</sup> in the index.



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# Country focus – China



## Threats from US over solar subsidies

Ranking	Issue 31	Issue 30
All renewables index	1	1
Wind index	1	1
Solar index	3	3

Source: Ernst & Young analysis

## General

While there are signs that the rapid pace of China's broad economic growth appears to be slowing to a more sustainable level, there is no doubt that the country remains committed to the ongoing development of its renewable energy sector. Despite this, Q3 has been a relatively quiet period in terms of policy announcements or significant news items relating to the country's renewables market. Rather, the quarter has been dominated by the accusations of US politicians and solar panel manufacturers that China's solar subsidies represent a violation of global trade rules.

## Solar

The collapse in August/September of a number of high-profile US solar manufacturers has renewed demands from US lawmakers and union leaders that the Obama Administration pursue unfair trade complaints against China for its policy of awarding "anti-competitive" subsidies to support the growth of its solar sector.

According to the US Energy Department, China provided around US\$30b (€22b) in credit to its biggest solar manufacturers last year, about 20 times the US effort. A new report by S&P acknowledges that Chinese solar companies have been able to use cheap debt, often interest-free, to achieve economies of scale, offer extended credit terms and to gain market share. This has resulted in significant oversupply in the global market, an estimated 30GW in 2011 compared with expected demand of 15-20GW, which has in turn pushed down the price of solar power at an astonishing rate.

Just days after the bankruptcy of **Solyndra**, Oregon Senator, Ron Wyden sent a letter to President Obama accusing China of "dumping" solar panels on the US market. In the first seven months of this year, China shipped US\$1.4b (€1.0b) of solar panels to the US, according to US International Trade Commission data. Wyden is calling for the Department of Commerce to launch an investigation on whether to impose a trade tariff on Chinese modules, and pursue a case against China at the World Trade Organization (WTO).

No formal action has yet been taken by the Obama Administration, and the outcome is by no means a foregone conclusion. The Solar Energy Industries Association, a US trade group, has attributed Solyndra's bankruptcy to the harsh realities of a maturing industry in a competitive marketplace. The less than conventional cylindrical PV panel produced by the failed manufacturer has also been blamed for its downfall. Inevitably, fierce competition from Chinese manufacturers has played a role in driving down costs and therefore putting pressure on competing companies around the world. The question is now, therefore, whether China has in fact provided its domestic companies with an unfair advantage resulting in

the unjust downfall of US manufacturers, or whether US policy-makers and industry players are conveniently ignoring other technologies and market-based factors. China should wait and see what challenge it will actually face.

It was not all bad news for China's solar sector in Q3. In a bid to stimulate its domestic manufacturing market during the current global slowdown in demand, the country is turning its attention to Africa, its fifth-biggest export market for PV products, as a area of future growth. China hopes to take advantage of the regions' growing focus on alternative energy to help overcome power shortages, which in turn could open new markets for the solar-power products. China has already confirmed it will start construction of six solar projects in Africa this year.

## Wind

China undoubtedly remains the global leader in respect of wind power. However, in a bid to prevent growth in the sector becoming unmanageable, particularly with reference to a struggling grid infrastructure, the country has tightened its wind power approvals process. In order to qualify for government subsidies for power tariffs from the Renewable Energy Development Fund, the construction of all new wind farms will need to be endorsed by the NEA in Beijing. Such endorsement will then allow provincial governments to approve projects, and also make them eligible for connection to the local grid.

The change comes in response to the build up of excess capacity under previous rules, whereby provincial governments had the right to approve wind farms up to 50MW. The inadequate grid infrastructure has been unable to deal with the flood of requests for new connections and resulted in a large proportion of China's impressive wind portfolio not actually generating power. It is hoped that the new rules will allow wind installations and grid connection requests to be monitored more centrally, enabling more sustainable growth in the sector.

As a result, there is set to be a slowdown in wind turbine installations of up to 20% over the coming year, causing turbine manufactures to exit the domestic market, or look more toward export markets. One such company that is already planning on leaving the domestic market is Germany's REpower, which is looking to sell its majority stake in a turbine factory in Inner Mongolia.

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# Country focus – US



## End of loan guarantee exacerbated by solar sector woes

Ranking	Issue 31	Issue 30
All renewables index	2	2
Wind index	3	2
Solar index	1	1

Source: Ernst & Young analysis

### Solar bankruptcies

The US solar sector, and arguably the country's wider renewable energy market, has been dominated this quarter by news of bankruptcies, corruption theories and accusations of international trade Law violations. Q3 saw Evergreen Solar, SpectraWatt and Solyndra all declare bankruptcy, each citing Chinese competition as a major factor.

The failure of **Solyndra** has attracted the most attention - in 2009, it was awarded a federal loan guarantee worth US\$535m (€393m) to build up its manufacturing capacity, and its Fremont plant even received a visit from President Obama in May last year. Following its bankruptcy filing in September, it was subsequently raided by the Federal Bureau of Investigation (FBI) as part of an investigation as to whether the company misled the Government about its finances. The Obama Administration has also been criticized for failing to vet the company closely enough.

These events have led to broader questions being raised about the Government's clean energy support policy and the fairness of competition from Chinese module makers. The investigation could represent a lethal blow to the image of US renewables and to support for public investment in the sector.

Chinese subsidies have been blamed for the troubles of US solar companies, causing Democrat Senator Ron Wyden to call on President Obama to consider imposing "anti-dumping" duties on Chinese solar equipment and filing a complaint against China at the WTO. Wyden claims that solar panel imports from China are set to triple in the current year, from 2010 levels. The jury is still out on whether the Obama Administration will take any action but regardless of the outcome, the question remains whether US technological excellence can keep it in the race against China's advantages of low price and economies of scale.

### Section 1705 Loan Guarantee program

The bankruptcy of **Solyndra** has arguably had a more far-reaching effect than simply launching FBI investigations and raising potential WTO claims against China. Given **Solyndra** was the recipient of a US\$535m (€393m) loan guarantee, the Department of Energy's (DoE) Section 1705 Loan Guarantee is now under intense scrutiny. The negative attention has impelled the Department of Energy (DOE) to increase the program's documentation requirements and in some cases, these additional requirements, retroactively applied to previously approved programs, are derailing projects. Coincidentally, Q3 also witnessed the scheduled closing of the loan guarantee program; however, the additional scrutiny and scandal accusations have increased concerns that the program will not be renewed as part of upcoming legislation.

Notwithstanding, the loan guarantee program was successfully applied to a number of projects, with nearly US\$5b (€4b) in

guarantees finalized on the last day of the program. More noteworthy projects include **Abengoa's** Mojave Solar 250MW CSP installation (US\$1.2b (€0.9b) guarantee), and **SunPower Corp's** 250MW California Valley Solar Ranch PV project (US\$1.2b (€0.9b) guarantee).

### Record investment in Q3

Indeed, according to Bloomberg New Energy Finance (BNEF), taking financial new investment as a whole, the US was the dominant country worldwide in Q3, accounting for US\$16.9b (€12.4b), up 37% on Q2 and 156% on Q3 of 2010. This is compared with US\$13b (€10b) in China over Q3.

However, this strong performance is likely to be a result of investor concerns that Congress will allow key US support programs for clean energy to expire at the end of this year without renewal. As well as the Government moving to complete loan guarantee work ahead of the expiry of the program at the end of September, developers and investors have been rushing to finance their projects to make sure construction begins before the Treasury grant scheme for wind and solar ends in December this year.

### Expiration of the 1603 Program

By 31 December 2011, all projects that hope to be eligible for the 1603 grant in lieu of the Investment Tax Credit (ITC) must demonstrate construction commencement through (i) physical work of a significant nature or (ii) the safe harbor test of whether more than 5% of the total actual costs of specified energy property have been paid or incurred. Actual applications must be filed with the Treasury no later than 1 October 2012.

Following the expiration of the program, project developers will once again have to utilize traditional tax credit monetization structures. However, the anticipated return to reliance on tax credits is expected to force developers to consider only projects of significant size to absorb the often prohibitive transaction costs associated with tax credit monetization.

With no certainty in the short term on whether the program will be renewed, the US is likely to witness a shrinking project pipeline. This will be particularly noticeable in the wind sector, which will now be looking to make decisions on whether or not to develop projects which will become operational post 2012, when the PCT is due to expire.

### Solar project approvals

In other solar news, companies seeking to build large-scale solar projects on federal lands that fall outside the "fast-track" zones designated by the Interior Department's Bureau of Land Management across a number of southwest states, may have to wait twice as long to get projects approved. Developers are increasingly concerned, following the announcement that the agency plans to reduce the size of, or eliminate entirely, some of the 24 zones identified in earlier environment impact assessments. If site availability becomes squeezed, developers may well find themselves hindered by a prolonged approvals process for sites outside these zones.

