RECAI

Issue 37

Renewable energy country attractiveness index

May 2013

10th anniversary edition

The RECAI celebrates 10 years of chronicling the renewable energy industry with a new look and refreshed content

New index reflects a changing world

Our revised methodology realigns the country rankings – who comes out on top?

Special feature: Power to the people

A look back at the transformation of the global renewables landscape and the increasing role of consumers in the energy revolution

Show me the money...

Institutional investors step in to fill the funding gap, while restructurings and consolidation set the scene for an M&A boom

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Renewable energy country attractiveness index

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Chief Editor's note

Ben Warren, RECAI Chief Editor

Welcome to our new look RECAI. On behalf of Ernst & Young, I would like to welcome you to the 10th anniversary edition of the *Renewable energy country attractiveness index (RECAI).* I am delighted to introduce both an updated methodology, creating an attractiveness index that much better reflects the new world the renewable industry is facing, and a refreshed format that I hope you will find more accessible.

As we mark this anniversary, the global renewable energy sector finds itself at a significant inflexion point. Declining government support, particularly in Western markets still struggling with austerity, may have put the brakes on some segments, but emerging markets appear eager to fill the gap as renewable energy plays an increasingly important role in energy security, enabling economic growth and stimulating economic diversification. And while global investment may be down on the previous year, installed capacity certainly is not, reflecting serious levels of resilience in the sector during these challenging times.

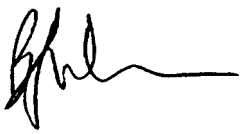
So, as the sector considers a future with less government subsidy, the cost reductions achieved in recent years make mature renewable energy technologies far more affordable, enabling the sector to finally break from subsidy. Some casualties are inevitable, and we will continue to witness further consolidation, financial restructurings and some bankruptcies, particularly in the supply chain.

The global renewable energy sector today is much more aligned to energy market and general economic fundamentals, rather than being wholly reliant on fiscal support regimes that have proven to be vulnerable to both economic health and politics. The affordability of renewable energy, and the important role it can play in the global energy mix, is now more critical than ever.

And it will likely be these factors, in addition to the decarbonization agenda, that will provide a much more robust foundation for growth in the foreseeable future.

In this issue, we reflect on some of the major events that have contributed to the evolution of the renewable energy sector in the past decade, and gaze into our crystal ball to speculate on what the next 10 years might hold.

We hope you enjoy our new-look *RECAI* for the next 10 year and as always, we welcome any comments or feedback you may have.

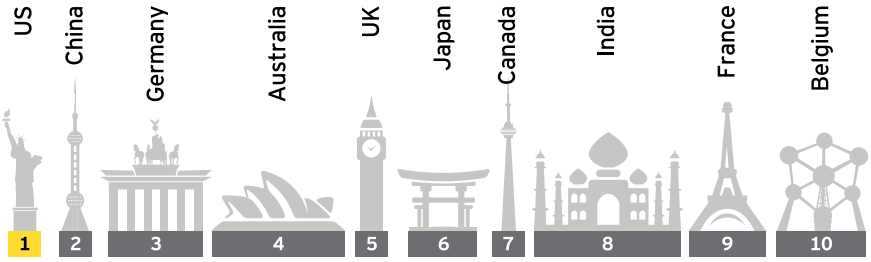


At a glance...

As the RECAI celebrates its 10 year anniversary, we look back on one transformative decade and welcome in another.

Our index - *top ten countries*

New methodology



Transactions market on the *edge*

Sector trying to stabilize itself amid bankruptcies, restructuring and consolidation.

US$ **1b**

ABB solar acquisition

But some big deals are still being done

From *"subsidies"* to *"power to the people"*

Falling government subsidies and global competition spark an energy revolution, driven by individuals, consumers and corporates.

Quarterly developments:

Where's *"hot"*...

Chile
Goes large

India
Back on track

Saudi Arabia
Lays down the rules

...and *"not"*?

Brazil
Scares away wind

Romania
Big freeze

Spain
Deflates

Rise of the institutional investor

Pension and life insurance funds increasingly look to renewables for stable returns.

New clean energy investment in *Q1 2013**

US$40.6b
Total new clean energy investment

206
New-build asset finance deals

Q1 2012 → Q1 2013

Lowest quarterly investment since 2009

*Source: BNEF

Summary

An overview of this issue

10 years on, an unrecognizable world

The 10th anniversary of the *RECAI* coincides with the global renewable energy sector going through an unprecedented period of change. The renewables industry is beginning to face up to a world of declining government subsidies.

This paradigm shift is happening at a time when renewable energy is becoming increasingly affordable and its role in the future energy mix is moving firmly into the mainstream. We look at how the sector has evolved since its early beginnings in the 1970s, and the tremendous transition witnessed during the 10 years of this publication, and consider what the future might hold.

Transactions market on the edge

Bankruptcies and consolidation are reshaping the asset ownership and supply chain landscapes, and we are teetering on the edge of emerging renewables markets finally opening their doors and improved liquidity in the banking sector. But, the market seems to be asking for a bit more time to adapt itself to this new world order.

Valuation gaps and continued forbearance by stakeholders of indebted companies are currently limiting activity, while de-leveraging strategies and the reallocation of capital priorities are driving M&A activity around operating assets.

But once the tectonic plates stop moving, it will be exciting to see the opportunities that unfold for both the energy market survivors left behind and those who are currently knocking at the door ready to come in once the market stabilizes.

Big deals are still being done, however, as evidenced by ABB's US$1b acquisition of Power-One to beef up its solar connectivity credentials. Divestment announcements by BP and Bosch, meanwhile, indicate transaction opportunities arising from some major corporates increasing their focus on core business models.

Institutional investors step up

The financing community is also seeing the ground shift beneath it, as new players such as institutional investors step up to answer the eight trillion dollar question.

The long-term, predictable yield nature of infrastructure assets is starting to attract direct investment into renewable projects, but these investors are still finding their feet.

An alignment of interests and the equitable apportionment of risk and reward between sponsors and institutional investors, as well as improved understanding of technology performance and the realization of returns, will help mobilize more capital into the renewables sector.

Subsidies … yesterday's news?

On the policy front, austerity measures and global competition have accelerated the timeframe in which the sector needs to wean itself off subsidy dependency. Cost reductions, energy efficiency and binding international commitments on decarbonization all have a role to play, but consumers and corporates are likely to be the real drivers of the low carbon economy in the years ahead.

Summary

continued

New decade, new index

In this milestone edition of the index, we have reassessed the drivers that are steering investment and deployment decisions across the global renewables sector. Ten years on, the landscape looks almost unrecognizable.

Our new methodology reflects these drivers, and in particular the increasing importance of more basic factors such as macro stability and energy demand; this contrasts with 10 years ago when financial incentives and installed capacity were the epitome of attractiveness.

US regains top spot

This issue of the index sees the US regain the top spot, as high barriers to entry for external investors realign China into second place. However, growth prospects for the sector remain strong in China, with continued GDP growth, increasing energy demand, and the ongoing strategic importance of the sector to the local economy providing solid foundations for the future.

South America leaves Europe behind

Giant 400MW CSP projects and a growing demand for energy sees Chile continue its ascent as South America's shining star, while the entry of Peru into the index reinforces the region's potential. However, new policy measures and tender cancellations in Brazil are likely to temper the rapid growth witnessed in the country these past 18 months.

Peru has joined the index due to good solar and biomass resource and a strong investment climate; while weaker short-term prospects sees Argentina fall out of the top 40.

In Europe, Romania became the latest to slash its subsidies, temporarily postponing the number of green certificates (GCs) awarded to existing projects until 2017–18 and potentially reducing those for new projects from 2014. The move reinforces the relatively somber mood in Eastern Europe, as policy makers try to find the balance between growth and sustainability.

Germany also delivered a blow to the sector in Q1 when it floated the idea of retroactive cuts, only to remove the proposal weeks later. However, with other subsidy reduction proposals likely to remain in limbo until after the September election, the German sector will have to play the waiting game.

Asia Pac gets a new addition while MENA needs more time

High levels of project activity and investment interest in Japan and Australia give the Asia Pacific region a strong presence at the top of the index. The latest analysis by Bloomberg New Energy Finance (BNEF) indicates that new wind power projects in Australia are as much as 18% and 14% cheaper than new gas and oil plants respectively.

Thailand also joins the index in this issue, boasting strong solar resource and a healthy project pipeline, as well as stable fiscal and regulatory support measures.

There have been casualties, however, with a number of the Middle East and North Africa (MENA) countries falling out of the top 40. Slow recovery from the Arab Spring and an absence of clear policy frameworks means capacity deployment within our four-year forecast period remains low, resulting in the temporary loss of Egypt, Tunisia and the UAE from the index.

Anniversary feature:

Power to the People

To celebrate the RECAI's 10th birthday, Chief Editor Ben Warren takes a nostalgic look back at how the global renewables industry has evolved over the years into a vital part of today's energy mix.

Renewable energy has come of age. Today, it's a business imperative and personal prerogative; solar panels are appearing on homes and offices, biomass plants power factories and hospitals, and wind turbines on the horizon are now a common sight.

Internationally, we're seeing policies built with the planet in mind; governments are setting targets to cut carbon and convert to green power. Money is being spent and earned in an industry that, just four decades ago, was considered the domain of bearded hippies and eccentrics.

The convergence of culture, politics and science has meant renewable energy is now a global term, with the past decade in particular seeing it move from adolescence into adulthood. For those same 10 years, we have been developing and publishing our quarterly RECAI, tracking which nations have attracted significant clean energy investment and implemented policies to incentivize renewables deployment successfully. But it is important to remember that the foundations of this industry were laid more than four decades ago, and it is in this context we consider what has changed the global landscape, which nations have gained and lost, and perhaps more importantly, why?

1973

Imagine you're reading this in 1973. Wind turbines and solar panels are the stuff of futuristic dreams. The word "renewable" does not really hold any significance. Cheap and plentiful oil rules the planet and has enabled a post-war industrial boom. But things are about to change, all thanks to politics …

Ironically, war is the route to a greener world. Conflict in the Middle East and the OPEC oil embargo sees oil prices rocket by 70%. Signs reading "No gas" pop up at fuel pumps across Britain and the US, bringing home the scary reality of the Western world's over-reliance on a small group of oil-producing nations.

Alternative energy didn't really feature in much of the global press, and it wasn't a sector that was talked about very much. That's now changed: the renewable energy sector has become not just more global but also more mainstream.

Although there is a nascent environmental movement, it's the oil crisis that suddenly galvanizes the world into taking action, with an economic imperative now driving more developed nations to seek out alternatives to fossil fuels. It doesn't happen overnight — but a definite shift in culture has begun.

With Denmark leading the way, the US and Europe begin deploying significant volumes of wind power capacity. The sector starts to see the first utility-scale renewable energy projects, which lay the foundation of the industry we have today.

1984

Skip forward to the 1980s: while everyone's playing on Sega Megadrives, listening to Sony Walkmans and fearing nuclear destruction, they are also starting to talk about the huge hole developing in the Earth's ozone layer. Activity is ticking along nicely in the renewables world; the environmental movement becomes more prominent as it gathers support, not just from eager environmentalists, but also from students, journalists and discerning members of the business community.

The 1990s begin with a whole new phrase in our vernacular: the "greenhouse effect." Far from referring to little glass sheds, it is a phrase used by the Intergovernmental Panel on Climate Change in its first assessment report, which asserts that human activity is damaging the atmosphere and resulting in climate change. Toward the end of the decade, politicians and businesspeople are actually sitting down around the same table to draft the Kyoto Protocol, the 1997 international agreement that sets out clear multilateral plans to cut global carbon emissions.

Just as with music throughout this decade — when our listening habits are shifting from chunky cassette tapes to CDs — our appetite for renewable energy also starts to change, with a desire for more sophisticated, streamlined and efficient products. Solar PV technology is beginning to move from satellites and spacecraft to the factory floor, and people are finally talking about energy saving for the first time. Green power hits a milestone in 1999, impressing the world as solar installations reach a staggering 1GW. In context, however, a whopping 100GW will be installed by 2013.

1997

2000

The new millennium kicks off with warnings about a computer bug, "Y2K." But at the same time as predicting the end of the digital world as we know it, suddenly climate change is also on everyone's lips, and polar bears and melting ice caps become a trigger for talk about renewable energy.

At the end of the 1990s, onshore wind was becoming a more familiar sight across Europe and the US, and we started to see MW-scale turbines emerge. At that time, no one would have believed that, in only a decade and a half, the solar sector would be worth nearly US$80b per annum.

The RECAI era begins ...

The RECAI launched in February 2003, covering 15 countries, with Spain standing proudly at the top of the index. Today, Spain fails to rank in the top 10, and our RECAI now tracks 40 countries across six continents. It has become a chronicle of the changes – the good, the bad and the ugly – that have completely redrawn the global renewables map over the last decade.

During this time, clean energy has become an economic sector in its own right; technological advancements and global expansion have created new dedicated value chains.

And it is an economic sector with a healthy price tag: global annual clean energy investment of US$269b in 2012 represented a five-fold increase on 2004. Asia and Oceania is the only region to see continuous positive growth during this period, accounting for 42% of the global total in 2012.

This is in large part thanks to China, which entered our index in December 2004, taking 19th place behind Finland. In that issue, we made a discerningly accurate if somewhat understated prediction: "China is poised to play an increasingly significant role in world renewable energy markets."

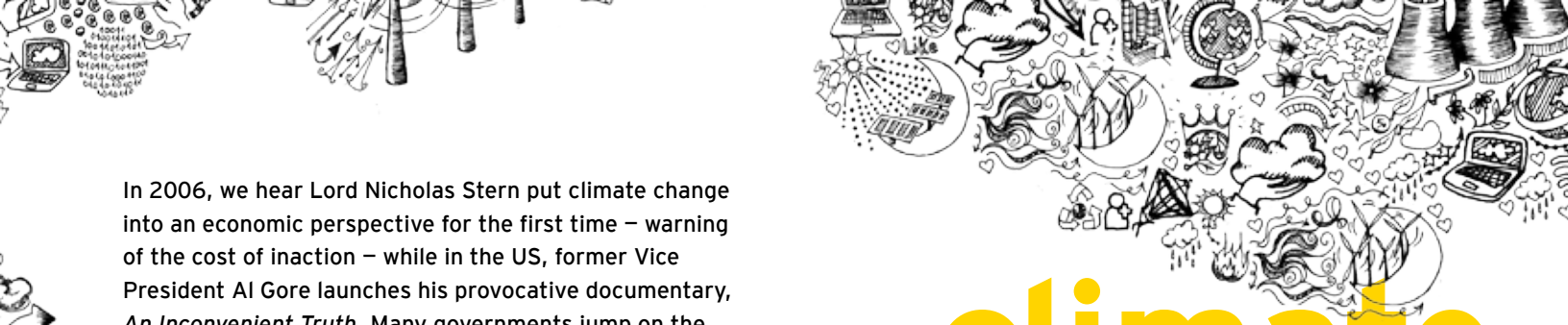
While China is now realigned to second place behind the US after a three-year reign at the top of the index – with our revised methodology now reflecting high barriers to entry for external investors – proactive policy measures and an unprecedented expansion have transformed it into a cornerstone of the global renewables market.