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# Country focus – India

## REC market experiences surge in activity through Q3

Ranking	Issue 31	Issue 30
All renewables index	4	4
Wind index	5	5
Solar index	2	2

Source: Ernst & Young analysis

### General

India's REC market has experienced a surge in activity through Q3 after a relatively cautious initial seven months. By late October, RECs were selling for double the floor price set by the Government. Excluding solar, RECs sold for INR2,700-INR3,000 (€40-€44)/MWh across the two exchanges. The upper and lower prices were due to expire next year; however, in August, the regulator extended the floor price of INR1,500 (€22) through to March 2017 to help create certainty in the market. The ceiling price was lowered from INR3,900 (€58) to INR3,300 (€49). Solar power credits are traded separately and have a floor price set six times higher to account for higher capital costs. The August announcement lowered the floor price to INR9,300 (€138) and the ceiling to INR13,400 (€198).

The increased activity is likely to be evidence of the market's concern over future energy price increases, which are estimated to increase by up to 18% next year. Such indications are fueling interest in power-saving technology, and will likely support the country's goal of 15% of green electricity by 2020.

### Access to finance

According to BNEF, investment in Indian clean-energy projects reached a record US\$7.2b (€5.3b) in the first three quarters, exceeding the total annual investment of US\$5.7b (€4.2b) in 2010. The solar sector has been key to this growth, generating a fourfold increase in investment to US\$2.4b (€1.8b) in the first nine months as a result of federal and state-level policies.

The results are particularly impressive given that rupee borrowing costs are among the highest in Asia - in October, the Reserve Bank of India raised the repo rate for the 13<sup>th</sup> time since the start of 2010, to 8.5%.

Q3 also saw the announcement that **KfW Entwicklungsbank**, the German state development bank, has agreed to provide a €250m loan to help fund one of the world's largest solar PV plants, a 125MW (expandable to 150MW) facility in the state of Maharashtra. Total financing for the project is €370m, with the remaining amount to be funded by the state.

There was further good news as the US Export-Import Bank announced that it expects India to become its biggest recipient of funding for clean energy projects in the next year. This includes some US\$575m (€423m) of funding for solar projects, of which around US\$75m (€55m) is already approved, the remaining representing deals in the pipeline. The Export-Import Bank has already approved US\$1.4b (€1.0b) in new deals during this financial year, raising its overall lending to India to US\$5.5b (€4.0b).

### Solar

Solar developers were invited to register for the second National Solar Mission auction in August, which will award licenses to build as much as 350MW of PV plants by 2013. However, the auction guidelines have been slightly revamped

with respect to the size and amount of projects companies can win. The Government increased the maximum size of each project from 5MW to 20MW, and will allow a successful bidder to win as much as 50MW of the total capacity. Projects will also be allowed seven months to achieve financial close compared with the previous six. It is hoped these changes will attract larger companies that may have previously been dissuaded from participating based on insufficient profitability from smaller projects. The deadline for submission of a Request for Selection (RfS) was 3 October for batch two, with shortlisted candidates being announced on 8 November. Solar PV projects under batch one - the first auction - are likely to be commissioned by end of 2011, while CSP projects are expected to come online during 2013.

In addition to the Solar Mission, which operates at a central level, various states have been independently taking steps to promote solar power. For example, in September, Rajasthan state issued draft bidding documents to develop 250MW of solar capacity, representing part of Phase 1 of the state's new solar target of 10-12GW of new capacity over the next 10 years. Meanwhile, the state of Tamil Nadu has announced plans to create 10 solar parks each with a capacity of 300MW, at a total cost of around INR450b (€7b).

### Wind

The Ministry of New and Renewable Energy has removed a 2002 rule which only permits wind installations at sites with a minimum wind power density of 200W/m<sup>2</sup> at a hub height of 50 meters. While this change is expected to provide a general boost to the wind sector, it is unlikely to alter its growth potential significantly since it will mainly benefit small-scale rather than larger utility-scale projects.

It was also announced in Q3 that the Government wants to axe an accounting rule that provides a federal tax break for wind farms in the country, which it claims has encouraged investment in wind power as a way of cutting taxes rather than diversifying the energy mix. The Government plans to discontinue the benefit next April and introduce a new tax code; however, the announcement is likely to prompt a rush to build projects in the current financial year, which could temporarily impact activity in 2011, even if the tax break is continued.

The largest private equity investment in the Indian wind sector was also seen this quarter, with Goldman Sachs agreeing to acquire a majority stake in **ReNew Wind Power**, an Indian renewable energy producer, for INR10b (€148m). **ReNew** plans to expand its capacity by 200MW to 300MW annually, and will use Goldman's investment to acquire new projects.

### Biomass

In order to boost biomass-based power generation in the country, the Government is preparing a national bioenergy program which will be launched in the 12th Five-Year Plan (2012-17). The Government has allocated INR34b (€1b) for the biomass mission and it is hoped the national initiative will replicate some of the success of the National Solar Mission.

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# Country focus – UK

## ROC banding levels proposed and sharp solar FIT drop

Ranking	Issue 31	Issue 30
All renewables index	6	5 <sup>1</sup>
Wind index	4	4
Solar index	22	20

Source: Ernst & Young analysis

<sup>1</sup>Joint

### Policy

On 20 October, the Department of Energy and Climate Change (DECC) published its consultation document setting out the proposed support levels for large-scale renewable electricity from 2013-17 (2014-17 for offshore wind) under the renewables obligation (RO). The proposals were initially scheduled for release as early as July and the delay, along with the postponed launch of the renewable heat incentive (RHI), has undoubtedly fueled a mood of uncertainty across the UK renewables industry, with investors finding it difficult to commit to project plans without guaranteed support levels. It is possible this sentiment could continue through to 2014, when the Electricity Market Reform is expected to replace the RO with a contract-for-difference FIT.

However, despite mixed reactions to the ROC banding proposals, there is a general sense of relief that some clarity has been provided by the Government. Ernst & Young Director, Arnaud Bouille notes that, "The gradual step down in support can be debated; it does; however, confirm the UK Government's mid-term commitment to renewables and sends a signal to the sector as a whole: the industry needs to become more competitive and costs need to come down." According to the Government, the revised incentives will cut the cost of the subsidy program by up to £1.3b (€1.5b), and boost the deployment required to ensure the UK meets its EU 2020 target.

### Onshore wind

Onshore wind projects will receive 0.9 ROCs/MWh from April 2014 onward, down from 1 ROC currently. While there is some disappointment across the sector, this should still provide a suitable regime to ensure the development of windy sites across the UK. It is likely the reduction will mainly impact smaller projects and community schemes as opposed to large-scale infrastructure projects.

However, progress is still required in respect of the planning regime and grid access in order to unlock the country's onshore wind potential. A recent report has revealed that planning approval rates for new wind farms have sunk to an all-time low of just 42%. Onshore wind developers are therefore being urged to deepen their engagement with local communities and ensure projects are economically viable before applying for consent.

### Offshore wind

Offshore wind appears to have emerged as the winner of the latest banding proposals, which extends current levels of state subsidies by one year to 2015 and reduces previously set cuts for subsequent years. For the tax year 2014-15, offshore wind generators will continue to receive 2 ROCs/MWh, reducing to 1.9 the following year, and 1.8 thereafter. Previously, the current 2-ROC allocation was expected to expire in April 2014, decreasing to 1.5 ROCs thereafter.

The 2-ROC regime should provide the continued stimulus required to support investments for these large-scale infrastructure projects. With an additional 10GW+ of offshore wind capacity required to be commissioned over the next decade to meet the UK's 2020 targets, Ernst & Young estimate an investment opportunity worth some £30b (€34b) for large infrastructure funds and other institutional investors seeking to achieve long-term returns.

### Biomass

There has been a mixed response to the proposed revisions for biomass. Overall, the bands for different forms of biomass burning were largely unchanged, although a new category under consideration - enhanced biomass co-firing - would essentially double support to 1 ROC from 0.5. This positive outcome resulted in a record intraday trading gain for **Drax Group Plc**, owner of Europe's largest coal-fired power plant, which will benefit from these higher subsidies.

However, failure to improve support for dedicated biomass, which will be held at 1.5 ROCs until 31 March 2016 before decreasing to 1.4 thereafter, has resulted in disappointment for many across the biomass sector. Several projects have been on hold because the current rates of subsidies make it uneconomic to continue. This includes Drax, which recently had two 299MW projects approved by the Energy Minister but was candid in stating that these would only be built if subsidies for dedicated biomass were increased. It is likely, therefore, that tensions will begin to arise between the competing uses of dedicated biomass and co-firing.

### Solar

Under the ROC banding review, solar power will continue to receive 2 ROCs/MWh until 2015, when it will be cut to 1.9 for a year, and 1.8 thereafter. However, recent policy activity has also seen the launch by DECC of a consultation on UK solar FIT tariffs. The consultation proposes a reduction in tariffs of up to 55.5%, depending upon installation size. Installations up to 4kW will reduce to £0.21/kWh (€0.24/kWh) from £0.43/kWh (€0.49/kWh). It is also proposing reductions to the tariffs for solar PV installations 4-250kW in size, some of which already saw cuts in August this year.

The proposed start date for the new FIT for solar PV is 1 April 2012 for all new solar PV installations that become eligible on or after 12 December 2011. The consultation also required public feedback on two new concepts; multi-installation tariff rates for aggregated solar PV schemes and the introduction of energy efficient requirements.