Rapidly falling technology costs have also contributed to this surge in investment: average wind turbine prices have fallen 29% since 2008, while solar PV prices have fallen 80% in the same period and 20% in 2012 alone.

The RECAI has chronicled the struggle by policymakers to implement stable and transparent measures to support renewables deployment in the face of a global economic crisis. At the same time, the need for this deployment has intensified, as energy security, industry creation, global competitiveness and demand growth become critical drivers for clean energy expansion alongside environmental concerns.

But we are also tracking the challenges: over-supply, fiscal issues, access to finance, infrastructure barriers, fossil fuel cost-competitiveness and supply chain consolidation are just some of the short-term barriers hindering renewables deployment on a national and global scale.

And so the saga continues ...



climate

In 2006, we hear Lord Nicholas Stern put climate change into an economic perspective for the first time – warning of the cost of inaction – while in the US, former Vice President Al Gore launches his provocative documentary, *An Inconvenient Truth*. Many governments jump on the bandwagon and battle it out to claim leadership over the fight on climate change, and the great race to create green-collar jobs begins.

Even the global financial crisis of 2008 didn't slow the renewable energy market, as Keynesian economics took hold and many nations, most notably China and the US, launched stimulus packages with a very heavy green agenda.

Wind farms start emerging in all corners of the world. Solar power no longer saunters along in sandals: it strides forward with a shiny new briefcase and speaks an international language. People realize there's money to be made. The industry sits up and pays attention – and our view of renewable energy irrevocably changes too.

For developed nations, it's clear that rising oil prices and the fear of "peak oil" have to drive a transition to a low carbon world. The awakening of the giant economies of China and India sparks a race to plunder vast fossil fuel reserves. But this is done in parallel with an interest in renewable energy, and we now have even the oil-laden Middle East starting to explore solar power and energy efficiency.

So why the change? Preserving our planet for future generations is obviously a factor, but a world-shaking economic crisis is the real catalyst that brings home to businesses and consumers the volatile cost of energy and the relative merits of homegrown green electricity. The renewable energy market, however, does not escape the economic crunch, as European nations start to shy away from previously generous subsidy levels. But luckily for those homes and businesses that have the appetite to go green, the cost of doing so has fallen significantly – in large part thanks to the Asian tiger economies.

The biggest tiger of all is China, venturing out of a strict communist system a little over a decade ago to embrace aspects of a free market economy. China soon competes on par with the developed nations and becomes the surprise leader in the race to take the renewables crown.

It has taken the wind sector 40 years to get its energy to a level where it can compete with fossil fuels on a levelized-cost basis.The solar PV sector has reached this level four times as fast. Today, solar PV competes with all other forms of energy generation in many markets and many applications across the globe. This was almost unthinkable only five years ago.

tiger

2010

By 2010, for every US dollar invested globally in renewable energy, 50 cents is invested in China, and around half the world's wind turbines are installed in Chinese soil. In 2012, the cost of Chinese solar panels drops to a mere US$0.60 per watt peak, even lower than the US$1.25 per watt peak the previous year that led solar installations to double worldwide. Perhaps unsurprising then, in 2010, China overtook the US to take first place in our RECAI rankings.

And why? Because Beijing's energy policy is keeping closely in line with industrial planning: it's easy to see the job creation that China was benefiting from — and now the thing that's really top of the agenda in China, particularly in Beijing, is pollution and lowering emissions.

Other emerging markets are also picking up the low carbon agenda and renewable energy baton, as the BRIC economies start demanding more energy to drive their economic growth.

For some countries, such as South Africa, it's a case of reducing their reliance on coal after being struck by power shortages. Brazil is championing wind and biofuels, while Chile is South America's rising star, with a pipeline of giant solar plants waiting to be built in the hot, arid Atacama Desert butting onto the Pacific Ocean. The reason? Swelling populations are demanding more energy, and homegrown renewable sources give them far more control over their own energy destiny.

For the already populous India, a large number of states all seem to want a piece of the solar pie, and its equally ambitious Central Government is aiming to install 9GW of solar power over the next few years. No doubt the pull of green energy is also bolstered by the reality of crippling blackouts that recently sparked riots in several Indian metropolises.

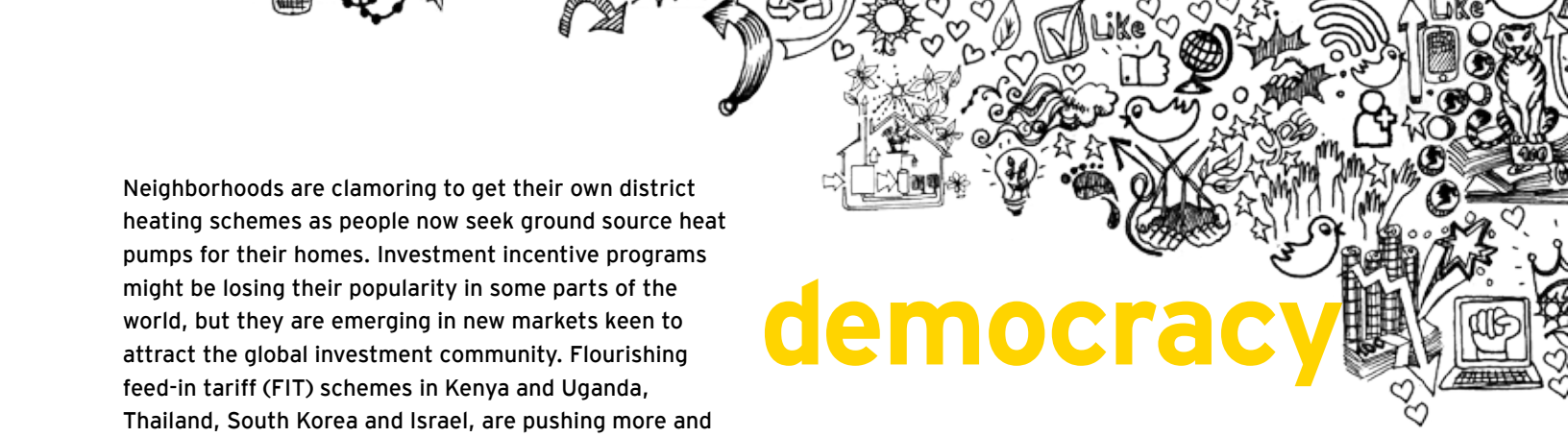
Elsewhere, Australia is attracting admiring glances from investors eager for a slice of its new US$10b Clean Energy Finance Corp. Fund, which will start issuing loans in July 2013. And Mexico last year joined the UK as only the second nation to introduce legally binding climate change targets.

As the renewable energy sector comes of age, many more nations are looking to renewables to make significant contributions to the energy mix. The technology is affordable, and the risk of overreliance on imported energy is too great to ignore.

Not only is lean and green renewable power competing with other types of energy for investment, it's also changing the way people think about energy. Many are now beginning to take responsibility for their own energy supply. In 2013, the world's energy sector stands on the threshold of another revolution: power to the people.

Flexible and renewable power sources are now spreading their tentacles further than any large fossil fuel power stations could. Where huge, centrally located oil, coal and gas plants used to pump out energy to millions, those same millions are now able to run their own small power plants on rooftops or in their back gardens — all thanks to solar panels, CHPs, biomass boilers and mini wind turbines.

2013



Neighborhoods are clamoring to get their own district heating schemes as people now seek ground source heat pumps for their homes. Investment incentive programs might be losing their popularity in some parts of the world, but they are emerging in new markets keen to attract the global investment community. Flourishing feed-in tariff (FIT) schemes in Kenya and Uganda, Thailand, South Korea and Israel, are pushing more and more consumers down the renewable energy path.

democracy

Countries are competing for the interests of renewable energy developers and investors when it comes to policy design, but value for money and affordability are now top of the agenda.

Businesses aren't missing a trick either: the price of energy has made it a boardroom issue. Energy is no longer the domain of gloried caretakers; the world of the energy manager has arrived. They now sit on the boards of the world's corporate giants, with an increasingly important voice. Energy has become not only a financial and business issue, but also a social one, as companies scramble to manage their businesses in a more responsible manner.

Just this year, for example, Apple announced plans to run its iCloud data centers on 100% renewable energy, while supermarket giant Walmart has similar plans to run all of its stores on green energy by 2020.

The search engine Google led the way in 2007 by installing a 1.7MW solar farm at one of its sites, and has now spent more than US$1b on renewable sources, including construction of a 161MW wind farm in January 2013. Other firms such as Nike, HSBC, Volkswagen, PepsiCo, Renault and Sumitomo are following suit.

Smaller businesses are also now following in the wake of these retail giants.

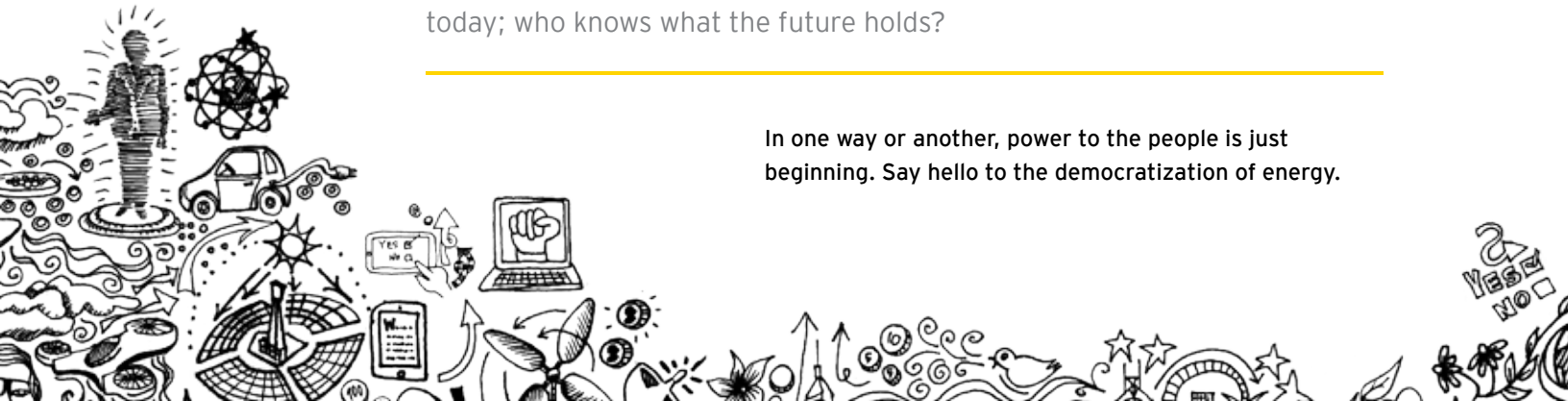
But do we have enough momentum to keep this up? What will the renewable industry of the 2030s look like?

Energy demand, natural resource, technology costs, access to finance and global competitiveness are the factors that will likely determine which markets remain attractive in the long run, regardless of whether we categorize them as "emerging" or "developed" markets right now.

And where smartphones and tablets go, perhaps energy may follow. We're arguably in a stage of history where the consumer is king: the consumer can make real choices. Just as we've taken control of telecoms, with instant global communication on social networks, such as Twitter, YouTube and Instagram, and video calls between phones and tablets, perhaps we can do the same with energy.

Who predicted we could be controlling energy consumption in our own home from our smartphones, even 10 years ago? Mobile applications and new technologies have given energy users more control and more choice. Businesses, communities and individuals can all generate their own power today; who knows what the future holds?

In one way or another, power to the people is just beginning. Say hello to the democratization of energy.



Key developments

Country-specific highlights

Chile goes large. A cross-party agreement to expedite key energy legislation should boost investment in transmission networks and geothermal exploration, as well as formalize the ambitious target of 20% renewable energy by 2024. High electricity prices and surging energy demand driven by the mining sector are galvanizing significant project activity, including a number of >100MW wind projects and a giant 400MW CSP project. (See article, page 36.)

India back on track. The reintroduction in the latest budget of generation-based incentives (GBIs) for wind projects is expected to revive the flagging sector, after installations plummeted 50% following the cancellation of the scheme a year ago. The Government also plans to provide low-interest-bearing loans for renewable projects to help tackle financing barriers, while a significant number of large-scale auctions are also helping to spur deployment activity. (See article, page 34.)

Saudi Arabia lays down the rules. January saw completion of the kingdom's largest ground-mounted PV installation to date, a 3.5MW plant in Riyadh. Meanwhile, KA-CARE's 54GW "mega tender" officially got under way following the release in February of a consultation white paper detailing the proposed competitive procurement process. A 500MW–800MW introductory round is expected in the first half of this year, followed by two further rounds, taking expected awarded capacity to around 7GW by 2015.

Brazil scares away wind. In a bid to avoid further connection delays, the Government is proposing that wind farm developers take responsibility for developing new transmission lines in future government-led auctions. Regulators may also apply domestic content rules in future tenders, in addition to those already attached to development bank funding. However, such measures will increase project costs and intensify competition, prompting a number of wind companies to reconsider their presence in Brazil.

Romania's big freeze. April's surprise announcement of a temporary freeze in support for existing projects from 1 July has threatened a mass exodus from the sector. The draft legislation proposes to postpone the allocation of half the GCs awarded to wind projects until 2018, and hold back two of every six GCs for solar projects until 2017, with recovery thereafter. The energy regulator (ANRE) has separately proposed reducing the number of GCs awarded to new projects from 1 January 2014.

Spain deflates. The sector received yet another blow this year following new legislation that reduces subsidies by stripping out the effects of energy, food and tax changes on the inflation rate applied to FIT levels. This has led a number of large international investors to initiate legal action against the Government; international funds have invested an estimated €13b (US$17b) of capital in renewable energy assets in Spain.

Key developments

Deal, investment and policy highlights

BP markets wind assets. The energy giant is to sell its interests in 16 operating wind farms in the US with capacity of around 2.6GW and an estimated value of US$1.5b, as well as 2GW of projects poised to start construction. The company has attributed the divestments to a renewed focus on its main oil and gas business.

Bosch stops the solar engine. Falling prices have been cited as the catalyst for the decision by Germany's Robert Bosch, the world's biggest car parts manufacturer, to abandon its US$2b foray into the solar sector. The group will cease production of ingots, wafers and cells and will seek an expedited sale of its solar business units.

US$1b solar deal easy as ABB. Swiss engineering company ABB, also the world's largest power and automation technology group, has acquired solar inverter manufacturer Power One for US$1b. ABB hopes to use the technology to make it the market leader in connecting solar power to the grid.

UK IPO opens up options. The oversubscribed £260m (US$395m) IPO of Greencoat UK Wind on the London Stock Exchange (LSE) in April may represent a template for green infrastructure funds looking to tap equity in capital markets, after it became the first pure-play investment on operational UK wind farms available on the LSE.

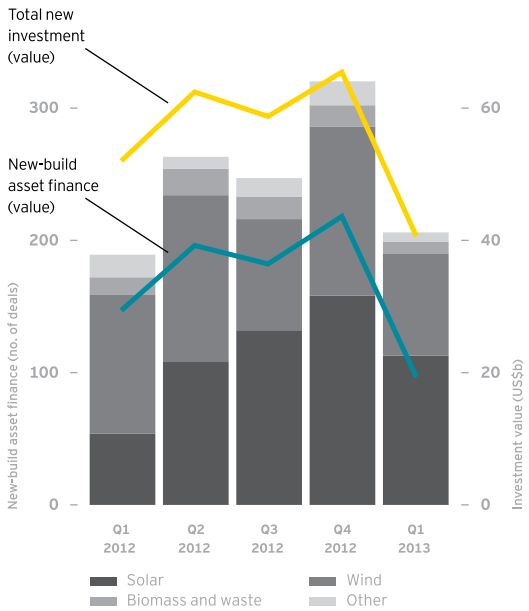
EU 2030 debate ignores real issue. In late March, the European Commission launched a public consultation on the EU's 2030 climate and clean energy framework. The proposals included a 40% carbon reduction target and a 30% energy share for renewables by 2030, up from the 2020 targets of 20%.

However, many see the plummeting price of carbon under the EU's emission trading scheme as a more pressing matter. A decision in April not to postpone a series of permit auctions means the surplus of permits in the market will continue to drag down prices, which fell a further 45% to less than €3/EUA following the decision. Rates this low are extremely unlikely to have any meaningful impact on carbon usage or decision-making.

New clean energy investment worldwide, Q1 2013

Q1 total new clean energy investment of US$40.6b is the lowest quarterly figure since 2009 and down 22% on prior year ...

... but falling prices are expected to boost investment in clean energy assets by 230% to US$630b per year by 2030.*



Source: "Global trends in clean energy investment – Q1 2013 fact pack", BNEF, April 2013

*Extracted from BNEF's *Global renewable energy market outlook 2013,* April 2013, and based on total clean energy asset investment of US$189b in 2012.

Global view

"Mega projects in emerging markets become the norm, while constant tinkering with subsidy programs in Europe threatens credibility."

North America

- President Obama called for the doubling of renewable energy production in the **US** by 2020 and the permanent extension of the production tax credit (PTC) for wind power. Uncertainty over the PTC in 2012 contributed to a 54% fall in new clean energy investment in Q1 2013, and the availability of sufficient tax capacity in the US remains a worry. (See article, page 24.)
- The Bank of Tokyo has helped to kick-start the funding process for the first **US** offshore wind farm, the 468MW Cape Wind project.
- **US** grants to renewables developers have been slashed by around 9% due to an automatic "sequestration" reduction to the federal budget after Congress failed to enact a budget deficit plan by the end of February.
- In February, Spain's Isofoton SA announced plans to construct a giant US$360m 150MW solar PV project in **Mexico,** beginning early 2014. The Ministry of Energy expects solar and wind to surge 150-fold to 1.5GW and 10-fold to 12GW, respectively, by 2020. The Government also intends to add social and environmental externalities to power generation costs from 2014, boosting the relative cost-effectiveness of renewable projects.

South America

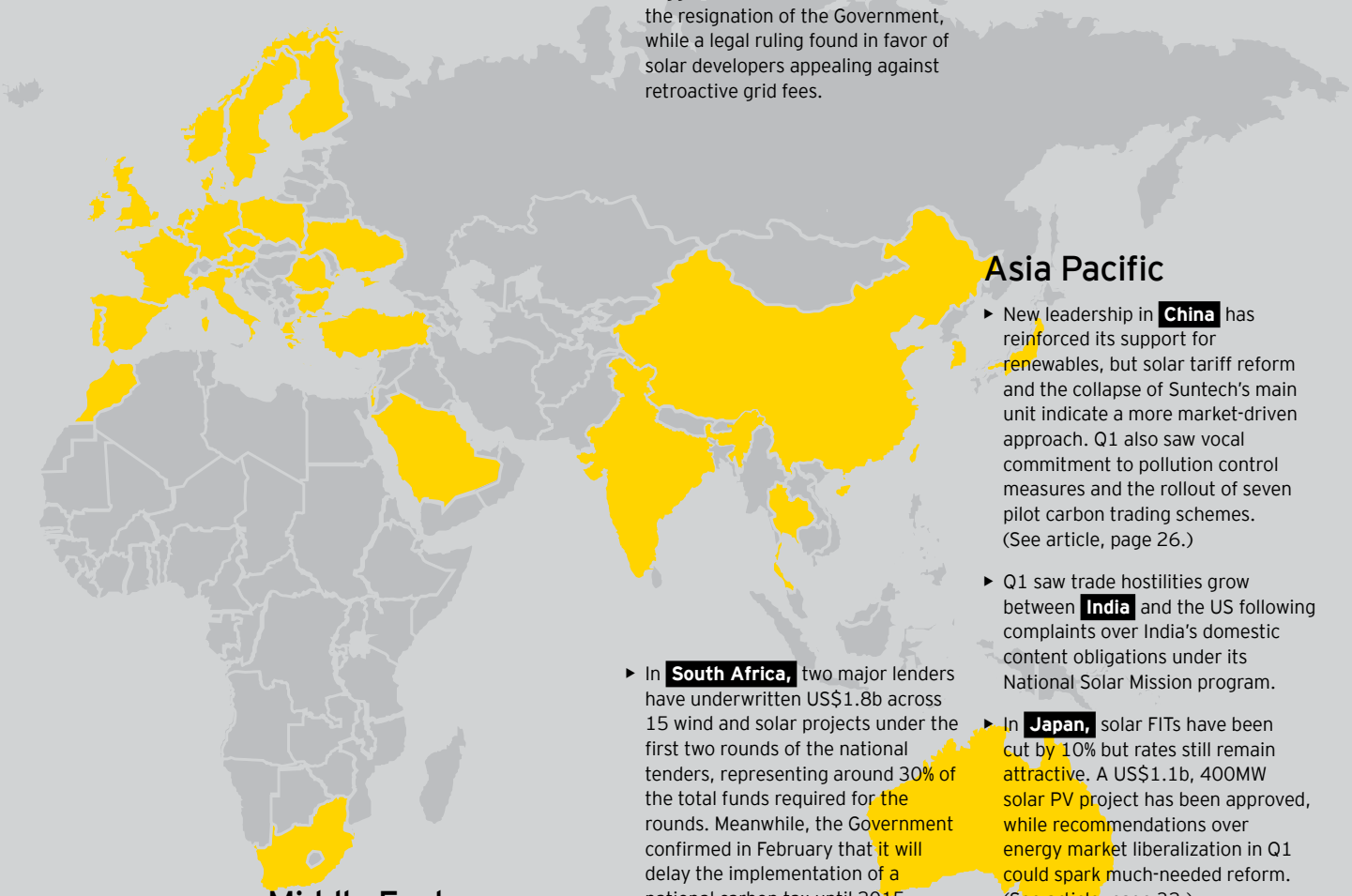
- For **Brazil** and **Chile,** see our "Key developments" section, page 12.

Europe

- In **Ireland,** the Government has extended the eligibility deadline under its second FIT program by two years to 2017, while a decision in March will see dispatch curtailment applied to wind farms on a pro-rata basis, to avoid new wind farms being shut down in favor of existing plants.
- The first stage of the **Netherlands'** SDE+ tariff program reopened in April. However, the scheme continues to be criticized for encouraging the undercosting of projects and disadvantaging more expensive technologies.
- The **French** Government has announced another tender, this time awarding 120MW of medium-sized rooftop solar installations. It also revealed in March that the 1GW second round offshore wind tender will be subject to a ceiling price of €220/MWh (US$287/MWh) – or the median bid value plus 20% if lower – in order to prevent bids exceeding the regulator's suggested tariffs as happened in round one.
- Uncertainty in **Germany** over the outcome of major subsidy reform proposals is likely to stall investment in the short term. (See article, page 28.)

Europe (continued)

- Another draft of **Poland's** delayed renewable energy law includes proposals to reduce subsidies for large-scale solar and a "stabilization fund" to protect investors against GC price drops. Poland is currently the prime destination for green investment in Eastern Europe, but constant delays in implementation and longer-term policy uncertainty is hindering progress – leading DONG Energy to exit the market.
- The **UK** Government has underwritten £75m (US$114m) in biomass loans and is awarding "final investment decisions" for a number of large-scale projects ahead of "contract for difference" strike prices being released. However, tax breaks for shale gas and nuclear cost allocation continue to send mixed policy signals.
- **Bulgaria's** high energy bills and unstable generating capacity triggered mass demonstrations and the resignation of the Government, while a legal ruling found in favor of solar developers appealing against retroactive grid fees.
- Solar installations in **Greece** doubled in 2012, despite various FIT reductions and taxes last year, and early 2013 saw a rush to beat further cuts. The Public Power Corporation S.A. also launched a series of tenders for large-scale solar PV projects, although financing remains a key barrier.
- For **Romania** and **Spain,** see our "Key developments" section, page 12.



Asia Pacific

- New leadership in **China** has reinforced its support for renewables, but solar tariff reform and the collapse of Suntech's main unit indicate a more market-driven approach. Q1 also saw vocal commitment to pollution control measures and the rollout of seven pilot carbon trading schemes. (See article, page 26.)
- Q1 saw trade hostilities grow between **India** and the US following complaints over India's domestic content obligations under its National Solar Mission program.
- In **Japan,** solar FITs have been cut by 10% but rates still remain attractive. A US$1.1b, 400MW solar PV project has been approved, while recommendations over energy market liberalization in Q1 could spark much-needed reform. (See article, page 32.)
- Recommendations to leave **Australia's** renewable energy target unchanged coincide with the latest analysis suggesting grid parity has been achieved for new wind projects. (See article, page 30.)
- For **India,** see our "Key developments" section (page 12) and country articles (page 34).

Middle East and Africa

- **Morocco** is now planning its first 50MW solar PV auction, in addition to January's 300MW CSP tender. Meanwhile, GDF Suez announced it will develop the 300MW Tarfaya wind farm at a cost of €450m (US$586m), making it Africa's largest wind farm.
- In **South Africa,** two major lenders have underwritten US$1.8b across 15 wind and solar projects under the first two rounds of the national tenders, representing around 30% of the total funds required for the rounds. Meanwhile, the Government confirmed in February that it will delay the implementation of a national carbon tax until 2015.
- In March, the 100MW Shams 1 CSP project – the world's largest operational CSP project – was officially inaugurated in the **UAE.** At a cost of US$600m, it represents a major milestone in the deployment of solar power in the Middle East.
- For **Saudi Arabia,** see our "Key developments" section, page 12.

Our index

RECAI scores and rankings at May 2013

(See page 38 for individual technology indices.)

Rank	Country	RECAI score	Macro drivers			Energy market drivers			Technology-specific drivers		
			Macro stability	Ease of doing business	Total	Prioritization of renewables	Bankability of renewables	Total	Wind	Solar	Other technologies
1	US	71.6	77.3	71.2	73.6	38.6	75.0	60.4	68.0	79.4	52.0
2	China	70.7	66.4	44.2	53.1	58.3	62.9	61.1	77.5	78.5	55.7
3	Germany	67.6	75.7	61.0	66.9	55.4	72.7	65.8	59.9	63.0	45.8
4	Australia	60.6	85.1	73.0	77.9	53.6	65.6	60.8	46.9	57.2	30.1
5	UK	60.0	77.8	75.0	76.1	51.2	68.7	61.7	59.0	38.7	35.3
6	Japan	59.4	77.1	59.8	66.7	45.1	69.9	60.0	44.3	57.1	49.8
7	Canada	57.8	81.3	74.0	76.9	47.8	61.6	56.1	52.4	45.6	45.4
8	India	54.9	52.1	37.3	43.2	58.8	49.3	53.1	52.2	61.0	44.9
9	France	54.0	70.4	60.8	64.6	42.0	60.6	53.1	47.0	49.3	39.3
10	Belgium	53.9	67.3	78.0	73.7	65.0	61.1	62.6	42.4	36.9	26.4
11	Italy	53.7	46.7	45.7	46.1	50.7	63.9	58.6	37.9	57.9	42.8
12	South Korea	52.7	65.8	60.9	62.9	63.3	55.7	58.7	40.1	42.0	40.8
13	Spain	51.1	51.7	55.9	54.2	48.2	67.1	59.5	37.0	45.8	27.5
14	Netherlands	51.1	75.9	63.2	68.3	58.3	62.8	61.0	44.1	29.1	28.2
15	Brazil	50.7	47.9	39.0	42.6	51.2	56.5	54.3	45.9	43.0	57.5
16	Denmark	50.7	79.4	74.1	76.2	56.8	61.1	59.4	46.3	24.7	28.1
17	Sweden	50.3	81.5	73.4	76.6	58.0	63.0	61.0	44.4	20.7	38.5
18	Chile	49.8	74.0	70.9	72.1	64.8	54.9	58.8	32.6	38.0	32.5
19	Portugal	49.2	43.0	65.9	56.7	55.0	55.5	55.3	38.4	40.8	35.1
20	Austria	48.6	73.4	66.0	68.9	64.3	59.9	61.6	32.1	31.6	34.3
21	Poland	47.6	64.5	55.5	59.1	61.1	56.2	58.2	40.1	28.5	31.2
22	Taiwan	46.6	66.2	63.1	64.3	45.0	57.0	52.2	32.7	40.3	30.3
23	South Africa	46.1	60.9	61.0	60.9	41.4	49.4	46.2	35.9	48.0	26.2
24	Turkey	45.9	46.8	52.5	50.2	52.9	47.3	49.5	41.7	36.8	37.9
25	Norway	45.9	79.9	75.6	77.3	52.1	61.1	57.5	43.0	13.8	33.1
26	Peru	45.8	57.9	68.4	64.2	50.5	55.5	53.5	24.9	41.1	42.3
27	Israel	45.2	70.2	69.3	69.6	59.2	54.5	56.4	19.7	45.5	17.3
28	Ireland	44.9	66.7	68.6	67.8	66.1	58.5	61.5	42.2	13.6	17.1
29	Mexico	44.7	54.6	58.4	56.9	50.4	47.8	48.9	38.2	36.0	28.6
30	Thailand	44.7	56.7	70.0	64.7	52.8	48.2	50.1	25.0	45.6	28.4
31	Morocco	44.2	49.9	45.5	47.3	58.1	49.4	52.9	36.3	38.4	12.3
32	Finland	43.4	81.7	69.7	74.5	46.8	61.5	55.6	40.5	12.7	29.7
33	Romania	43.3	47.4	49.4	48.6	58.1	49.2	52.8	36.7	31.5	21.1
34	Czech	42.4	57.8	56.8	57.2	56.8	50.5	53.0	28.0	32.6	28.5
35	New Zealand	42.3	84.8	78.9	81.3	56.6	61.3	59.4	32.9	16.6	13.3
36	Bulgaria	42.2	53.8	55.6	54.9	54.5	48.0	50.6	30.0	35.3	22.6
37	Slovenia	41.4	55.8	57.9	57.0	71.0	48.4	57.5	18.9	33.6	30.2
38	Saudi Arabia	40.3	66.0	72.4	69.8	44.1	50.8	48.1	16.6	47.0	3.5
39	Ukraine	38.4	40.9	30.9	34.9	45.5	37.8	40.9	35.6	40.6	27.0
40	Greece	38.4	31.2	38.1	35.4	49.2	30.7	38.1	34.1	48.7	25.0

Index highlights

Important note to our readers: new methodology

Who would have predicted the world we currently live in 5 years ago, let alone 10? The global renewable energy sector is facing a time when market fundamentals, such as energy demand, security of energy supply and the affordability of renewable energy (relative to other sources), feature as some of the most prominent drivers of renewable energy growth.