### Wave and tidal

Wave and tidal have been recognized as emerging technologies by the Government and have been awarded 5 ROCs/MWh compared with the current 2, for the first 30MW of capacity of any tidal stream or wave power project. Additional capacity will receive 2 ROCs. The Government has estimated the UK could install as much as 300MW of wave and tidal power capacity, up from 4MW of prototype projects currently.

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# Country focus – Spain



## Upsurge in M&A activity prior to subsidy cuts for wind

Ranking	Issue 31	Issue 30
All renewables index	9	9
Wind index	15	10 <sup>1</sup>
Solar index	4 <sup>1</sup>	4

Source: Ernst & Young analysis

<sup>1</sup>Joint

### Policy

Following the expiry of its 2005-10 renewable energy plan, Spain is now looking to map out its strategy for the next decade to meet its binding EU 2020 emissions target. Early in the quarter, Spain approved more modest targets in its final draft of the 2011-20 renewable energy plan, in a bid to control subsidy costs, while still encouraging growth.

Compared with the June 2010 draft, which set out a target of 22.7% of total energy from RES, the country now aims to generate 20.8% from RES by 2020. This is equivalent to an installed capacity of 50GW, down from 53.2GW in previous drafts but is still almost double the 26GW installed at the end of last year. The table below sets out the revised capacity targets across the various renewable technologies. The most significant change occurs for PV, which had a 2020 target of 13.5GW in previous drafts.

Sector (MW)	2010	2015(E)	2020(E)
Onshore wind	20,744	27,847	35,000
Offshore wind	-	22	750
Solar PV	3,787	5,416	7,250
Solar CSP	632	3,001	4,800
Biomass	533	1,162	1,950
<b>Total</b>	<b>25,696</b>	<b>37,448</b>	<b>49,750</b>

Source: *Plan de Energías Renovables 2011-2020*, July 2011

The figures show that Spain's revised targets remain ambitious and do not appear to signal a lack of commitment by the Government. However, the success of this plan will rest largely on the backing it receives from the party that wins the forthcoming national general elections on 20 November 2011.

### Wind

Just as the solar sector is beginning to come to terms with the major revisions to its incentive scheme over the past year, it appears that the wind sector must now also share the burden of helping the country reduce its subsidy bill for green energy. Spain's landmark renewable energy Law, 661/2007, only governs wind power prices for new projects through to the end of next year, therefore a draft decree sent to the national energy commission in September sets out the proposed regulations post 2012. However, lobbyists are arguing the 2020 target will not be achieved if the bill is passed.

The draft bill, which sets out the rules for wind farms from 2013 onward, proposes a system of variable premiums which will diminish for capacity installed each year in excess of the annual target of 1.4GW (required to reach the 2020 target of 35GW). For the first 1.4GW, all producers will receive a €20/MWh premium over market prices; however, the guaranteed floor price will decrease from the current €77/MWh to €55/MWh, and will be reviewed annually.

The decree also limits subsidies for wind projects to 12 years compared with the current and developers will only receive premium payments during the first 1,500 operating hours each year. Finally, premiums will not be revised in line with inflation.

The Spanish wind energy association (AEE) has warned that these measures will introduce a level of volatility into support levels that could make financing projects impossible. It claims that the proposed measures will essentially result in a 40% reduction in support for wind farms installed after 2012. Wind sector developers and investors in Spain, and across Europe, will be waiting nervously over the coming months to see whether the draft decree will be passed and its likely impact on the country's project pipeline.

### CSP

While Spain's solar PV sector continues to face falling profits and legal wrangling, the country's CSP sector continues to prosper as the world's number one market. At the end of July, installed capacity totaled 852MW, almost double that of the US, the second biggest CSP market. Spain currently has 21 plants online, 27 under construction, and 13 fully licensed facilities, the result of which will be an estimated installed capacity of around 2.5GW by the end of 2013.

In order to finance these new CSP projects, companies have opted to establish JVs, particularly with Japanese partners such as **Mitsubishi**, **Mitsui**, **Itochu** and **JGC Corporation**. Project financing has also becoming an increasingly viable option for CSP projects. For example, eight European banks have provided €288m for Solar Millennium AG's 50MW Arenales project near Seville, along with a €10m letter of credit and a €21m value added tax (VAT) facility.

### M&A activity

Prior to the recently proposed wind subsidy cuts, 2011 had witnessed a surge in M&A activity, notably the sale of **ACS's** renewable energy assets to the following three buyers:

**Bridgepoint** acquired 11 wind farms with a total capacity of 443MW for a consideration of €596.5m.

**Canepa Asset Management** purchased nine wind farms with a total combined raw installed capacity of 215MW for €223.4m including debt.

**Gas Natural Fenosa Group** acquired five wind farms totaling 95.5MW, in which it already held a shareholding, for a value of €72.4m.

And the distressed solar PV market has also given rise to an upswing in M&A activity. This has resulted in one of the largest investments in an operational portfolio to date: **Munich-Re** and **KKR's** acquisition of a 49% stake in a diversified portfolio of solar parks and operational assets from **T-Solar Global SA** for a consideration of approximately €140m.

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# Country focus – Brazil

## Auctions bring price of wind power below natural gas

Ranking	Issue 31	Issue 30
All renewables index	10 <sup>1</sup>	11
Wind index	10 <sup>1</sup>	14
Solar index	16 <sup>1</sup>	16

Source: Ernst & Young analysis

<sup>1</sup>Joint

### Wind

The third quarter of 2011 has proved to be an exciting time for Brazil's wind energy developers, with no less than four power auctions providing opportunities to reshape the country's electricity market. While other RES technologies, and natural gas, have also featured across the auctions, wind power has attracted the most attention when it became apparent that, for the first time, the price of wind power has fallen below the price of electricity generated by natural gas.

The wind sector managed to secure power purchase agreements (PPAs) for 78 wind projects totaling 1,929MW across the "A-3" auction conducted on 17 August and the reserve energy auction which took place the following day, the goal of which is to increase security of energy supplies and to avoid electricity shortages. The projects contracted under this twin auction are required to start operating in 2014. Wind projects therefore secured around half the total capacity available across the two auctions, at an average price of BRL99.56/MWh (€40.01/MWh,) even lower than the price of electricity generated from natural gas at around BRL103/MWh (€41/MWh).

Less than 10 days later, Brazil's Ministry of Mines and Energy scheduled a new auction for 20 December, with a bid deadline of 20 September. The "A-5" auction will award 20-year contracts for wind, biomass and natural gas plants, and 30-year contracts for hydroelectric plants. Contracts awarded under this auction will expect power plants to be operational by January 2016. The A-5 auction has attracted registration from 377 projects totaling 24.3GW of installed capacity, of which 79% relate to wind projects with a total capacity of 7.5GW. EPE, the state-run energy research company, will now analyze the documentation submitted by the bids and announce which projects passed the technical qualification stage.

There was even more good news for wind power developers who may have missed out on contract awards this year, with the announcement of yet another auction, to be held on 22 March next year. The 2012 A-3 auction requires registration by 21 November and will attract projects which can become operational by January 2014.

The 2011 auctions have proved that wind and natural gas plants can compete directly in the market, and even that wind power can be cheaper. Market analysts have suggested a number of reasons for this surprising result, including the recent arrival of Chinese wind equipment suppliers in the Brazilian market, which may prompt domestic suppliers to cut prices to remain competitive. The lower cost may also be a response to an increasing number of wind turbine manufacturers in Brazil. Further, the economic slowdown has arguably caused paralysis for many European projects, which may have driven investors to seek out other potential growth

markets, such as Brazil.

According to Agência Nacional de Energia Elétrica (ANNEE, the Brazilian regulatory agency for the electric energy market), Brazilian wind power capacity is on track to grow by 600% by 2014 to more than 7GW, compared with around 1GW at the end of 2010.

### Challenges

It cannot be disputed that the auction mechanism in Brazil has created additional competition across the energy sector, resulting in a strong portfolio of RES projects, with a particular emphasis on wind power. However, Abeolica (the Brazilian Association of Wind Power) has warned that lower return margins may mean that projects remain vulnerable to complications that could arise during construction.

More generally, it is felt that Brazil's future electricity planning needs to reflect the positive outcome of the auctions to ensure long-term investor confidence. According to Abeolica, improvements in the environmental licensing process and solutions to problems with logistics and ports remain the main barriers to continued growth of Brazil's wind sector. Investors and industry participants will therefore be watching closely over the coming months to assess whether the Government intends to introduce the long-term specific policy framework required to sustain investment in the sector.

### Biomass

While biomass projects have featured in the various auctions throughout Q3, only 11 projects totaling 554MW of capacity were awarded contracts in the August auctions, and the A-5 auction generated interest from only two biomass projects totaling 160MW. The unexpectedly large drop in wind energy prices over the past few years means biomass now faces fierce competition from wind energy as well as from large hydropower and natural gas. It is unclear how well the sector will fare in the medium to long term should it remain more costly.

### Small hydro

Small hydro developers were not successful in securing PPAs for any of the plants participating in the August A-3 auction, indicating such projects were unable to compete with the low prices that appeared to dominate the auction. The sector will be keen to see whether any of the 19 small hydro projects totaling 303MW will be more successful in the A-5 auction when the results become clear on 20 December.