The double-edged sword of recession, in terms of diminishing energy demand and austerity measures that call into question the cost and value for money of renewable energy support, highlights the risk of focusing too much on local policy to drive investment decisions. Long gone are the days when successful renewable energy developers and investors chased the next best FIT scheme around the globe.

Accordingly, 10 years into the RECAI, we have implemented a new methodology in the preparation of the index, to better reflect today's market dynamics. Key changes made to the methodology include:

- **More focus on the importance** of the role renewable energy has to play in the overall energy mix of a particular market, including an increased emphasis on:
  - **Energy supply and demand,** and the cost competitiveness of renewable energy within a particular market
  - **The importance of decarbonization,** taking account of other national commitments driving renewables deployment
- **An increased emphasis** on the economic and political stability of a particular market

For further information on the index methodology, please contact the editor at kwhite@uk.ey.com

Outcomes

The **US** replaces **China** at the top of the index due to comparatively high barriers to entry in Asia's fastest-growing market. China remains an extremely attractive investment prospect, thanks to strong political support, growing energy demand and a robust project pipeline. However, the barriers for external investors to access this growth market and repatriate returns drive the re-alignment.

High barriers to entry for external investors also cause **France** and **India** to score lower than most of their top 10 rivals, although France's score also reflects relatively low levels of electricity demand growth. In India, bankability is jeopardized by the high cost of financing and significant infrastructure barriers.

Auction delays and cancellations contribute to **South Africa** and **Brazil** moving further away from the top 10, as medium-term deployment estimates are downgraded to reflect the shifting timetables.

Chile stands out as the rising star in our index, supported by strong natural resources and a rapidly growing pipeline across a variety of technologies.

Policy uncertainty and severe cuts to power offtake support leave Central and Eastern Europe sitting near the bottom of the index, with a weak macro outlook for **Romania,** in particular, counteracting otherwise reasonable technology prospects. **Poland** fares better, but legislative delays continue to dampen investor appetite.

This issue sees **Peru, Thailand** and **Slovenia** join the index. All three benefit from strong solar resources, with Peru and Slovenia showcasing high levels of support reflected by consistent policy measures and transparent power offtake incentives, while Thailand in particular boasts a strong project pipeline.

Some of our MENA countries drop out of the top 40 this issue. Despite completion of the **UAE's** 100MW Shams 1 CSP plant, deployment forecasts remain low, and a comprehensive policy framework is still lacking. Meanwhile, limited activity in **Egypt** and **Tunisia** reflects their slow recovery from the Arab Spring. Relatively slow progress in **Argentina** also sees it slip out of index.

1 Finance market

The rise of the institutional investor

Capital demand: the eight trillion dollar question

The latest outlook analysis by BNEF estimates that some US$7.6t will be required globally to fund the capital cost of renewable energy power assets between now and 2030, compared with around US$1.2t in 2006–12.

The question for stakeholders in the renewable energy sector is, therefore, where will the money come from? In Europe, utilities have traditionally been the natural finance providers given their ability to access equity and debt capital markets, but even these are now suffering: in 2001, all of the top 10 utilities in Europe were rated A or above, compared with only one in 2012. These downgrades negatively impact the utilities' ability and appetite to allocate significant capital from their balance sheets to renewables.

Even in pre-crunch times of plenty, the funding gap would present a massive challenge to a buoyant leveraged utility equity model, and we are not expecting to return to a buoyant market any time soon. But there are signs that the global financial crisis may have catalyzed the union of two unlikely suitors: the young and capital hungry renewable energy market, and the mature, "deep pocketed" insurance companies and pension funds (here referred to as "institutional investors" or "institutions").

Capital supply: the day the earth stood still

For institutions with 30% to 50% of their estimated US$52.5t assets under management[1] allocated to equities, the global finance crisis prompted a flight to safer havens for institutional capital – such as bond investment – which might typically make up another 30% to 50% of assets under management. But increased demand for this paper drove yields available from high investment grade debt to drop to all-time lows. In some cases, real returns today are in negative territory.

Infrastructure offers new opportunities

In September 2012, the Universities Superannuation Scheme (USS) – the principal pension scheme provided by universities and other educational institutions in the UK – revealed that its deficit had rocketed from £2.9b (US$4.4b) to £9.8b ($US14.9b) over the year, blaming record-low gilt yields. In the same year, USS set itself a target allocation to infrastructure (an asset class that includes renewable energy) of 7% of the pension scheme, equivalent to around £2b (US$3b).

USS was not alone in its increased allocation to infrastructure after 2008, and the reasons are clear. Infrastructure assets have a number of appealing characteristics:

- Long life span
- Relatively predictable cash flows
- Moderate to high yields
- Typically inflation-linked incomes
- Low correlation with other asset classes

Institutions in Europe are increasingly turning to infrastructure assets to meet their risk-return requirements. For example:

- Aviva Investors announced the Return Enhancing and Liability Matching (REaLM®) strategy that aims to hedge against inflation risks and generate returns in excess of liabilities. On 7 August 2012, Aviva Investors REaLM infrastructure fund announced its acquisition of a 23MW portfolio of residential solar PV systems from HomeSun Holdings Ltd.
- Pension Insurance Corporation is a company that relies on investments with a spread over the risk-free rate, but with low volatility so that it can offer attractive pricing to pension schemes whose liabilities it might wish to buy out. Last year, it made a £40m (US$60m) solar plant investment, announcing that it had won the bidding process for a pension scheme shortly afterward.

[1] Investors domiciled in 17 OECD countries (IMF data, September 2011).

In the second example, the timing was not coincidental – it is clear that investments in renewable energy infrastructure can make the difference in pricing such a transaction. The same logic can be applied to companies offering annuities to retail customers or pension funds saving (or providing) for their members' retirement.

Why is progress slower than expected?

The majority of institutions who have sought access to renewable energy assets have used intermediated investment platforms such as specialist investment vehicles and renewable energy infrastructure funds. Most pension funds are slimly resourced and do not have the credit assessment and transaction skills in-house. Others are yet to be convinced of infrastructure's enhanced risk-adjusted returns, citing policy concerns, liquidity and wider regulatory issues, making direct investment difficult.

Direct investment into renewable energy projects remains limited to only a few institutions, for a number of reasons:

- It takes time for the institutions to build specialist in-house expertise, and deal volumes have not been predictable enough or sufficiently large to justify the investment.
- The asset class is still relatively immature, and a liquid market for tradable paper investments (rated or unrated) does not yet exist.
- Some renewable energy support mechanisms do not result in investment grade, inflation-linked revenue streams that institutions value so highly – for example, tax credit incentivization structures.
- Renewable energy competes directly with other infrastructure and wider asset classes (equity capital markets are returning to pre-crunch and, in some cases, all-time, highs).

As the demand for new capital sources increases from project sponsors, and institutions continue to seek long-term predictable yield-bearing investments, it is perhaps inevitable that increased volumes of capital will be derived from institutional investors.

It is also increasingly likely that the number of direct investments will increase over time. This may well have a profound impact on the future of the intermediate fund management model. Other sources of capital are also likely to be needed, such as the deep pools of the debt capital markets. But over the next few years, pension and insurance funds are going to be important players in the global renewable energy sector.

Renewables and institutions: the ingredients of a successful marriage

- **Alignment of interest and equitable apportionment of risk and reward**

Institutions value long-dated index-linked income from renewable energy assets more highly than typical investors in these assets, and so there are benefits for all renewable energy asset and market stakeholders.

Developers and owners benefit from higher premiums paid by the lower-priced capital that direct institutional investment can bring.

There is a natural alignment of interests between the industry and the capital providers. But there needs to be an equitable apportionment of risk and reward to the sponsor and the investor.

- **Understanding investor requirements and structuring the relationship between the capital and the asset appropriately**

Direct investment into renewable energy assets by institutional investors is becoming more frequent, and will accelerate when asset owners and intermediaries better understand institutional investment drivers and provide tailored conduits for their capital.

- **Proven ability to deliver the expected returns**

It is our belief that relatively inexperienced market investors value investment in teams and project counterparties that have a proven ability to manage assets and deliver investor returns above all else.

2 Transactions market

The continuing squeeze

Distress driving supply chain consolidation

The global solar industry continues to grapple with falling materials prices and over-leveraged balance sheets, increasing the probability of renewed M&A activity as consolidation and mergers become more critical for survival. However, falling costs are also prolonging pricing and margin uncertainty across the supply chain, buyer activity continues to be selective, and most of the balance sheet activity we are seeing involves only existing stakeholders. We expect the oversupply in the wind and solar PV sectors, in particular, to lead to further consolidation during 2013, but the current themes are still very much around stressed borrowing positions and restructurings.

In March, Suntech's main subsidiary, Wuxi Suntech Power Co., Ltd., defaulted on US$0.5b of convertible US bonds, triggering the insolvency of one of solar's highest-profile participants. The struggling US-registered Chinese corporation is attracting interest from acquisitive competitors looking to buy up assets as the company seeks to reduce its debt burden. The impact of this and the weakening of other corporate balance sheets throughout the supply chain continue to be cause for concern in the industry. Inventory levels and component prices also continue to be of immediate concern, and these issues are aggravated by rising protectionism.

Elsewhere, though facing similar challenges, Chinese solar manufacturer LDK has been seeking to raise equity from shareholders. While in Europe, SolarWorld is engaged in urgent discussions to reschedule liabilities with creditors of around US$1.2b, again citing industry overcapacity as the main factor adversely affecting its business.

Playing the long game

In our experience, stakeholders (both bank lenders and other creditors) have often adopted a longer-term view in such situations when seeking value from distressed exposure to assets. Attempts to accelerate repayments of borrowings may often erode value — forbearance by lenders and a longer-term view have been notable features of the financial crisis more broadly. Also within the renewables sector, and solar in particular, stability is an absolute requirement for longer-term growth. Therefore, stakeholders will tend to monitor positions closely and avoid precipitate action unless absolutely necessary.

> "Corporate strategies of deleveraging and reducing capacity have led to a churn in good-quality operating assets."

M&A activity around operating assets is being driven by similar deleveraging strategies ...

The story so far has therefore mostly been one of renewables supply chains turning to existing stakeholders for support. But transactions are also closing, with new owners driving renewables industry consolidation. For example:

- The US$1b equity value acquisition of NASDAQ-listed Power-One by leading Swiss power and automation technology major ABB in April will enable ABB to combine Power-One's electricity conversion capabilities and technology with its own.
- Further down the supply chain, we are witnessing a strong appetite from Far East construction groups and original equipment manufacturers (OEMs) seeking development pipelines of solar and wind assets to provide a distribution channel for their products.

... but also as operating asset owners reallocate their capital priorities

Factors driving the levels of investment in renewables include divestment needs, market restructuring and the entry of new investors into the sectors. Utilities and

"The mismatch between project sponsors' capital expenditure plans and the corporate capacity to finance this investment will continue to drive more asset disposals."

financial buyers are finding greater value in buying operational plants than in investing in plant construction. Also, many European utilities are pressured by tightening balance sheets, and US utilities appear to be seeking to rebalance their holdings in favor of regulated businesses.

The above drivers for corporate strategies of deleveraging and reducing capacity have led to a churn in good-quality operating assets. We have seen a ready supply of buyers for such assets across Europe, particularly from pension and infrastructure funds but also well-funded industrial groups. Chinese OEMs such as GoldWind have, for some time, been seeking wind installation investments in Europe.

Such transactions include Vestas selling a number of operating wind farms to the original developers, as well as to local utilities in Europe and Chile in recent months.

Turning the tide

We are also seeing an increase in the sale of emerging technology applications with one or two operating assets as reference sites. Such deals seek to crystallize fair value for the developer while passing the technology to an owner who is well-placed to commercialize its potential. In 2012, for example, we advised Rolls-Royce plc on its strategic options for a tidal energy technology division that it had developed in the UK, later advising on a sale of the business and IP to Alstom at a point when their landmark marine technology installation went operational in Scotland.

Energy mix optimization — corporates get in on the act

Our 2012 global survey of 100 energy-intensive companies with revenues in excess of US$1b identified energy issues facing C-suites over the next five years. It revealed that 67% of boards expect to increase the proportion of renewables in energy generated with company-owned or -controlled assets. By setting their own ambitious criteria, e.g., specific generation, capacity or investment targets, we expect this to drive broader interest in owned renewables assets and greater adoption of direct energy procurement by corporate energy users.

Early adopters such as IKEA and Google have been prolific, with Google investing over US$1b in renewable energy construction. The objective is often to physically build operating assets, i.e., to increase the built asset base as opposed to acquiring an existing asset that doesn't intrinsically add to the "green" agenda in the same way.

That said, for smaller corporates, the daunting prospect of investing millions in a renewables plant can be risk-mitigated and financed more readily by acquiring an operating asset, perhaps by partnering with a financial investor (e.g., Duke Energy worked with Google). Not surprisingly, the OEMs are keen to partner with corporates in developing these assets, in terms of operations and maintenance as well as financing and acquisition support.

M&A outlook

The mismatch between project sponsors' capital expenditure plans and the corporate capacity to finance this investment will continue to drive more asset disposals. Both financial investors (with an increasing number of pension and insurance funds casting their eyes over the renewable energy sector) and OEMs under pressure from overcapacity are likely to remain the most active buyers of operational assets and development assets, respectively.

We would also expect to see some trading of loan book portfolios over the coming months as various banks look to redress their long-term lending positions.

Meanwhile, further consolidation can be expected in the supply chain. Depressed pricing, reduced fiscal support for renewables and continued overcapacity are all going to contribute to additional casualties in the year ahead.

3 Policy and regulation

From subsidy to diversity

Unprecedented change in the economic fortunes of largely Western markets, and the emergence of energy-hungry BRIC economies, has led to dramatic shifts in energy policy that would have been impossible to predict only a few years ago. This raises the question of what exactly is driving the sector now?

The subsidy drug

Throughout the early incubation of the global renewables sector — dating back to the 1970s — and the rapid growth seen more recently, one constant has been the industry's dependence on subsidies. While there has been endless debate about which forms of subsidy will most help meet renewable energy deployment targets, subsidies have remained a constant presence in one form or another.