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# Country focus – Romania



## Positive revisions to incentive scheme finally approved

Ranking	Issue 31	Issue 30
All renewables index	13 <sup>1</sup>	16 <sup>1</sup>
Wind index	13 <sup>1</sup>	16
Solar index	23 <sup>1</sup>	23 <sup>1</sup>

Source: Ernst & Young analysis

<sup>1</sup>Joint

## Policy

It has been a year since Romania was added to the CAI (Issue 27), when we reported on the country's revised renewable energy Law which, if implemented, would significantly boost the country's RES-E by offering differentiated, and potentially lucrative, GC packages across all renewable technologies. In short, it represented one of the most attractive renewable energy schemes; however, application of the Law has been stalled since 2008. This legislative delay has resulted in uncertainty of returns for investors already implementing projects and has potentially discouraged new investors from entering the market.

A year on, we are able to report that the Law, and its attractive GC scheme, is close to being fully implemented. On 13 July this year, the European Commission (EC) finalized its review process and went on to approve Law 220/2008, subject to a number of revisions which are set out below.

The EC's approval was followed by the ratification of a Government Ordinance on 19 October 2011, which incorporated the EC's revisions and finalized the new RES-E Law. The final stage is the issue of the "secondary legislation" which, according to the Vice President of the country's energy regulator, Agency for Natural Resources and Energy (ANRE), has already been prepared and will shortly be signed and enforced by the regulator. There are therefore signs that the Law will be completely finalized and applicable shortly.

The following are some of the key revisions to Law 220/2008 following the EC's review:

- ▶ A reduction in the number of GCs awarded to biomass and geothermal projects from three to two GCs, except where energy results from crops especially cultivated for biomass
- ▶ Capacities <1MW will benefit from a FIT as opposed to a GC scheme, details of which are to be determined a maximum of 120 days post validation of the Law
- ▶ "Guaranteed access" replaces "Priority dispatch" for the majority of projects, where the generator of capacities exceeding 1MW will be able to deliver the electricity to the grid, provided the stability of the grid is not put at risk. Priority dispatch will be available to generators up to 1MW, that are unlikely to endanger the stability of the grid
- ▶ The GC price range shall be indexed annually by ANRE in accordance with the annual average inflation index calculated for the Eurozone for the preceding year, as officially quoted by Eurostat
- ▶ Introduction of the overcompensation concept - if the internal rate of return (IRR) of a RES technology exceeds the IRR published by ANRE for that specific technology by more than 10%, the number of GCs may be reduced

- ▶ Power plants generating over 125MW must individually notify the EC in order to be accredited by ANRE as RES-E producers entitled to GCs
- ▶ All projects will receive 1GC for the new mandatory testing period (usually between one to three months)
- ▶ GCs issued by TSO Transelectrica will have a 16-month validity period

The table below re-confirms the GCs that will be awarded for each technology per MWh and the minimum and maximum value based on the GC price range of €27-€55/GC. The support mechanism applies to generators that have been qualified by ANRE and have commissioned their generation capacities by the end of 2016.

Sector	No. of GCs	Min value	Max value
Wind	2	€54	€110
Solar PV	6	€162	€330
Biomass	2	€54	€110
Geothermal	2	€54	€110
Small hydro	3*	€81	€165

Source: Modified Law 220/2008

\* Refurbished small hydro plants will receive only two GCs

As a general rule, GCs will be available for 15 years for generation capacities using new equipment. Under the new rules, wind farms will receive two GCs per MWh until 2017, reducing to one GC thereafter. In 2011, the penalty that a supplier has to pay to Transelectrica for each non-acquired GC is €112.3.

## Wind

While it is hoped the application of the new GC scheme will spur investment across all RES-E technologies, wind is expected to provide the most significant growth. From only 12MW at the end of 2009, the country boasted an installed capacity of 464MW at the end of 2010, increasing a further 34% to 623MW at the end of September this year.

Czech utility, **CEZ**, has completed 338MW of its Fântânele-Cogealac project which, at 600MW, will be the largest onshore wind farm in Europe once complete at the end of 2012. In March, **Iberdrola** started work on its 1,500MW project, which could form the largest onshore wind power installation in the world when complete in 2017. The first 80MW phase is expected to be operational by the end of 2011.

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# Country focus – South Korea



## ETS receives mixed response but offshore still on track

Ranking	Issue 31	Issue 30
All renewables index	15 <sup>1</sup>	16 <sup>1</sup>
Wind index	19 <sup>1</sup>	20 <sup>1</sup>
Solar index	14 <sup>1</sup>	13 <sup>1</sup>

Source: Ernst & Young analysis

<sup>1</sup>Joint

### Policy

In a bid to reduce carbon emissions and boost investment in renewable energy, the South Korean Government expects, by December, to pass its proposed emission trading scheme (ETS) bill, which it claims has the backing of both the ruling and opposition parties. South Korea has pledged a 30% reduction in emissions from expected levels by 2020 and, if the legislation is passed, will become the third Asia Pacific country to tax polluters after Australia and New Zealand.

Thus far, incentives have primarily been offered through tax breaks and a FIT scheme, though the latter is due to be replaced by an RPS in March 2012. The RPS will require power producers with capacity greater than 500MW to generate 2% of total power from RES in 2012, increasing to 10% by 2022.

The ETS legislation has inevitably been opposed by manufacturers, who say it will increase costs and make exports less competitive globally. Data from state-owned Korea Energy Management Corp. indicates companies could face an additional KRW5.6t (€3.6b) of costs as a result of ETS legislation. After intense industry lobbying earlier this year, South Korea has delayed implementation of the mandatory ETS by two years to 1 January 2015, increased free carbon allowances and softened penalties for non-compliance, resulting in a slightly watered-down bill.

Separate from the ETS, South Korea is also introducing what it calls a greenhouse gas and energy target management system (TMS) next year, under which firms will be given emission reduction targets. However, in a bid to ease the burden, the Ministry of Knowledge Economy also announced in May a “domestic offset mechanism” allowing large firms to fund the deployment of clean technologies in smaller companies and use the resulting credits to meet their goals in the TMS. It is hoped this mechanism will make it cheaper for big emitters to reach their domestic targets.

### Offshore wind

2011 has continued to be an exciting year for South Korea’s offshore wind sector, as it edges ever closer to its ambitious goal of becoming the world’s third-largest offshore wind power generator. In May, the Government announced that the Young-Kwang area, located off the southwest coast of the Korean peninsula, has been selected as the offshore wind turbine test bed through which it will test and monitor offshore wind turbine performance.

Meanwhile, in August, Dutch wind turbine developer, **STX Windpower** commissioned its flagship 2MW direct-drive wind turbine at a demonstration offshore wind park around 1km off Jeju island, the first to become operational in the country.

Jeju Island, the largest island of the country, is regarded to be one of the optimal places to install off-shore wind turbines. In early September, **Doosan Heavy Industries and Construction Co.** and **Posco ICT** signed a memorandum of understanding to build a 60MW offshore wind farm off the island’s coast at a cost of KRW250b (€0.2b). The project is scheduled to be completed by June 2014.

The jewel in the country’s offshore crown; however, remains the 2.5GW wind farm project, due to be constructed off the southwest coast and comprising 500 5MW turbines. The Government expects this public-private partnership (PPP) project to attract investments from both sectors totaling US\$8.2b (€6.0b). Based on the current schedule, around 100MW of capacity is to become operational by 2013, a further 900MW by 2016 and the final 1.5GW by 2019.

Tenders for the manufacture and installation of turbines are expected next year, and it is hoped that this will help domestic shipbuilders challenge **Siemens AG** and **Vestas Wind Systems A/S** in the global turbine market. Korean shipyards, including the world’s three largest, **Hyundai Heavy Industries Co.**, **Daewoo Shipbuilding & Marine Engineering Co.** and **Samsung Heavy Industries Co.**, are looking to their experience of building oil sector infrastructure, including the laying of underwater pipes and cables, to prove that they can compete effectively in the offshore market, not only producing the turbines but also installing them at sea.

Indeed, there are already signs that South Korea’s shipbuilders are venturing deeper into the wind market – according to data from the Korean Intellectual Property Office, patent applications for wind power systems surged from 71 in 2002 to 669 in 2010, indicating an average annual growth of 104%. Hyundai, for example, is reportedly developing a 5.5MW turbine and will showcase the prototype of the turbine before the year-end.

### Wave and tidal

After seven years under construction, South Korea’s first tidal-power plant began full operations in August at the artificial sea-water Lake Shihwa. With a total power output capacity of 254MW, it is now the world’s largest tidal power installation, surpassing the 240MW Usine de la Rance tidal power plant in France, after 45 years.

The southern and western coasts of South Korea are well known for high tides and strong tidal currents. Long-term feasibility studies have been completed on even larger tidal power plants at two other sites – Garolim, with a planned 480MW capacity and Incheon Bay with a proposed 1GW capacity.

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# Introductory country focus – Ukraine

## Strong resource supported by attractive tariffs

Ranking	Issue 31	Issue 30
All renewables index	32	n/a
Wind index	32	n/a
Solar index	23 <sup>1</sup>	n/a

Source: Ernst & Young analysis

<sup>1</sup>Joint

## Policy

Ukraine is an emerging market economy at the cross-roads of Eastern Europe, Russia, Central Asia and the Middle East, and as such holds great potential as a new market for trade and investment. However, an uncertain economy and continued political instability have caused potential investors to hesitate, and inefficiencies in the energy system have resulted from aging power plants and corroding powerlines.

There are strong signs; however, that the country is fully committed to meeting its goal of generating 19% of energy from RES by 2030 as set out in the Government's 2006 strategy. Further, in mid 2010, a new deal with the International Monetary Fund (IMF) secured a US\$15b (€11b) credit line over a two-and-a-half-year period, which it is hoped will spur renewed investor interest.

The country's renewable resource potential is impressive, and in April 2009, a new "Green Tariff Law" was approved which, unlike the previous tariff system, sought to differentiate between renewable sources. The Green Tariff (GT) is calculated by applying various coefficients to the Basic Tariff which was set as at 1 January 2009. The Law also introduced a fixed minimum GT denominated in euros based on the exchange rate at the time, in order to mitigate the impact on the GT of a devaluation of the Ukrainian Hryvnia.

Minimum GT rates		UAH/MWh	Coefficient	Peak hour coeff	Total UAH/MWh	Tariff EUR/MWh
Technology						
Wind	< 600kW	584.6	1.2	1.0	702	65
	600-1,200kW	584.6	1.4	1.0	818	75
	>1,200kW	584.6	2.1	1.0	1,228	113
Solar	Rooftops > 100kW	584.6	4.6	1.8	4,840	446
Solar	Rooftops <100kW & facades	584.6	4.4	1.8	4,630	427
Biomass (all)		584.6	2.3	1.0	1,345	124
Hydro	< 10MW	584.6	0.8	1.8	842	78

Source: Publicly available information

The GT Law obliges the state to purchase green energy under the tariff system until 2030 and also ensure connection to the grid. Further, where there is a subsequent change to the GT rules, an energy producer will have the right to either follow the new rules, or those valid at the start of operations. In a bid to improve supply chain security, the Law also provides that, from 1 January 2012, a generation company can only charge its customers the GT rate where at least 30% of the materials, works and services associated with the project are based on domestic supply, increasing to 50% from 1 January 2014.

However, to meet its 2030 target, the country will first need to address the challenges posed by its complex permitting

procedures and inadequate grid. While overall grid capacity is around 7GW, the network around strong RES areas such as Crimea are limited to 2GW.

## Tax incentives and access to finance

A significant range of tax exemptions are available to green energy companies and projects including corporate tax exemption on the sale of RES electricity for 10 years from 1 January 2011, VAT exemptions on certain imports, and a 75% land tax reduction on the purchase of land for green energy projects.

The main source of finance for RES projects has historically been the Government. In April 2011, the Cabinet of Ministers approved a €7b increase in funding for the 2010-15 "economic program on energy saving" to €32b, the majority of which will in fact be used to renovate the power grid.

## Wind

Ukraine has significant wind energy potential; however, it remains an under developed market, with only 87MW installed at the end of 2009 and zero installations in 2010. The average wind speed in open sites is around 6.5m/s, potentially reaching 8m/s in hilly areas. Wind power potential is estimated to be 19-24GW and a strong project pipeline currently exists, although only a few of these have the necessary construction permits. MAKE forecasts an additional 750MW in the next five years.

Crimea and the steppes of Southeast Ukraine are the most promising wind regions. Crimea expects €1.2b to be invested in a 900MW wind farm, with signs construction could begin on the first 125MW stage by the end of the year. **Wind Power**, a subsidiary of utility **DTEK**, has also already begun work on its 1.2GW portfolio of wind capacity on the coast of the Sea of Azov. Government goals indicate that by 2030, 20%-30% of power will be generated by wind, supported by strong GT rates.

## Solar

Ukraine also has strong solar energy potential, with irradiation of around 800-1450kWh/m<sup>2</sup> per year in the north and south respectively. Installed capacity was negligible at the end of 2010; however, Austria's Activ Solar has this year completed all four phases of its 80MW Ohotnikovo project on the Crimean Peninsula, claimed to be the largest PV project in Central and Eastern Europe. The country's target capacity for the period 2010-15 is 1GW.

## Other

Biomass represents more than two-thirds of Ukraine's total estimated renewable potential thanks to its traditional focus on agriculture. The country currently produces less than 0.5% of its energy from biomass; however, it is estimated it could produce more than 10 times its current level of output.

Hydropower is currently the leading source of renewable energy in the country. There are approximately 22,400 rivers within the Ukraine of which only 110 are longer than 100km. As such there is significant potential for small hydro plants, around 2.3GW compared with the current installed capacity of 150MW.

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# Introductory country focus – Tunisia

## Significant solar potential signals exciting opportunities

Ranking	Issue 31	Issue 30
All renewables index	34 <sup>1</sup>	n/a
Wind index	33 <sup>1</sup>	n/a
Solar index	12 <sup>1</sup>	n/a

Source: Ernst & Young analysis

<sup>1</sup>Joint

## Policy

Reliance on fossil-fuel reserves and a lack of political support has meant that, historically, development of renewable energy has not been a high priority for Tunisia's leaders. However, the rapid expansion of the global renewables market, recognition of the country's significant RES potential and a number of major international solar initiatives has resulted in a strong commitment to diversify the country's power generation portfolio, in particular through investment in wind and solar power capacity. The share of electricity generated by RES is around 1%; however, government targets aim to increase this to 11% by 2016, and 25% by 2030.

Despite the relatively low levels of current installed RES capacity, it could be argued that Tunisia has in fact spent the last 20 years preparing for the transformation of its energy sector that is currently taking place. Since 1985, Tunisia has pursued a "Rational Use of Energy" policy and has sought to establish an appropriate institutional and legal framework and financial environment conducive to energy conservation and management, including the development of the National Fund for Energy Conservation (FNME) in 2005. Among the MENA countries, Tunisia is acknowledged as a "pioneer" in the initiation of energy efficiency and renewable energy policy.

It is acknowledged that political turmoil in North Africa in recent months is likely to have an impact on the socio economic direction of the region in the short term. However, the three-to-five-year outlook of the CAI means that these events are not anticipated to adversely impact Tunisia's medium-to-long term RES attractiveness.

## Incentives

Tunisia does not currently offer a specific incentive system for renewable energy comparable to a FIT or REC scheme, but rather uses direct financial and tax incentives to promote green energy. Capital subsidies, grants and rebates (one-off payments by the Government or utility) are available, mainly for the purpose of energy audits and implementation of energy efficiency measures. At present, direct financial incentives are mainly aimed at water heating and small-scale energy substitution rather than large-scale renewables. However, various tax incentives do exist for renewable energy, such as the reduction of customs duty and VAT exemption on the import and local manufacture of raw materials and equipment used for renewable energy generation.

## Grid

Expansion and investment will be required to increase grid capacity and ensure suitable infrastructure to receive and distribute power from emerging large-scale renewables projects. The Government has also enacted legislation allowing surplus electricity produced by plants attempting to be self-sufficient to be sold on to the **Tunisian Electricity and Gas**

**Company** (STEG) (up to 30% of total production) at a rate of TND92/MWh (€47/MWh) plus a flat network fee of TND5.0/MWh (€2.6/MWh) for transporting the output to the place of consumption. To address grid-related issues, interconnections of the country's power grid to those of Algeria and Libya and European countries are planned, including a 1GW inter-connection with Italy expected to be operational by 2016.

## Solar

Tunisia has a significant solar potential, boasting irradiation rates of around 1,700-2,200kWh/m<sup>2</sup> per annum. As such, the country is able to support CSP generation on a large scale. It is expected the PV market will also continue to develop given the significant resource, although the intense desert heat does make PV panels less efficient. However, the Government has introduced subsidies to lower the cost of solar panels by around 30% to encourage commercial and residential installations.

To date, there are no CSP plants operational in the country; however, a strong project pipeline exists as a result of the various national and international investment programs set out below. **Nur Energie**, for example, has announced that it plans to construct CSP tower projects totaling 2GW, with the first plants ready for construction in 2012-13. Another CSP project in the pipeline is El Borma, which will total 150MW.

## Wind

In the northern regions of Tunisia, wind measurements revealed wind speeds of 7-10m/s, indicating strong potential for wind power development. Current energy output from wind farms is around 114MW and total potential is estimated to be around 1GW. Therefore, while potential is not unlimited, it does provide a strong platform for growth over the coming years. MAKE forecast additional capacity of 692MW through to 2016.

## National and international investment programs

In 2009, the Government launched the Tunisian Solar Plan, a €2b PPP spanning 2010-16 which aims to fund around 40 separate renewable energy projects, specifically targeting solar and wind. Around 70% of this funding is expected to come from the private sector which will lead 29 of the projects, and approximately 40% of the resources will be devoted to the development of energy export infrastructure.