An industry built on a foundation of subsidy will inevitably become reliant on it. It could be argued that the generously subsidized solar and wind markets in Europe did not create the right environment for driving down cost and resulted in the industry being criticized for pushing up energy bills. Contrast this to the industrial approach taken in the East, where a ruthless approach to cost reduction has left the more mature supply chains in Europe and the US teetering precariously. Overcapacity, particularly in the solar sector, has exacerbated the problem.

Kicking the habit

The impact of the global crisis has pushed the affordability of renewables subsidies firmly into focus. Government austerity programs have led to cuts in fiscal support around the globe, accelerating the timeframe in which the sector needs to wean itself off subsidy dependency. In the more extreme cases, such as Spain and Bulgaria, retroactive adjustments to FITs have triggered an exodus from the sector almost overnight. The industry therefore faces a future independent of subsidies, and it must try to manage this transition carefully.

This brave new world focuses attention on other areas of cost reduction, such as financing costs and transactional efficiency, and calls for innovation in new business models to reach parts of the value chain previously untouched or under-exploited. Dr. Robert Gross spoke of this opportunity: "it is regrettable that the potential for infrastructure investment, and associated economic stimulus, is being wasted at a time of very cheap money."[1]

However, this is far from a worrying time for the sector. Some onshore wind and solar PV technologies can now compete with their hydrocarbon brothers without subsidy in numerous applications. Mature sectors in renewable energy should seek to make a meaningful contribution to global energy supply, independent of government support.

Emerging markets join the race

While subsidy withdrawals by Western governments have left local industries in turmoil, emerging economies have been ploughing investment into local manufacturing, supported by ambitious deployment plans. Professor Tom Burke argues that "decarbonization in emerging economies is being accelerated by the convergence of energy security as a driver for energy policy, with concerns regarding climate change, which differentially impacts the least developed countries."[2]

China has focused investment to match an insatiable growth in energy demand, while air quality issues have put decarbonization firmly on the agenda of the politically active middle classes. China's renewables ambitions span the domestic market, where it plans to install 49GW in 2013, and growth through export credit agency-backed outbound investment into markets such as India, South Africa and Brazil.

Other emerging economies have also been ambitious. Faced with the very real threat of the lights going out, India is driving new levels of power sector investment and aims to nearly double the amount it generates from renewable sources. South Africa is now two rounds into its REFIT program, aiming to install 3.7GW by 2016, while Saudi Arabia has recently committed €10b (US$13b) to solar development plans. Unpredictable events such as Fukushima have also transformed energy policy in Japan and elsewhere by engendering a shift from nuclear to renewables.

Decarbonization alone is therefore no longer the key policy driver. In these times of austerity and heightened global competition, the drivers of economic growth, economic diversification and energy security, arguably put the renewables sector on much more solid foundations.

"It is regrettable that the potential for infrastructure investment, and associated economic stimulus, is being wasted at a time of very cheap money."

So where next?

With national subsidy budgets dwindling and emerging economies increasing global competition, does this mark the end of government-led financial incentives?

Notwithstanding the increasing number of renewables installations that are now being deployed subsidy-free, the sector as a whole is still not ready for a world without fixed prices. According to Dr. Gross, to think otherwise "misunderstands the nature of investment in markets where marginal price is set by fossil fuels."[1]

Emerging technologies in particular will continue to rely on fiscal and regulatory support to catch up with their wind and solar counterparts, although we can expect this journey to maturity to be much more rapid. What is needed, says Dr. Gross, is "market redesign that creates the right conditions for investment in technologies that are capital intensive but need no fuel."[1]

When it arrives in earnest, the impact of grid parity will be transformational. Cost reductions in established technologies have broadly followed long-term expectations in line with learning rates, but the industry must now work together across the value chain to pursue further cost reductions more aggressively. However, more mature technologies should not cannibalize the funding available to the detriment of newer technologies.

Global pacts still needed

At the same time, it is unrealistic that fixed 25-year offtake prices alone will create the necessary foundations for a sector trying to compete against fossil fuels on a global scale. The industry should continue to seek internationally agreed mechanisms and legally binding targets, in order to transcend geographical constraints and policy dependency. Without these, trade protectionism, competing fossil fuel agendas and failure of economic giants such as the US and China to set an example will prevent a truly global low carbon economy.

Energy users take ownership

The real revolution, however, must come from the way we use energy; energy efficiency programs, smart grids, decentralization of energy generation, energy storage solutions and electric vehicles will all help energy users gain more control over the quantity and source of their own energy equilibrium. This shift benefits from being aligned to the focus on cost competitiveness. This energy revolution has already started, but "governments have a role to play in de-risking and investing in the big infrastructure such as electric vehicle charging,"[2] says Professor Burke.

From subsidy to diversity

A global low carbon economy now depends on energy efficiency measures, economic growth drivers, cross-border cooperation, technological advancements and infrastructure investments, as much as it depends on subsidy handouts and national policy. Diversity is key.

But at the same time, effectual international agreements are yet to materialize and the global financial crisis is hindering policy efforts at a national level. In this move from subsidy to diversity, therefore, it is individuals and corporates, not policy makers, that are likely to be the real driving force of the energy revolution.

[1] Dr. Robert Gross, interviewed by Ernst & Young, *RECAI Issue 37*, 8 May 2013. Dr.Gross is Senior Lecturer and Director of the Centre for Energy Policy and Technology at Imperial College, London; Policy Director, Energy Futures Lab; and Head of the UKERC's Technology and Policy assessment function ICEPT.

[2] Professor Tom Burke, interviewed by Ernst & Young, *RECAI Issue 37*, 29 April 2013. Professor Burke is Founding Director of E3G, Chairman of the Editorial Board of ENDS magazine (Environmental Data Services) and Visiting Professor at Imperial and University Colleges, London.

Country focus

US

Highlights

- **Obama calls for doubling of renewable energy by 2020 and a US$2b clean technology fund**
- **Boom-bust effect of PTC uncertainty resulted in 54% year-on-year drop in new investment in Q1**
- **US$12b tax credit extension fuels permanent versus phaseout debate**
- **Call for fossil fuel tax break to be extended to renewable energy**
- **Senators propose carbon tax legislation to raise US$1.2t**
- **US$2b debt financing for flagship 468MW offshore program gets under way**

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Obama's vocal commitment In March, President Obama unveiled his "blueprint for a clean and secure energy future." This included a call for the US to double renewable energy generation again by 2020 and halve oil imports against 2008 levels. It also proposed a US$2b fund that will provide targeted support over the next decade, via an Energy Security Trust, for research initiatives designed to accelerate the cost-effective rollout of a wide range of clean technologies, such as electric vehicles, homegrown biofuels and fuel cells. He also called for the Department of the Interior to improve its permitting process for clean energy projects.

While this development and Obama's State of the Union Address in February, in which he affirmed the need to combat climate change, are both positive for alternative energies, details on specific actions were notably lacking. And Obama arguably faces more constraints, both fiscal and political, than he did on first taking office.

The notorious collapse of Solyndra in 2011 under a mountain of government debt totaling US$528m, together with the fossil fuel boom resulting in historically low gas prices, means Obama now has to champion a broader energy strategy encompassing oil and gas as well as alternative energy sources. The US$2b funding proposal, for example, includes support for research to increase the volume of domestically produced natural gas and does not specifically cover renewable energy technologies such as wind and solar.

PTC boom and bust triggers 54% fall in new investment One notable and unmistakable pledge in Obama's energy blueprint, however, was a call on Congress to make the renewable energy PTC permanent and refundable. The January 2013 extension of the tax credits for wind projects came too late to prevent layoffs across the supply chain and a significant slowdown in development, a scenario likely to be repeated in 2014

US ranking snapshot	Issue 37
Total RECAI	1
Onshore wind	1
Offshore wind	6
Solar PV	1
Solar CSP	1
Biomass	4
Geothermal	1
Hydro and marine	2

The fight for climate change and renewable energy incentives is no longer restricted to the political arena; big business has stepped onto the battlefield.

unless new legislation this year provides some long-term clarity. Figures from BNEF indicate that the US saw a 54% year-on-year fall in new clean energy investment in Q1, in part as a result of the rush to complete projects before the anticipated expiry of the PTC in December 2012.

While the high cost will probably decrease the likelihood of Congress permanently extending the tax credit – the current extension is estimated to cost more than US$12b over 10 years – its inclusion in the budget is a strong signal of Obama's intention to retain the PTC beyond the current December 2013 expiration date.

However, there are still calls to abandon the credits by some factions, and even supporters of the incentive, such as the American Wind Energy Association, have proposed a six-year phaseout as opposed to a permanent and indefinite extension, which some see as unrealistic in the face of economic austerity and falling technology costs.

PTC eligibility ruling good news for wind

Mid-April saw the Internal Revenue Service (IRS) release clearer rules defining the tax credit eligibility criteria under January's extension. Of particular note is the welcome news that the IRS will now treat each wind farm as a single project so that work on any part of the project will qualify as the start of construction of the entire project, as opposed to previously, when each turbine and tower had been treated as a separate power plant for PTC purposes.

Big business steps onto the battlefield

Critically, the fight for renewable incentives is no longer just restricted to the political arena. In February, the highly influential Business Roundtable released a report entitled *Taking Action on Energy: A CEO Vision for America's Energy Future,* which set out recommendations for a detailed, comprehensive national energy strategy. In particular, it called for a "smooth transition to an era of unsubsidized competitiveness" by extending, but gradually reducing and ultimately eliminating, the PTC for wind projects.

Beneficial tax structure open to all The report also called for the extension of the master limited partnership to renewable energy projects – a publicly traded fossil fuel tax break that combines the tax benefits of a limited partnership with the liquidity of a publicly traded company. This was also the subject of legislation proposed by a bipartisan group of four senators in late April, which would see renewable projects also take advantage of this tax-advantaged corporate structure on a non-discriminatory basis.

Retail giants call for climate change measures Pressure from big business is showing no sign of letting up; April saw the release of the Climate Declaration by high-profile corporates such as Ben & Jerry's, IKEA, Starbucks, eBay and Intel, claiming that climate change is "one of America's greatest economic opportunities of the 21st century." A number of these companies are already taking measures to boost efficiency and reduce carbon emissions in anticipation of some kind of carbon pricing mechanism, and are now calling for Congress to enforce this in legislation.

Carbon tax bill gets ball rolling In February, two senators submitted a climate bill that proposes to reduce carbon emissions to 80% below 2005 levels within a decade and raise up to US$1.2t over the same period via a tax of US$20 per tonne of CO^2 emitted beyond a specified threshold. Even supporters of the bill acknowledge the dismal odds of it entering legislation in the current partisan climate; however, it remains a strong signal that there are pockets of proactivity within the political community.

More large-scale projects on the horizon

After almost a decade in development, the country's flagship 468MW Cape Wind offshore wind project received a much-needed boost in March when it signed a term agreement with Bank of Tokyo-Mitsubishi UFJ to act as global coordinating lead arranger for the project and raise around US$2b in debt financing, covering almost 80% of the total estimated project cost.

In other project news, the Department of the Interior has prioritized 23 renewable energy projects – totaling 5.3GW in capacity – on public lands in Arizona, California and Nevada. March also saw formal approvals for a number of large-scale projects, including California's 750MW McCoy solar project and Nevada's 200MW Searchlight wind energy project.

Country focus

China

Highlights

- **New leadership marks new era and US$2.4b of renewable energy subsidies sends strong signal on appetite for clean energy**
- **Pollution control measures and a 2015 national carbon scheme raise priority of decarbonization**
- **Solar tariff reductions and collapse of Suntech signal more market-driven approach, but jeopardize 10GW target in 2013**
- **Grid bottlenecks threaten profitability as 20% of installed wind installations still not connected at the end of 2012**

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New leadership maintains the status quo

March marked the start of a new era for Chinese policy making as the country welcomed a new President and Premier. While political change often results in policy reversals and varying appetites for a low carbon economy, there appear to be no such worries in China. Early indications are that significant investment in renewable energy is here to stay and remains a critical part of the Government's long-term growth strategy.

Nothing showcases this more clearly than April's announcement that around CYN14.8b (US$2.4b) has been allocated for renewable energy subsidies, in a bid to meet the country's target of installing 100GW of wind, 21GW of solar and 13GW of biomass by 2015.

Decarbonization high on the agenda

The new Premier has also been vocal in his commitment to reduce pollution levels since taking office, and in mid March, Vice Environment Minister Wu Xiaoqing presented a number of policy proposals to tackle the issue, including a pilot program to control coal consumption across three areas.

These announcements coincide with the planned rollout from June of emissions trading pilot schemes across seven different cities and provinces, including Beijing and Shanghai. China is targeting a national carbon trading scheme by 2015, and has also been considering a compulsory carbon tax, although the Government confirmed in March that it has postponed the latter for at least a year due to severe opposition from the coal industry and inflationary concerns.

The implementation of a national emissions trading scheme could have some interesting global repercussions for cross-border trading schemes, and could remove the objection from some US carbon market opponents that adoption of such a scheme in the US would put them at a disadvantage to China.

China ranking snapshot	Issue 37
Total RECAI	2
Onshore wind	2
Offshore wind	3
Solar PV	2
Solar CSP	4
Biomass	3
Geothermal	8
Hydro and marine	1

Solar tariff reforms signal a change of direction, away from a pure growth market propped up by financial subsidies.

Solar tariff reform signals more sustainable approach The new leadership also seems keen to continue its support for the solar sector, although proposals do signal a slight change of direction, away from a pure growth market propped up by financial subsidies. The March proposal would replace the uniform production subsidy of CYN1/kWh (US$0.2/kWh) under the current FIT scheme, with four tariffs based on the location of the solar installations, effectively representing a FIT reduction in three of the four designated regions. The Government is also reportedly planning to introduce a tariff of CNY0.35/kWh (US$0.06/kWh) for grid-connected distributed solar power projects with capacities less than 6MW.

Amendments to the support structure for solar PV are also likely to see the cancellation of the Golden Sun capex-based subsidy program, as many believe it has limited ability to encourage high-quality projects that can secure connection to the grid.

While, on the one hand, these revisions indicate a new focus on sustainable growth in the face of falling technology costs, they may also jeopardize China's ability to meet its ambitious target of doubling annual solar installations to 10GW in 2013, given only 5GW was installed in 2012 when the more attractive FIT was available.

Suntech collapse may have a silver lining Such subsidy reforms may also conflict with the Government's objective of supporting its troubled solar manufacturing sector, as oversupply resulting from subdued global demand continues to push down prices and squeeze profits in the aftermath of aggressive debt-driven expansions.

The bankruptcy in March of Wuxi Suntech, the main subsidiary of Suntech Power Holdings, the world's largest solar panel producer, is perhaps China's most high-profile casualty to date. The petition for insolvency and restructuring was filed by eight Chinese banks on 18 March 2013, following Wuxi Suntech's default on US$541m of bonds just three days earlier. It is reported that the bankruptcy may wipe out more than US$1.28b that Wall Street and debt investors had ploughed into the solar manufacturer.