Tunisia is also involved in the early stages of the Mediterranean Solar Plan, a separate EU-backed scheme that envisions investment of around €38b to create 20GW of new solar generation and other RES around the Mediterranean Sea. The output of these projects would be exported to Europe to help the EU meet its target of 20% of electricity from RES by 2020.

Given its key strategic location, Tunisia has also committed to be part of the DESERTEC "super-grid" connecting various African and European countries in a bid harness and distribute power from the region's vast solar resource. By 2050, the project will have invested around €400b in solar plants and transmission lines to meet a considerable proportion of the electricity demand of both MENA and continental Europe.

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# Introductory country focus – Argentina



## Abundant natural resources hindered by weak grid

Ranking	Issue 31	Issue 30
All renewables index	34 <sup>1</sup>	n/a
Wind index	33 <sup>1</sup>	n/a
Solar index	28 <sup>1</sup>	n/a

Source: Ernst & Young analysis

<sup>1</sup>Joint

## General

Argentina is the third-largest power market in Latin America, and one of the most deregulated, with around three-quarters of the country's generation capacity owned by private companies.

Argentina's power mix primarily comprises natural gas (over 50%) and hydropower (circa 40%). Argentina's dependence on gas is of concern given the country's own natural gas reserves have reduced considerably over the last five years.

Electricity demand continues to grow steadily in the country and forecasts suggest an ongoing annual increase of 6%. Estimates indicate that an additional 1GW of new generation capacity per annum will be necessary to satisfy this growing demand.

## Policy

Law 26.190, passed in December 2006, established that 8% of electricity demand should be generated by renewable sources by 2016. The Law also introduced FITs for wind, biomass, small-scale hydro, tidal, geothermal (all of which receive circa €2.6/MWh) and solar (circa €150/MWh). Tariffs are valid for a period of 15 years.

In addition, the GENREN program, initiated in 2009, called for state utility Energía Argentina Sociedad Anónima (ENARSA) to contract at least 1GW of renewable energy capacity, to be sold into the grid at fixed rates for a period of 15 years. In July 2010, the Government awarded PPAs to 17 wind farms with a combined capacity of 754MW, 4 biodiesel power plants with an aggregate capacity of 110MW, 5 small hydro plants amounting to 11MW and 6 solar PV projects totaling 20MW.

According to government data, in September 2010, Argentina was due to pay US\$127/MWh (€93/MWh) to wind developers successful in the GENREN tender, which could be up to two-thirds more than in neighboring countries such as Brazil. Small hydro producers will receive around US\$162/MWh (€119/MWh).

## Access to finance

Argentina defaulted on its bonds in 2001 and has since had difficulty accessing the international credit market. A lack of support for project development from financial institutions continues to be a barrier to renewable energy development in the country.

That said, Argentina attracted US\$743m (€546m) in clean energy investment in 2010, ranking it 16th among G 20 members. Its five-year growth rate for clean energy investment is 115%, which places it second among the G 20.

## Grid

Argentina has two interconnected grid systems. The Argentine Interconnection System (SADI) covers the upper three-quarters of the country, while the wind-rich Patagonia region is covered by the Interconnected Patagonian System (SIP).

At the end of 2001, as a result of the economic crisis, many electricity generators and distributors deferred making further investments in their networks. It is believed that the current transmission infrastructure is sufficient to support the build-out of the successful GENREN tenders; however, project development beyond this level will require significant investment in the transmission infrastructure

## Wind

Argentina has abundant unexploited wind resources, especially in the southern Patagonia region where capacity factors are well in excess of 45%. Current installed capacity stands at 32MW, though the Government is targeting 1.2GW by 2016.

Despite ongoing difficulties with project financing and low electricity prices, certain provinces have introduced local tax incentives. For example, Chubut, in north Patagonia, has approved legislation removing 100% of taxes on gross income from wind power in the first 5 years of operation, reducing to 50% in years 6 to 10. The province hopes such incentives will spur the build-out of an estimated 2.2GW pipeline.

## Solar

Argentina's eastern plains and north western regions are ideal for solar PV development. However, only 10MW of solar has been installed in Argentina to date, making it a huge untapped resource. The Government has set a target of generating 3.3GW of solar power by 2020.

## Biomass

Argentina has historically focused on biofuel development rather than biomass, resulting in minimal installed capacity to date. However, it is estimated 80% of the country's annual 6m metric tonnes of forestry biomass could be used to generate electricity, and Argentina's planning ministry has received bids to build out 104MW worth of biomass capacity.

## Small hydropower

Argentina has introduced the Small Hydroelectric Program, which will conduct studies to identify potential sites and promote the development of small HPPs. The majority of the 30MW of current installed capacity is located in the southern Andes region, which the Government expects to increase to 60MW by 2012.

## Geothermal

To date, geothermal resource has mainly been used for heat recovery as opposed to power generation. Research into the country's geothermal potential is still at an early stage, but the Government has set a target of 30MW of electricity generation by 2012.

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# Introductory country focus – Israel

## Strong solar resources and large project pipeline

Ranking	Issue 31	Issue 30
All renewables index	37	n/a
Wind index	38 <sup>1</sup>	n/a
Solar index	12 <sup>1</sup>	n/a

Source: Ernst & Young analysis

<sup>1</sup>Joint

### General

Israel currently obtains around 43% of its energy needs from coal and 37% from gas. Renewable energy sources represents only 0.1% of total capacity.

Israel has been looking to diversify away from coal and oil for some time. Its efforts were given a boost by the recent discovery of substantial offshore reserves of natural gas. Furthermore, the Government has set a goal of generating 5% of the country's electricity needs from renewable energy by 2014, increasing to 10% by 2020. The Government believes this target will result in US\$5b (€4b) of investment in the sector and deliver 2.76GW of renewable electricity capacity by 2020.

### Policy

The electricity sector in Israel is regulated by Electricity Law 5756-1996. Its main mandate is to ensure the reliability, availability, quality and efficiency of electricity distribution in the country. It also promotes the conditions for competition and cost minimization.

The Israel Public Utility Authority (PUA) approved a FIT policy in June 2008 covering small domestic and commercial plants for both solar and wind. The tariff levels were circa €0.30/kWh for wind turbines up to 50kW (with a 30MW aggregate cap), circa €0.38/kWh for solar installations below 50kW (with a 50MW aggregate cap) and circa €0.31/kWh for solar installations above 50kW and below 5MW (with a 300MW aggregate cap).

Tariffs have subsequently been decreased from their original levels for both solar and wind; however, the size of plants and caps which are acceptable for the subsidies has been increased, such that solar plants above 12MW will now receive the subsidies. The rates as of 2011 are circa €0.20/kWh for solar (which will be applied retroactively to 200MW of approved projects), while wind receives circa €0.08/kWh. The new aggregate caps are 460MW for large solar fields, 100MW for rooftop PV arrays and 800MW for wind farms. In October 2011, the mid-sized solar FIT was again cut, by a further 25%, for projects not reaching financial close within 90 days of the announcement.

There are further supporting mechanisms for renewable energy which include tax cuts, tax exemptions, facilitation of land availability and investment grants. For example, there are lower corporate tax rates for companies with foreign investment, where the greater the level of foreign investment, the lower the tax rate (as low as 10% for foreign investments of over 90%).

The Renewable Energy Association of Israel (REAI) was also established in 2009 to promote the implementation of renewable energy. Its main activities are lobbying and promoting implementation of renewable energy by the various authorities and ministries of Israel.

Internationally, Israel is engaged in joint research efforts under a number of bilateral agreements, including the BIRD Energy program for joint US-Israeli renewable energy development.

### Grid

Israel Electric Corporation (IEC) is the supplier of virtually all electrical power in Israel. IEC builds, maintains and operates the majority of power stations, substations and the transmission and distribution networks. The State of Israel owns around 99.85% of the company.

At present, the grid can only absorb between 5%-20% of its energy from renewable sources due its inability to tolerate fluctuations. In the near term, this doesn't appear to present an issue; however, investment will be required should Israel substantially increase its level of renewable energy generation in line with its targets. Israel also lacks interconnections with neighboring countries (with the exception of Gaza and the West Bank), which in the future could prevent large-scale exports of electricity within the region and further afield to the EU.

### Solar

In 2009, Israel was the top-performing country in the world with respect to the relative growth of its solar PV market, experiencing a near 20 fold increase over the previous year and an additional 21.5MW of installed capacity.

Cumulative installed capacity now stands at 61MW, of which around 88% represents grid-connected systems. This rapid growth is in part due to the country's excellent natural solar resources, with some regions boasting 350 days of direct sunlight each year.

Solar CSP is also expected to experience significant growth in the near future, with over 300MW of plants currently in planning. For example, a 240MW thermal plant is due to be constructed at Ashalim in the western Negev desert, at a cost of US\$750m (€552m), becoming operational in 2014.

### Wind

Israel also boasts relatively good natural resources for onshore wind, with an estimated 2.5GW of potential. Current installed capacity stands at only 6MW, though the Government has set a target of 800MW by 2020. This figure coincides with the total quota of wind projects available for FIT subsidies.

In September 2010, Israel's Prime Minister gave "national infrastructure project" status to a US\$400m (€294m) wind farm on Israel's Golan Heights, clearing it for fast-track approval by regulators. The new farm will comprise 70 turbines totaling 155MW, and is expected to be completed by mid 2012.

### Other

Israel has made less progress in the way of other technologies besides solar and wind. There are minimal amounts of other technologies such as small-scale hydro, biomass and geothermal, though small-scale pilot plants are being undertaken. There are no indications that the FIT subsidies are due to be extended to these technologies in the short term.

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# Introductory country focus – Hungary



## Strong biomass resources but mixed responses to FIT

Ranking	Issue 31	Issue 30
All renewables index	38	n/a
Wind index	38 <sup>1</sup>	n/a
Solar index	35 <sup>1</sup>	n/a

Source: Ernst & Young analysis

<sup>1</sup>Joint

## Policy

As an EU Member State, Hungary is subject to a binding target of 13% of energy from RES by 2020. However, in its Renewable Energy Action Plan (REAP), approved in December 2010, the Hungarian Government set an even more ambitious target of 14.65%. The 2010 target of 3.6% was actually achieved in 2007, mainly due to biomass, which accounts for around 80% of the country's renewable energy. Hungary is still highly dependent on energy imports from Russia; however, with natural gas and nuclear representing >90% of the energy mix.

In seeking to achieve its EU target, Hungary has evolved its FIT scheme, known as "KAT" and first introduced in 2003, to incentivize ongoing RES development through the purchase of electricity at higher than market rates. The KAT rates for different technologies, guaranteed until 2020 and adjusted annually in line with inflation, are presented below.

€ per MWh	PV/ wind	< 20MW <sup>1</sup>	>20MW <50MW	>50MW <sup>2</sup>	Co-generation
Peak rate		118.04	94.40	73.40	71.75-126.10
Off-peak 1	107.67	105.62	84.51	46.96	45.05-80.57
Off-peak 2		43.10	34.46	46.96	11.03

Source: Publicly available information

<sup>1</sup> Also applies to hydro plants <5MW <sup>2</sup> Applies to hydro plants >5MW

The volume of electricity for which the KAT rate is paid, as well as the duration, is limited by the Hungarian Energy Office (HEO) based on the project payback period. There has been some political opposition to the current KAT system amid claims that electricity prices are "unjustifiably higher" as a result of cross-subsidization of local heating prices. Around 70% of KAT funding goes to combined heat and power (CHP) plants and the majority of the remaining 30% goes to biomass and wind plants. The Government is working on the reform of the KAT to ease the burden on electricity prices and better focus financial support on "real" renewable electricity.

Indeed, a draft plan published on the Government's website indicates Hungary is considering replacing the current mandatory purchase system with premium subsidies under a FIT mechanism. The new scheme, known as Metar, which is scheduled for approval in early November, sets upper and lower capacity limits for eligible generators, guarantees 15-year subsidies, and awards premiums for heat and power offtake or projects in under developed regions. The Hungarian energy sector will be eager to find out whether the new scheme will provide the boost required to meet its 2020 target.

## Grid connection and permitting

Despite these incentives, insufficient grid capacity, high connection costs and a very difficult permitting process represent significant barriers. Grid connection takes an average

of 45 months to secure and an estimated 10.6% of total project costs are spent on obtaining it. Installation capacities for wind power are currently capped at 330MW (end of 2010) to reflect grid availability, severely hampering wind power development.

Further, in Hungary, 40 different authorities are involved in the permission process and a vast majority of all applications are denied at present. The EU average is five authorities and 30% rejection. Both financial investment and bureaucratic overhaul will be required if Hungary's RES market is to meet its potential.

## Wind

The potential for wind power development is relatively low in Hungary as most wind speeds do not exceed 5m/s. However, wind conditions in the northwest of the country are sufficient and it is hoped the attractive FIT will support ongoing developments.

The REAP sets a relatively modest target of 750MW by 2020, which is half of the 1.2GW EWEA believes can be easily achieved. MAKE is also more optimistic and forecasts additional capacity of 80-100MW per annum over the next five years. However, installed capacity totaled only 295MW at the end of last year and, in mid 2010, the HEO canceled a tender for 410MW of wind capacity, which had already drawn preliminary bids totaling 1.1GW. This has created some uncertainty on the Government's commitment to wind energy and future growth.

## Solar

Hungary boasts a relatively strong solar resource compared with other European countries, with an average annual irradiation of 1,300kWh/m<sup>2</sup>. It is estimated the theoretical potential could amount to several tens of thousands of MW. Current installed capacity was only 1.6MW at the end of 2010, although a number of larger projects (50-80MW each) are currently in planning. The main reason behind the slow market expansion is likely to be the low FIT level, roughly equal to the average electricity price and therefore offers little incentive.

## Biomass

Hungary possesses excellent agro-ecological conditions for generating energy from biomass, and to date it has been the main driver of the country's RES performance. Based on the REAP, the theoretical potential of bio energy could exceed as much as 20% of the country's estimated energy demand for 2020. Installed capacity at the end of 2010 totaled 378MW and it is estimated that only 10% of the resource is currently being utilized, although the REAP sets a relatively modest 2020 target of 600MW. There are at least seven new projects in the pipeline, ranging between 20MW and 210MW in size.

## Other

Hungary boasts one of the largest reserves of geothermal energy in Eastern Europe; however, the low-to-medium temperature makes it far more suitable for heating than electricity generation. Hungary is also one of the less mountainous countries in central Europe and therefore has only limited hydroelectric potential.

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# Commentary – guidance notes

## Long-term index

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

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

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

## Renewables infrastructure index

The renewables infrastructure index is an assessment by country of the general regulatory infrastructure for renewable energy. On a weighted basis, the index considers:

- ▶ Electricity market regulatory risk (29%) – markets that are fully deregulated score higher, as they have experienced the “market shock” on underlying wholesale prices that this transition may exert. While this may not affect current projects, these effects are particularly important when considering long-term investment prospects.
- ▶ Planning and grid connection issues (42%) – favorable planning environments (low failure rates and strong adherence to national targets) score highly. Grid connection scoring is based on the ease of obtaining a grid connection in a cost-effective manner. The score also takes account of the degree of grid saturation for intermittent technologies.
- ▶ Access to finance (29%) – a market with a mature renewable energy financing environment, characterized by cheap access to equity and good lending terms, will score higher. The access to finance parameter incorporates sovereign credit ratings and sovereign credit default swaps in conjunction with qualitative analysis.

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

## Technology factors

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

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

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

1. Power offtake attractiveness (19%) – this includes the price received, the potential price variation and length of PPAs granted. Higher scores are also achievable if a government guarantees the power offtake rather than merchant offtakers.
2. Tax climate (11%) – favorable, high-scoring tax climates that stimulate renewable energy generation can exist in a variety of forms and structures. The most successful incentives and structures have been direct renewable energy tax breaks or brown energy penalties, accelerated tax depreciation on renewable energy assets and tax-efficient equity investment vehicles for individuals.
3. Grant or soft loan availability (9%) – grants can be available at local, regional, national and international levels, and 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.
4. Market growth potential (18.5%) – this considers current capacity compared with published targets. Higher scores are given if ambitious targets have been set and policy framework is in place to accelerate development. The realism of targets is taken into account as well as the seriousness with which they are being pursued (e.g., penalties in place for non-compliance).  
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.
5. 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.
6. Resource quality (19%) – for example, wind speeds and solar intensity.
7. 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](http://www.ey.com/CAI)



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# Glossary

Abbreviation	Definition
ANRE	Agency for Natural Resources and Energy
b	Billion
BNEF	Bloomberg's New Energy Finance
CHP	Combined heat and power
CLFR	Compact linear fresnel reflector
CSP	Concentrated solar power
CAI	Country attractiveness indices
DOE	Department of Energy
DECC	Department of Energy and Climate Change
ETS	Emission trading scheme
EC	European Commission
EIB	European Investment Bank
EU	European Union
EWEA	European Wind Energy Association
FBI	Federal Bureau of Investigation
FIT	Feed-in-tariff
GW	Gigawatt
GC	Green certificate
GIB	Green Investment Bank
GT	Green Tariff
HEO	Hungarian Energy Office
IPO	Initial public offering
IRR	Internal rate of return
IEA	International Energy Agency
ITC	Investment tax credit
IEC	Israel Electric Corporation
JV	Joint Venture
kW/kWh	Kilowatt/Kilowatt hour
LCOE	Levelized Cost of Energy
LPG	Liquefied petroleum gas
MW/MWh	Megawatt/Megawatt hour
M&A	Mergers and acquisitions
MENA	Middle East and North Africa
m	Million
mmbtu	Million Metric British Thermal Units
NEA	National Energy Agency
PV	Photovoltaic
PPA	Power purchase agreement
PTC	Production tax credit
PPP	Public private partnership
REAP	Renewable energy action plan
REC	Renewable energy credit
RES	Renewable energy sources
RES-E	Electricity from RES
RHI	Renewable heat incentive

Abbreviation	Definition
RPS	Renewable portfolio standard
RO	Renewables obligation
ROC	Renewables obligation certificate
R&D	Research and development
S&P	Standard & Poor's
TMS	Target management system
t	Trillion
VAT	Value added tax
WTO	World Trade Organization