However, it is perhaps interesting that, contrary to strong policy signals over the past 12 months that the Government was willing to prop up its major solar companies, the collapse of Suntech's main unit and its subsequent restructuring may advocate more of a market-driven approach. State intervention can sometimes circumvent the natural process of competition and prevent the much-needed restructuring of the solar supply chain. Therefore, the exercise of market forces – if intentional – is an encouraging sign.

Possible EU import tariff on horizon It seems, however, that the new leadership will not be able to escape the ongoing international trade disputes relating to anti-dumping and anti-subsidy allegations over solar components. The latest developments in March saw EU Member States approve the EC's plan to register solar panels imported from China, interpreted as possible preparation for a new retroactive import tariff later this year.

The Chinese Government has indicated that it would impose "countermeasures" should such import taxes come into force, although this could also hurt the country's own wafer makers, which still need to import raw materials. Tensions have been increased further by the EU's decision to widen its anti-dumping investigation to include solar glass manufacturers.

Wind curtailment hitting profits Despite new figures showing that wind power has now overtaken nuclear as the third-largest energy source in China after coal and hydropower, and the country retaining its position as the largest wind market for the fourth year running, power transmission bottlenecks continue to jeopardize sustained growth levels in the sector. At the end of 2012, 20% of cumulative onshore wind installations were still not connected to the grid.

The high curtailment rate for wind projects is also increasingly hurting profits. In 2012, Huaneug reported a 22.8% year-on-year increase in gross generation but a 9.6% year-on-year decline in utilization hours, while Longyuan Power lost an estimated CYN1.3b (US$207.4m) in revenue as a result of grid connection failure.

There are some signs that the Government is starting to tackle the shortcomings of its transmission and distribution network. However, it will still take several more years to completely close the gap between installed and grid-connected wind capacity.

Country focus

Germany

Highlights

- **Normally a beacon of stability, Germany proposes tariff freezes and even the possibility of retroactive cuts, but upcoming election likely to prolong uncertainty**
- **Major utility abandons project pipeline**
- **Renewable subsides are taking the hit, despite representing only 50% of the rising consumer surcharge – exemptions and systemic pricing issues may be the real culprit**
- **€1.4b (US$1.8b) offshore project reaches financial close, while new entrant secures €1b (US$1.3b) grid deal**

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Renewables policy enters the twilight zone of uncertainty

For a country that is well known for its stable and decisive policy-making, the current uncertainty over proposed reductions to financial support for renewables has proved to be disconcerting for many, with rumblings that a range of investors and developers intend to reduce investment heavily in the country's green energy market.

Late January saw Environment Minister Peter Altmaier announce a freeze in the renewables surcharge paid by electricity consumers, in response to rising electricity prices. After an initial plan to finance this freeze via reductions in renewable energy subsidies was rejected by Economics Minister Philip Rösler as being insufficient, a joint proposal was prepared by the two ministers in February. This would set a moratorium on FIT payments to new plants for the first five months of operation, lower FITs for new wind installations by around 11% to €0.08/kWh (US$0.10/kWh) and remove a FIT bonus for repowering old turbine sites.

Controversially, the proposal also included a one-off 1.5% reduction in FITs for existing plants from 2014, in addition to gradual reductions already legislated for. However, Chancellor Merkel in March vowed the Government would not impose retroactive cuts, which has eased some anxiety within the renewables community. Yet some banks are using this general market discontent to impose triggering events or renegotiate funding terms on project finance already secured, or to cancel negotiated term sheets altogether.

At the time of writing, Chancellor Merkel and state premiers had yet to reach an agreement on the proposals and, while talks are due to continue on how to tackle rising power prices, comprehensive legislative reform is unlikely before September's federal elections, according to Merkel, pushing any change in the FIT scheme into 2014 at the earliest.

Germany ranking snapshot	Issue 37
Total RECAI	3
Onshore wind	3
Offshore wind	2
Solar PV	3
Solar CSP	23
Biomass	1
Geothermal	6
Hydro and marine	7

Subsidy reform proposals means companies are now planning projects for 2017, with no idea of what the regime will look like.

Industry openly condemns destabilizing effect of proposed cuts There are already signs that the uncertainty created by the proposals is starting to deter investment. Munich utility Stadtwerke München – which unveiled a €9b (US$12b) renewables investment program in 2008 – announced it will halt all planned projects in the sector that are not already under construction. A number of other players, such as Nordex and REpower, have also spoken out on the insecurity such policy uncertainty creates for investment decisions.

This is particularly pertinent in the offshore sector, where long lead times mean companies are now planning projects for 2017 with no idea of what the regime will look like, which in some cases could render original investment calculations invalid.

"Subsidy" overhaul may miss the point The proposed subsidy reductions were, in large part, triggered by the impact of the 47% hike in the renewables surcharge on consumer energy bills in late 2012; unlike subsidies for the mining and nuclear sectors, this is the only "subsidy" that is paid by customers and not by the Government. However, turbine maker Enercon, among others, has openly called for an assessment of what is actually driving this increase, speculating that the wind sector – and potentially renewables more generally – has been unfairly targeted.

Renewable energy production costs apparently account for only half the surcharge, with solar PV representing around 50% of this amount, biomass around 25% and wind only 10%. The other half of the surcharge reflects the cost of compensating energy-intensive companies that are exempt from the surcharge, as well as any adjustments for incorrect prior year estimates.

Some are also pointing to systemic errors from the "merit-order effect" inherent in Germany's pricing system, whereby priority of dispatch for renewable power on very sunny or windy days brings down the spot price due to excess supply. However, households are unable to access this low spot price and, as the renewables surcharge compensates for the difference between the spot market electricity price and FIT levels, this actually increases the surcharge during periods of high renewable energy generation. Therefore, sweeping cuts to renewable subsidies alone may not fully address the crux of the problem.

Politics muddy the waters but independent body may help The issue of how to deal with rising electricity prices has arguably been complicated further by the tense political environment trigged by a September federal election. None of the parties want to be accused of being insensitive to the plight of poorer Germans facing higher energy prices, a line Merkel's party may be able to take if opponents do try to delay Altmaier's proposals.

The Chancellor has also proposed setting up an independent national energy ministry, which may overcome the damaging impact of internal political wrangling over clean energy policy. While the current policy uncertainty is uncharacteristic for Germany, there is still some hope that a stable and intelligent solution will emerge.

Offshore wind gets back on track While policy dominated Q1, there were clearer signals for the offshore sector, which continues to battle with grid and cost challenges. The 288MW, €1.4b (US$1.8b) Butendiek offshore wind project reached financial close in February following the negotiation of a €937m (US$1.22b) senior debt package with a syndicate of nine lenders, as well as the European Investment Bank, Germany's state-run KfW Group and Denmark's Eksport Kredit Fonden. The news is a positive signal that offshore projects are starting to overcome fund-raising challenges.

Q1 also saw a new manufacturer enter an offshore market that has traditionally been dominated by ABB and Siemens. French manufacturer Alstom was awarded a €1b (US $1.3b) contract by Germany's network operator, to help connect five offshore wind farms to the grid.

Storage subsidies and FIT cuts target sustainable solar The Government announced that it will pay €660/kW (US$860/kW) of storage capacity as part of a €32.6m (US$42.5m) subsidization program starting 1 May, to encourage the purchase of battery systems to store solar power. Combined with the start of the 2.2% monthly degression of solar FITs in Q1, this could make it more attractive for households in particular to consume self-generated solar energy rather feeding it into the grid and claiming a FIT.

Country focus

Australia

Highlights

- **Recommendation to leave 41TWh renewables target unchanged offers some stability but carbon price still under fire**
- **Grid parity arrives for wind power – new wind installations now 14% and 18% cheaper than new coal and gas power plants, according to BNEF**
- **China's biggest coal producer to jointly invest AU$1.6b (US$1.7b) to develop at least 700MW of wind, as investors from Asia target a US$24b project financing gap**
- **420MW Macarthur wind farm costing AU$1b (US$1b) becomes operational; now the largest in the southern hemisphere**

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With stable policy measures currently at the top of the wish list for every investor and developer trying to make long-term project decisions, it seems at least one policy-maker is intent on making dreams come true. On 21 March, Greg Combet, Australia's Minister for Climate Change, confirmed that the country's 2020 renewable energy target (RET) would remain unchanged at 41TWh, equivalent to around 20% of total electricity consumption.

The Government also accepted the recommendation of the Climate Commission – which completed its first statutory review of the RET in December 2012 – that the frequency of scheduled reviews should be increased from two to four years, though this particular revision is yet to be approved by Parliament. With high-profile players, such as French energy equipment manufacturer Alstom and Korea's Samsung, previously threatening to halt investment in the country should the RET be amended, the importance of such decisions should not be understated.

Opposition pledge on carbon endangers deployment

However, a fairytale ending is not guaranteed. Wrangling between political parties, together with an upcoming election in September, means the RET could still be modified should the seemingly anti-renewables Liberal-National Coalition be successful at the polls.

However, more pressing on their agenda, in the event of an opposition election victory, would be the repeal of the carbon price legislation. The national carbon tax – which came into force only last year – has sparked heated political debates. Although the question of how, when and if a repeal may be possible remains an issue for the lawyers, there is little doubt that such a threat has created a gray cloud of uncertainty over the renewables sector.

Cheap wind changes project economics

However, some interesting figures released in Q1 may raise the question of whether a RET is even still necessary

Australia ranking snapshot	Issue 37
Total RECAI	4
Onshore wind	5
Offshore wind	15
Solar PV	5
Solar CSP	2
Biomass	26
Geothermal	12
Hydro and marine	15

The retreat of European lenders has opened the door for new investors to meet the estimated US$24b project financing requirement.

to support renewables, in particular onshore wind. Analysis by BNEF[1] found that electricity from new wind farms is now 14% and 18% cheaper than new coal and gas power plants, respectively, even before the price of carbon is taken into account. The analysis also suggests that large-scale solar PV could be cost competitive with new coal or gas plants by 2020, with other renewable technologies such as biomass and solar thermal following suit by 2030.

These new economic dynamics may therefore limit investment in new fossil fuel generating capacity in the medium to long term. AGL, Australia's second-largest electricity retailer, suspended development of the first stage of its 1,000MW Dalton gas-fired power station in the state of New South Wales back in October 2012 after reviewing its economic viability. Perhaps, then, judgment day has arrived earlier than expected.

However, not everyone is convinced by the latest announcements over grid parity. The CEO of Origin Energy, for example, believes that the RET debate has underestimated the cost of renewables deployment, in particular in respect of supply variability and the fact that most premium tier one onshore wind sites have already been developed.

Investors from Asia take the leading role

It seems that the gray cloud created by carbon policy uncertainty is not dampening the spirits of investors from Asia who, on the contrary, are showing an ever-increasing appetite for wind and solar projects down under. The retreat of European lenders amid the worsening economic climate has opened the door for new investors to meet the estimated US$24b project financing requirement to fulfill the country's 2020 RET, and it seems Chinese investors in particular are keen to take on the challenge.

In April, Shenhua Group Corp., China's biggest coal producer, announced that it would jointly invest around AU$1.6b (US$1.7b) with Australia's Hydro Tasmania to develop at least 700MW of wind power capacity across the country within the next decade. This came just two months after the same two parties completed a deal that saw Shenhua acquire a 75% stake in the AU$394m (US$408m) Musselroe 168MW wind farm, due for completion by Hydro Tasmania in July this year. There are also reports that major Asian energy players such as China Longyuan Power and Thailand's Electricity Generating Company are among the shortlisted parties bidding to secure a stake in the AU$300m (US$310m) Boco Rock wind farm, currently owned by Continental Wind Partners and General Electric, reflecting a growing interest in the project by international utilities.

Landmark project puts southern hemisphere back on the map With significant untapped wind resources remaining across large parts of the country, the flurry of deployment and transaction activity is expected to continue, and on an ever-increasing scale. April saw the official opening of the AU$1b (US$1b) Macarthur wind farm in the state of Victoria, now the largest wind farm in the southern hemisphere at 420MW. While unconfirmed, there are signs that Meridian is considering the sale of its half of the project and may be looking to attract institutional investors such as pension funds, as its investment in Macarthur was structured as a "low-risk participation," according to the company's CEO.

More wind, less red tape While many will be hoping that the MacArthur wind farm represents the first of many notable scale projects in the region, barriers still remain. New project announcements have declined year on year since peaking in 2009, in part due to new and cumbersome regulations for wind farms being proposed in New South Wales in particular. Planning policies in Victoria, for example, imposed a 2km distance between wind turbines and residences, while in March, the District Council of Yorke Peninsula rejected a development application from Australian renewable energy developer REpower to develop the US$1.3b Ceres project.

Large-scale solar stays on track There was more positive news, however, for solar projects in the planning pipeline, with April seeing the New South Wales Government recommend AGL's AU$200m (US$207m) 53MW Broken Hill solar plant for approval. The plant is part of a wider 159MW solar project being developed by AGL alongside First Solar Inc., which was awarded AU$129.7m (US$134.2m) of government funding in late 2012.

[1] "Renewable energy now cheaper than new fossil fuels in Australia", Bloomberg New Energy Finance, 7 February 2013

Country focus

Japan

Highlights

- **Solar FIT reduction of 10% not expected to slow activity in long term, but still spurred US$8b investment in Q1**
- **Revised PV forecasts could see up to 9.4GW of capacity installed in 2013, putting Japan in second place behind China**
- **Environmental barriers hinder wind projects, raising queries over 1GW offshore mega project**
- **Energy market liberalization reform package likely to be critical to US$33b infrastructure program**
- **Relaxing of zoning rules sparking geothermal revival that could tap into 23.5GW of potential**

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Solar subsidy cut accelerates investment

Few were surprised by the announcement by Japan's Ministry of Economy, Trade and Industry on 26 March that the FIT for solar power was to be cut by 10% from 1 April. Many had anticipated it even as the extremely generous rates were officially announced back in July 2012, while others were pleasantly surprised that the reduction was not greater. The FIT for solar installations over 10kW will now receive JPY37.8/kWh (US$0.4) for 20 years.

There are signs that the cut – while anticipated – did still galvanize the market. Figures show that in Q1, Japan attracted around 80% of the US$10.1b of new clean energy investment in the Asia and Oceania region (excluding China and India), a surge likely due to project developers rushing to secure the higher FIT.

Japan to overtake US as second-largest PV market

Notwithstanding this flurry of activity, it is unlikely that the reduction will have any detrimental impact on Japan's booming solar industry in the long run – after all, the level is still around three times higher than in Germany. The reduction may in fact help to minimize the impact of solar deployment on already high electricity prices, as the cost of renewables in Japan is still greater than generating thermal energy, even taking account of the high fuel import cost driven by the country's heavy reliance on imported fuels following its retreat from nuclear.