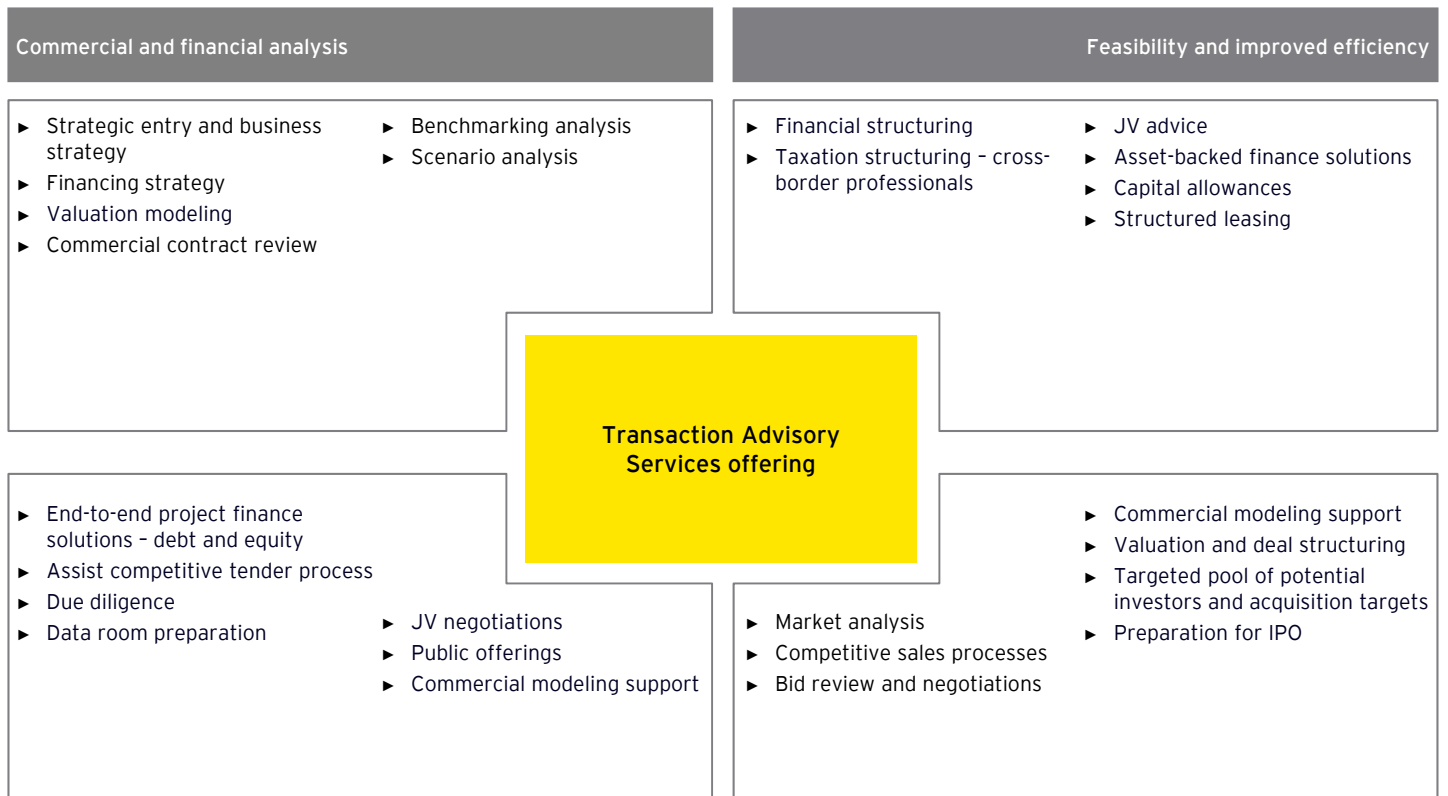
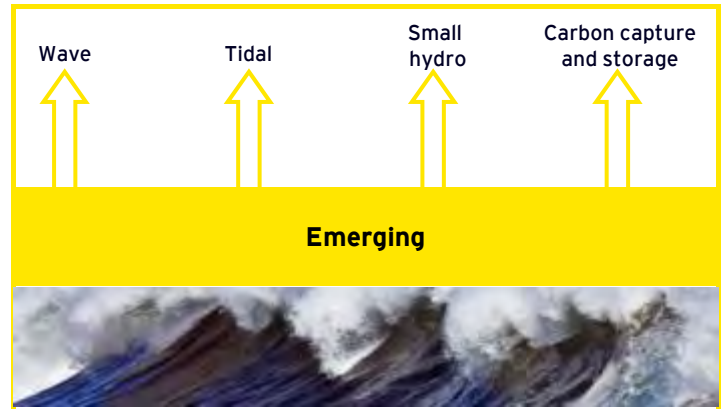
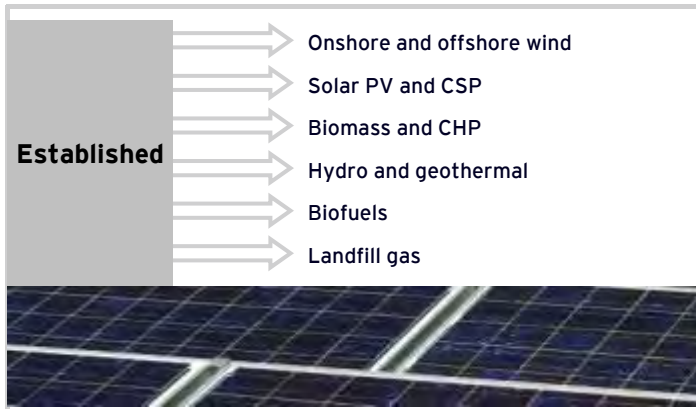


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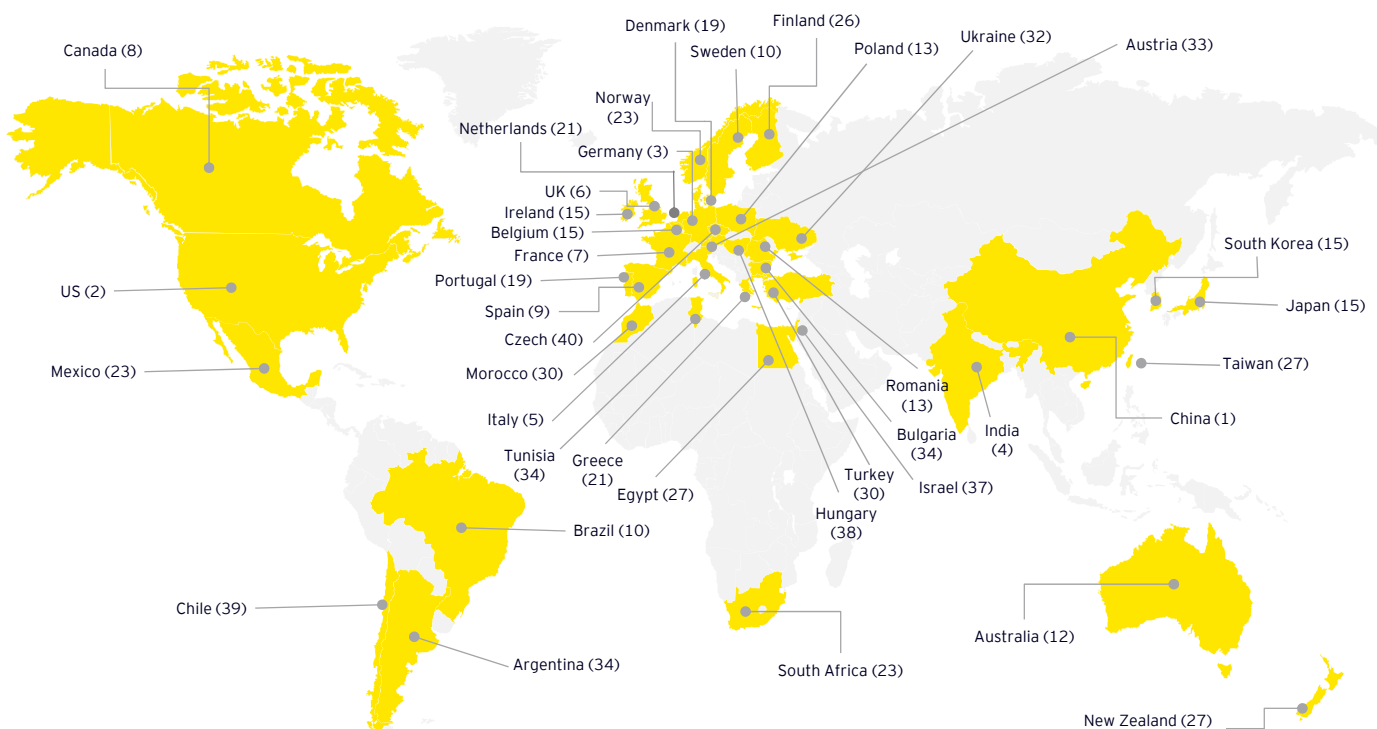
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EYG no. DE0275

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