In fact, despite the FIT cut, there are even predictions that Japan could replace the US as the second-largest PV market after China in 2013. BNEF has made the claim following an upward revision of its capacity targets, predicting that Japan could now install something closer to 6.0GW-9.4GW of solar capacity this year compared with previous forecasts of 3.2GW-4.0GW, based on an ever-growing project pipeline.

Japan ranking snapshot	Issue 37
Total RECAI	6
Onshore wind	12
Offshore wind	9
Solar PV	4
Solar CSP	NA
Biomass	6
Geothermal	3
Hydro and marine	3

Energy market liberalization could boost US$3b grid program but Government's appetite for nuclear leaves long-term energy strategy unclear.

Of particular note was the approval in April of a giant 400MW solar PV project, to be constructed on the remote island of Ukujima off the southern city of Sasebo, at an estimated cost of JPY100b (US$1b). The venture will be developed by Photovolt Development Partners GmbH and others, with construction — including a 55km undersea cable — scheduled to start in the second half of this year.

Wind temporarily loses momentum While FIT levels for other technologies remained unchanged, the country's wind sector appears to be faring less well relative to its luminous rival. Project activity remains low and is arguably nowhere close to exploiting the country's estimated 750GW of wind potential.

A multitude of environmental laws are currently limiting site availability for both onshore and offshore turbines, including onerous regulation introduced in October 2012 that requires power companies to conduct environmental assessment for projects great than 10MW. Strong views on the number of turbine-related bird fatalities appear to be the main driver of such legislation, although this is inevitably also a source of major disputes between the Environment Ministry and project developers.

That said, should such environmental barriers be overcome, wind power has the potential to be a growth driver once market excitement over generous solar incentives dies down and investors better understand the opportunities on offer. This is especially true of the offshore sector, which has been galvanized by plans for a 1GW project, although limited development in Q1 does raise queries over whether construction of this mega project will begin in July as planned.

Energy market liberalization one step closer

Perhaps more challenging for wind power deployment in the long run are infrastructure and energy market barriers created by the effective monopolies held by the country's 10 regional utilities across the electricity value chain, as well as an extremely fragmented power grid.

However, there are signs that energy market liberalization is on the horizon. A reform package set out by a government-appointed committee in early February recommended that the 10 regional utilities should spin off their transmission and distribution networks between 2018 and 2020, and called for the liberalization of the electricity retail market in 2016 under the watchful eye of a new regulator.

Such reforms, if approved, would foster greater competition between power producers and suppliers, helping to bring down high electricity prices as well as incentivize greater integration between the two grid systems. It could also make it easier to attract the necessary direct investment into infrastructure, not least to support the Government's existing program to generate around JPY310b (US$3b) of private and public investment into grid development on Hokkaido island and across the Tohoku region over the next decade, with the particular aim of stimulating further growth in its wind sector.

Energy strategy remains unclear

Notwithstanding the strong policy signals generated by such a package of reforms, there are still concerns that political appetite could act as a barrier, not least because previous plans to fully liberalize the electricity market were derailed by resistance from major power companies and the Prime Minister's own Liberal Democratic Party (LDP).

The LDP's long-term energy strategy also remains unclear since taking power in December 2012, and while it does appear to be supportive of alternative forms of energy, it also openly favors restarting nuclear reactors that meet new, stricter safety requirements. A return to nuclear energy would exert pressure on the above-market rates for renewable energy, which, combined with the Government's pro-business stance, may drive policy to keep electricity prices down for consumers and businesses, at the expense of long-term energy security.

Geothermal gets a revival Japan's generous FIT for geothermal projects, together with the lifting in 2012 of a moratorium on geothermal prospecting in national parks, appears to have sparked a revival in the energy possibilities underground, as interest in the country's 23.5GW of geothermal power increases.

In February, Marubeni, the largest electricity sector investor among Japan's trading houses, revealed that it is now looking at developing domestic geothermal resources, including an imminent surface survey at the Daisetsuzan National Park for the construction of a 40MW geothermal plant. This survey is significant as it is the first to be launched in a national park and, more significantly, the first to be launched in a Special Zone since 1978.

Country focus

India

Highlights

- **Wind subsidies reinstated after installations plummet 50% in 2012**
- **Low interest loans aim to tackle 13%+ cost of financing**
- **Second 750MW phase of National Solar Mission imminent and Andhra Pradesh 1GW PV tender oversubscribed by a margin of 34%**
- **US hauls India in front of World Trade Organization (WTO) over controversial domestic content rules**
- **Japanese consortium planning giant 2.2GW solar park in Gujarat**

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Budget reinstates wind subsidies After almost a year of anxious waiting, India's wind sector finally received some good news in late February following the presentation of the 2013–14 budget to Parliament. It included a financial package allocating subsidies totaling INR8b (US$147m) to wind power projects in the upcoming fiscal year, after GBIs for the sector were scrapped in March 2012. Project developers were hoping the budget would see the reinstatement of accelerated depreciation (AD) tax incentives – also phased out last year – but these appear to remain suspended.

Despite this, it is still anticipated the revival of the GBI will help resuscitate India's flagging wind sector, which has experienced an estimated 50% reduction in new wind power installations this fiscal year compared with 2011–12, following the removal of the AD and GBI support mechanisms. With wind power not yet cost competitive with coal, India has relied heavily on government financial support, and will continue to in the short to medium term.

However, there may also be a silver lining. Reduced government support caused the exit of the retail taxpayer side of the market, resulting in the growth of the independent power producer (IPP) market in 2012, mostly backed by large private equity companies. While the sector's size has therefore shrunk, it has also arguably resulted in a stronger market, with IPPs committed to setting up quality assets.

Funding barriers broken down The budget announcement also brought welcome news that the Government will provide low-interest-bearing loans for renewable energy projects over the next five years via the National Clean Energy Fund. High interest rates and relatively short loan terms have historically hindered the development of renewable energy projects given the significant upfront expenditure required. Access to low-cost debt indicates a proactive government approach to tackling this.

India ranking snapshot	Issue 37
Total RECAI	8
Onshore wind	9
Offshore wind	23
Solar PV	8
Solar CSP	6
Biomass	19
Geothermal	16
Hydro and marine	9

Suzlon Group's US$647m bond issue claims to be the first ever US dollar credit-enhanced bond from India.

February also saw state-owned lender Power Finance Corporation Ltd. cut interest rates by 0.50% for eligible renewable energy projects, giving a further boost to project developers struggling to obtain bank finance in a market where prevailing long-term interest rates start at around 13%. These revised rates will also apply to the National Solar Mission.

Mega solar auctions sweep the country The absence of any incentives for the solar energy sector in the February budget was a surprise to some, given that the country is to launch the second 750MW phase of its ambitious National Solar Mission in May. Despite this, activity levels in the sector remain high, particularly at a state level, where a number of high-profile tenders have been launched. The results, however, represent a bit of a mixed offering.

In February, it was reported that the 1GW solar PV tender in Andhra Pradesh had been oversubscribed by a margin of around 34% following bids from more than 180 companies, while April saw the Government of Rajasthan award 75MW of solar projects to seven different bidders, who will now have 180 days to reach financial close once the power purchase agreement has been signed. The northern state of Punjab also issued a fresh tender for 300MW of new solar capacity in late March, while Karnataka and Uttar Pradesh have launched 130MW and 200MW auctions, respectively.

However, the state of Tamil Nadu fared less well in Q1, reportedly receiving subscriptions for less than half the 1GW PV capacity on offer in its competitive tender. February also saw the deadline for a central government pilot scheme tendering 10MW of PV capacity being pushed back after authorities received only three bids.

Wind tender to attract big players It's not just solar that's got auction fever. The state of Rajasthan is also preparing a 300MW reverse auction for wind power, with bidders being offered 10MW–120MW of capacity. While reverse auction can generate concerns over highly aggressive discounted rates risking project failure further down the line, the condition that all bidders in this tender must have developed at least 100MW wind projects in India should mean that participants have a better understanding of the financial feasibility of such projects.

Domestic content rules taken before WTO India appears to be embroiled in the trade wars that are sweeping through the global solar market. In February, the US lodged a complaint with the WTO that domestic content requirements attached to the National Solar Mission discriminate against US solar equipment imports.

India is currently in talks with the US over the complaint, but the Government insists that more than 70% of the 551MW of solar capacity installed since the start of the National Solar Mission has been built using imported modules. Last November, India began its own anti-dumping investigation for solar cells from the US, mainland China, Taiwan and Malaysia.

Suzlon bond sets a precedent Late March saw the heavily indebted Suzlon Group – which in late 2012 failed to repay US$209m in India's biggest convertible bond default – complete a US$647m bond issue backed by a standby letter of credit from the State Bank of India, in what the group claims to be the first ever US dollar credit-enhanced bond from India. India's largest wind turbine maker needs the money to repay foreign creditors and boost equity capital under its liability-restructuring agreement with lenders, after international bondholders rejected a request for an extension on payments in 2012.

Project activity remains diverse In January, Mizuho Financial Group Inc. signed a memorandum of understanding with the Gujarat state government to lead a consortium of Japanese firms to construct a giant solar park in the region, according to Bloomberg, citing a company spokeswoman. The initial phase will install around 200MW at a cost of US$325m, but the plant could be expanded to as much as 2.2GW.

Meanwhile, the state of Gujarat's FY2013-14 budget proposal in February included the development of India's first offshore wind farm. The explicit inclusion of the technology in the state's renewable energy plan is a positive step as, despite having 7,600km of coastline, India has yet to exploit its offshore wind resources.

Red flags remain Transmission and distribution losses remain extremely high and, according to India's new and renewable energy secretary, an investment of INR400b (US$7.b) would be required to strengthen the system over the next four years. In April, it was announced that Germany will provide a loan of €1b (US$1.3b) to help address grid challenges, although renewables deployment is still likely to be hindered in the years ahead.

Country focus

Chile

Highlights

- **Proposed legislation could reduce power concession procedure times by 80% and introduce ambitious renewables target of 15%–20% of energy mix by 2025**
- **However, Government needs to be realistic after embarrassing climbdown in 2012**
- **Mega projects dominate the landscape – pipeline comprises a large number of >100MW wind projects and 100MW–400MW solar projects**
- **Rising energy demand across mining sector opens up significant opportunities for concentrated solar power in remote locations**

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Perfect conditions set the stage for renewables rollout

A lack of oil reserves, unreliable gas imports, high electricity prices, surging energy demand driven by the mining sector and power shortages arising from a traditional overreliance on hydropower represent the perfect mix of ingredients to make Chile a serious contender in the global renewables race.

On both the supply and demand front, Chile is coming under increasing pressure to diversify its energy mix, and with an estimated 40GW of wind power potential, 10% of the world's active volcanoes and a desert landscape often cited as one of the sunniest places on earth, is it any wonder the country is keen to go green?

Cross-party agreement expedites key energy bills

In January, Chilean ministers and congressmen across four parties signed an agreement to prioritize four energy bills currently awaiting legislative approval, including an electricity concessions project that will reduce the average procedure time for power concessions from 750 days to 150 days, and an electric "transmission highway" initiative that proposes the construction of public utility lines across the country to facilitate improved connections to the grid.

The agreement also covered new regulation on geothermal concessions that would grant exclusive exploitation rights, thereby removing uncertainty over entitlement for exploration companies.

Finally, the January commitment also seeks to push through a bill that promotes renewables expansion in the 2025 energy mix from the current 10% requirement to 15%–20%.

Moving targets undermine Government commitment

While this agreement, together with the legislation that may emerge as a result of its implementation, sends strong signals for domestic and

Chile ranking snapshot	Issue 37
Total RECAI	18
Onshore wind	25
Offshore wind	23
Solar PV	19
Solar CSP	5
Biomass	25
Geothermal	10
Hydro and marine	14

Continuous energy demand and high diesel costs are making solar CSP an increasingly attractive, and cost-effective, source of energy for remote mining sites.

foreign investors that Chile is committed to progressing its energy strategy, some caution is also advocated.

Back in 2010, President Pinera proposed increasing the renewable energy target to 20% by 2020, doubling the then legally binding target of 10% share by 2024. This goal was legislated in early 2012 but subsequently dropped in October, when it was decided that it was neither technically nor economically feasible, in part due to the infrastructural challenges facing the grid system.

In light of these interim developments, the January 2013 agreement could actually be seen as lowering the target to 15%–20% from the previously proposed 20% and extending the deadline from 2020 to 2025. Notwithstanding the positive signals emerging from policy-makers, therefore, consistency between words and actions is still somewhat lacking.

Large-scale projects dominate pipeline

However, this does not appear to be deterring investors. At the end of 2012, Chile's Environmental Impact Assessment System had a planned project portfolio totaling around 9.7GW, and 2013 has already seen a number of significant project announcements.

In January, E.CL SA obtained environmental approval for the second 108MW stage of its Parque Eolico Calama wind farm, taking total capacity to around 310MW at a cost of around US$685m.

In early February, Irish renewable energy company Mainstream reached financial close and started construction of its US$70m 33MW wind power project in Southern Chile, with the majority of funding being provided by the China Development Bank. Mainstream is also planning a 107.5MW wind farm costing US$240m in the southern Bío Bío region.

Meanwhile, German developer Saferay GmbH confirmed in April that it had applied for permits to build a US$300m solar PV plant in the Atacama Desert, with work on the 135MW plant expected to start in September.

Miners see solar at the end of the tunnel

Much of the impetus behind the current solar boom in Chile comes from the country's mining companies and other ventures that operate in remote areas. The cost of supplying diesel to such sites and the lack of access to coastal wind energy is making solar power an increasingly attractive, and cost-effective, source of energy.

In late January, for example, solar energy service provider SunEdison announced that it would be assisting Chilean mining and steel group CAP to construct a 100MW solar PV project in the Atacama Desert, expected to produce around 15% of CAP's energy demand.

First CSP project is the tip of the iceberg

While such large-scale solar PV projects are making an impression on the Chilean energy landscape, it is likely be CSP plants that really drive growth in the long term, with the ability to store and dispatch power into the night-time period making it an ideal match for the continuous energy demands of the mining sector in particular.

In late 2012, Abengoa SA completed a 10MW project at an Antofagasta Plc copper mine in the Atacama Desert, South America's first CSP project. Looking ahead, Iberéolica is developing a giant 360MW parabolic trough CSP plant costing an estimated US$2.6b, as well as its 400MW María Elena plant comprising four 100MW towers and costing around US$3.9b.

Late February also saw the Government launch its first national CSP tender. A grant of US$20m as well as US$350m in soft loans from the Inter-American Development Bank Clean Technology Fund and German development bank KfW will be available to support the 10MW of capacity.

Regulatory and infrastructure barriers need to be broken down

On both a policy and project front, therefore, Chile appears to be making its mark on the global renewables landscape. However, the Government is yet to introduce a regulatory framework for renewables. Economic feasibility of projects is likely to depend on funding from international finance institutions in conjunction with private investment in the short to medium term.

There are also issues relating to the integration of utility-scale projects into the grid, with renewables projects in particular disadvantaged by the current policy awarding interconnections on a first-come first-served basis as opposed to being reserved in advance. Such barriers will need to be overcome if the renewables sector is to meet its full potential.

Technology-specific indices

The technology indices reflect a weighted average across macro, energy market and technology-specific parameters.

Rank	Onshore wind		Offshore wind		Solar PV		Solar CSP		Biomass	
1	US	71.0	UK	70.8	US	74.1	US	71.7	Germany	65.9
2	China	70.8	Germany	68.2	China	72.6	Australia	63.8	UK	62.1
3	Germany	66.6	China	65.7	Germany	72.5	Spain	60.7	China	61.6
4	UK	64.7	Belgium	59.5	Japan	66.6	China	60.4	US	61.4
5	Australia	63.2	Denmark	58.9	Australia	65.2	Chile	58.9	Brazil	61.0
6	Canada	63.2	US	57.5	Italy	61.5	India	58.7	Japan	60.0
7	Ireland	59.9	Netherlands	56.9	Canada	59.6	Israel	58.3	Belgium	59.0
8	Sweden	59.7	Sweden	55.9	India	58.7	Morocco	58.0	Sweden	58.4
9	India	59.7	Japan	53.0	UK	57.9	South Africa	55.4	Denmark	57.7
10	Denmark	59.4	Finland	52.1	France	57.6	Peru	52.0	Netherlands	57.2
11	Norway	59.2	South Korea	52.0	South Korea	57.1	Italy	52.0	Finland	57.2
12	Japan	58.7	Canada	49.5	Belgium	56.8	Saudi Arabia	50.4	South Korea	56.4
13	Netherlands	58.3	France	47.9	Israel	56.1	Brazil	49.8	Austria	55.0
14	Belgium	58.0	Norway	46.3	Spain	55.3	Turkey	49.0	France	54.3
15	France	57.9	Australia	44.9	Thailand	54.3	France	48.2	Canada	54.3
16	Poland	57.4	Ireland	43.8	Saudi Arabia	54.1	Portugal	48.0	Poland	53.7
17	Brazil	57.3	Taiwan	38.2	Portugal	52.7	Greece	47.3	Italy	53.0
18	Austria	56.9	Poland	36.5	Taiwan	52.7	Mexico	46.4	Peru	50.3
19	Spain	56.2	Chile	35.6	Chile	52.7	Thailand	45.5	India	50.0
20	New Zealand	55.8	New Zealand	35.2	Peru	52.5	Taiwan	40.3	Thailand	49.6
21	Finland	55.4	Portugal	35.0	Austria	52.2	Canada	24.5	Portugal	49.3
22	South Korea	55.3	Italy	34.2	South Africa	51.8	South Korea	22.7	Taiwan	48.9
23	Portugal	55.2	India	33.3	Brazil	51.3	Germany	15.4	Czech Republic	48.8
24	Italy	54.9	Brazil	31.6	Slovenia	50.7	Austria	-	Spain	48.6
25	Chile	54.5	Spain	31.0	Netherlands	50.1	Belgium	-	Chile	47.8
26	Turkey	54.4	Turkey	30.3	Bulgaria	48.7	Bulgaria	-	Australia	46.7
27	Mexico	53.3	Peru	29.6	Czech Republic	48.3	Czech Republic	-	Slovenia	46.6
28	Romania	53.3	South Africa	28.9	Poland	47.7	Denmark	-	Norway	45.3
29	Morocco	53.0	Ukraine	28.2	Morocco	47.2	Finland	-	Turkey	42.4
30	South Africa	51.2	Mexico	27.6	Mexico	47.1	Ireland	-	Mexico	42.0
31	Taiwan	50.8	Romania	26.3	Turkey	46.7	Japan	-	Ukraine	40.8
32	Czech Republic	50.2	Bulgaria	25.9	Denmark	46.7	Netherlands	-	Ireland	39.2
33	Bulgaria	49.2	Morocco	24.9	Romania	46.5	New Zealand	-	Bulgaria	39.0
34	Thailand	47.8	Israel	22.4	Greece	45.0	Norway	-	Israel	38.8
35	Peru	47.1	Greece	20.9	Ukraine	44.5	Poland	-	South Africa	38.2
36	Ukraine	45.5	Slovenia	20.4	Sweden	43.7	Romania	-	Greece	37.6
37	Israel	45.1	Saudi Arabia	19.6	New Zealand	39.5	Slovenia	-	Romania	34.3
38	Greece	44.4	Austria	-	Ireland	35.9	Sweden	-	New Zealand	31.8
39	Slovenia	43.9	Czech Republic	-	Norway	35.7	UK	-	Saudi Arabia	23.3
40	Saudi Arabia	40.0	Thailand	-	Finland	33.7	Ukraine	-	Morocco	23.0

Rank	Geothermal		Hydro and marine	
1	US	63.4	China	54.6
2	New Zealand	63.1	US	53.0
3	Japan	60.9	Japan	52.2
4	Italy	54.1	Canada	52.1
5	Turkey	51.6	Brazil	51.4
6	Germany	50.4	Peru	51.4
7	Mexico	49.4	Germany	50.5
8	China	48.7	Norway	49.4
9	Portugal	46.9	India	48.9
10	Chile	44.5	Sweden	48.9
11	France	44.4	Italy	48.8
12	Australia	43.2	Austria	48.4
13	Peru	41.9	Turkey	48.1
14	Poland	39.8	Chile	48.0
15	Slovenia	39.6	Australia	47.6
16	India	37.9	Slovenia	46.5
17	Austria	36.5	South Korea	46.1
18	UK	36.0	Portugal	45.4
19	Taiwan	35.9	France	45.3
20	Sweden	34.5	Poland	43.8
21	Belgium	34.1	Taiwan	43.4
22	Norway	32.7	South Africa	43.4
23	South Korea	32.0	Spain	43.2
24	Romania	32.0	UK	43.0
25	Netherlands	31.1	Romania	42.9
26	Thailand	30.9	Mexico	42.7
27	Bulgaria	30.4	Czech Republic	42.7
28	Greece	29.6	Bulgaria	41.9
29	Saudi Arabia	29.5	Finland	41.5
30	Czech Republic	28.6	Netherlands	41.2
31	Brazil	27.0	Israel	41.2
32	Canada	26.9	Thailand	40.7
33	Denmark	-	Morocco	39.7
34	Finland	-	Denmark	39.6
35	Ireland	-	Ireland	39.0
36	Israel	-	Belgium	38.6
37	Morocco	-	Ukraine	38.2
38	South Africa	-	Greece	36.4
39	Spain	-	New Zealand	33.4
40	Ukraine	-	Saudi Arabia	-

Glossary

Abbreviation	Definition
AD	Accelerated depreciation
b	Billion
BNEF	Bloomberg New Energy Finance
BRIC	Brazil, Russia, India and China
CD	Compact disk
CEO	Chief executive officer
CHP	Combined heat and power
CSP	Concentrated solar power
EMEIA	Europe, Middle East, India and Africa
EU	European Union
EUA	European Union allowance
FIT	Feed-in tariff
GBI	Generation-based incentives
GC	Green certificates
GW	Gigawatt
IP	Intellectual property
IPP	Independent power producer
IRS	Internal Revenue Service (US)
KA-CARE	King Abdullah City for Atomic and Renewable Energy
kWh	Kilowatt hour
LDP	Liberal Democratic Party
LSE	London Stock Exchange
m	Million
M&A	Mergers and acquisitions
MENA	Middle East and North Africa
MW	Megawatt
MWh	Megawatt hour
NASDAQ	NASDAQ stock market (US-based)
OECD	Organization for Economic Cooperation and Development
OEM	Original equipment manufacturer
PTC	Production tax credit
PV	Photovoltaic
REaLM	Return Enhancing and Liability Matching
RECAI	Renewable energy country attractiveness index
REFIT	Renewable energy feed-in tariff
RET	Renewable energy target
SCM	Solar credits mechanism
t	Trillion
TWh	Terawatt hours
USS	Universities Superannuation Scheme
WTO	World Trade Organization

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We offer assurance, tax, transaction and advisory services to all the segments of the cleantech market that are informed by a deep understanding of industry trends and business dynamics. Selected services include:

Cleantech innovators	▸ Capital raising: debt and equity ▸ Cleantech incentives, subsidies and grants ▸ Growth strategy formulation and implementation ▸ IPO readiness ▸ M&A buy-side transaction support ▸ Valuation and business modeling	▸ Due diligence (financial/commercial) ▸ Operational transaction support ▸ JVs/partnerships/alliances ▸ Financial audit ▸ Global tax strategy and compliance ▸ Sustainability measurement, reporting and valuation
Renewable energy project developers	▸ Project finance: equity, debt, tax equity ▸ Cleantech incentives, subsidies and grants ▸ Capital and debt advisory: treasury, ratings advice, corporate finance ▸ Public-private partnership bid support ▸ M&A advisory: refinancing, assets/ portfolio optimization, sell-side M&A ▸ Buy-side M&A advisory	▸ IPO readiness ▸ Economic modeling ▸ Site selection/economic incentives ▸ PMO/project risk management/contract compliance/construction cost audit ▸ Project assurance and reporting ▸ Parent company financial audit
Corporations/investors/governments	▸ Sustainability and cleantech strategy advisory and implementation ▸ Resource efficiency and low carbon strategies ▸ Energy mix optimization strategy and implementation (roadmap, capital, technologies) ▸ Energy, water and material resources efficiency and procurement programs ▸ Supply chain performance improvement	▸ Carbon tax, cleantech tax incentives and government programs ▸ Carbon markets and CDM advisory ▸ Energy and environmental policy advisory ▸ Market penetration and transaction support (investment, acquisition, JV, partnerships) ▸ Corporate venture capital formation and portfolio IPO readiness

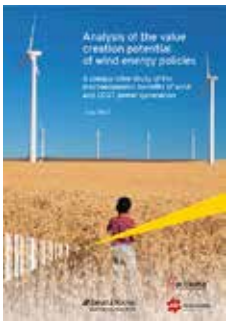
Recent Ernst & Young publications

Available at ey.com/cleantech

The Cleantech Growth Journey: CEO Retreat
(2013)

Summarized in this report are the insights and takeaways from the second-annual Ernst & Young Cleantech Growth Journey CEO Retreat, which focused on the critical issues of capital, transactions, corporate partnering and global expansion.

Analysis of the value creation potential of wind energy policies
(2012)



At the request of Acciona and EDP, Ernst & Young conducted a comparative study of the macroeconomic benefits of wind compared to combined cycle gas turbine power generation, in order to support energy policy decisions.

Plug in
(2013)

Plug in is our monthly update on the latest trends in power and utilities, including insights from our global network of professionals who are working with the world's biggest power companies. The March issue covers themes such as cloud computing, the Saudi potential and 2013 transaction trends.

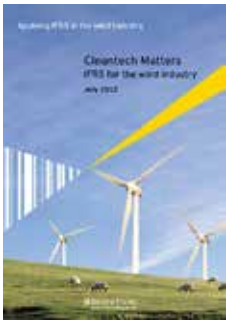
IFRS for solar
(2012)

This report discusses the key IFRS issues faced by many wind companies, including scenarios and examples drawn from public filings.

Rising tide: global trends in the emerging ocean energy market
(2013)

We look at different forms of ocean energy technologies and the progress of some of the countries leading the way. We also present a variety of external insights from industry players and policy-makers.

IFRS for wind
(2012)



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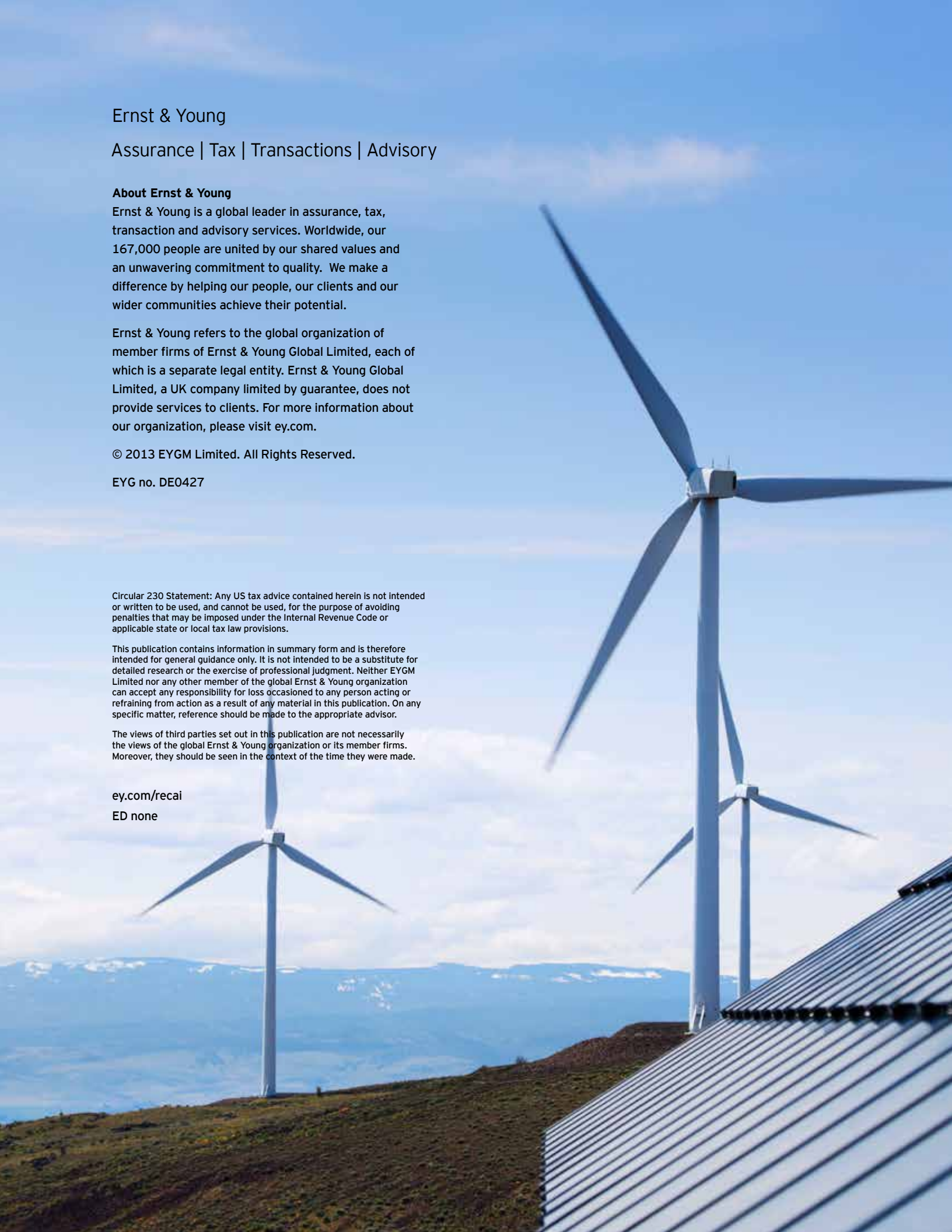

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