RECAI

Issue 42

Renewable energy country attractiveness index

September 2014

Treasure island

With island nations facing some of the world's highest energy costs, the attractive economics of renewable energy not only create opportunities for deployment but also have the potential to lead in the creation of new energy microsystems.

Enabling Europe

After decades focused on deployment, high levels of renewables penetration levels are now forcing industry and policy-makers to throw off the shackles of the past and lead the world into the era of enablement.

The power of localization

Often dismissed as a niche market, the significance of crowd- and community-sourced finance in contributing to the global energy transition should not be understated as small suddenly becomes big.

Index crowns a new leader

China has reclaimed the top spot from the US in our attractiveness index, while yet more trouble in Europe is accelerating the ascent of markets such as India, Brazil, South Africa and Kenya.

EY

Building a better working world

Renewable energy country attractiveness index

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Chief Editor's note

Ben Warren, RECAI Chief Editor

Taking the next steps. If this issue of the RECAI tells us anything, it's that there really are renewable energy opportunities everywhere and for everyone. Recent BNEF analysis forecasts that US$5t of an estimated US$7.7t of global energy investment could be spent on renewables by 2030, but the exciting reality is that this will encompass both life-changing access to residential-scale power for the world's poorest communities, as well as mega-scale projects that will accelerate us toward grid parity and beyond. It will encompass billions of dollars of investment from mainstream lenders, institutional investors and major corporates, as well as little as US$25 from thousands or even millions of crowdfunders and cooperatives. And it will encompass increased renewables deployment across all corners of the world, from the smallest island to the largest desert.

Significant movement in our index this issue further reinforces the fact that attractive renewable energy prospects are no longer the remit of only a few mature markets – they are truly global.

Despite the significant opportunities presented by a continuously expanding and scalable renewables sector, stakeholders must also try to remain focused on the end goal – affordable and secure low-carbon energy. In evaluating what's required for Europe's energy markets to transition into the next phase of maturity, for example, it becomes clear that both the industry and policy-makers can, and have, become distracted by legacy support mechanisms and the phantom of carbon markets, rather than remaining focused on achieving grid parity and developing the range of necessary enablers that will create stable and reliable low-carbon energy supplies as the penetration of renewables increases.

It is clear then, that we are operating in a sector that still has much to learn from the past, while also needing to focus more clearly on the future. A future where small is big, individuals can be powerful and scale is, well ... whatever it needs to be.

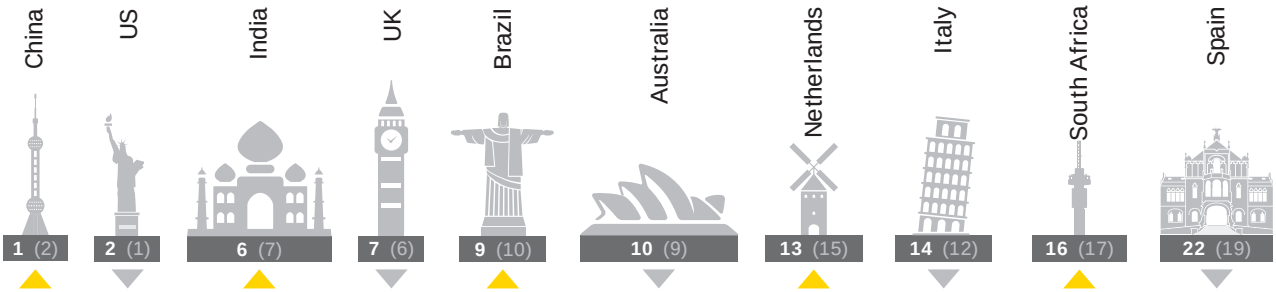
Ben Warren
Global Cleantech Transactions Leader
UK&I Environmental Finance Leader

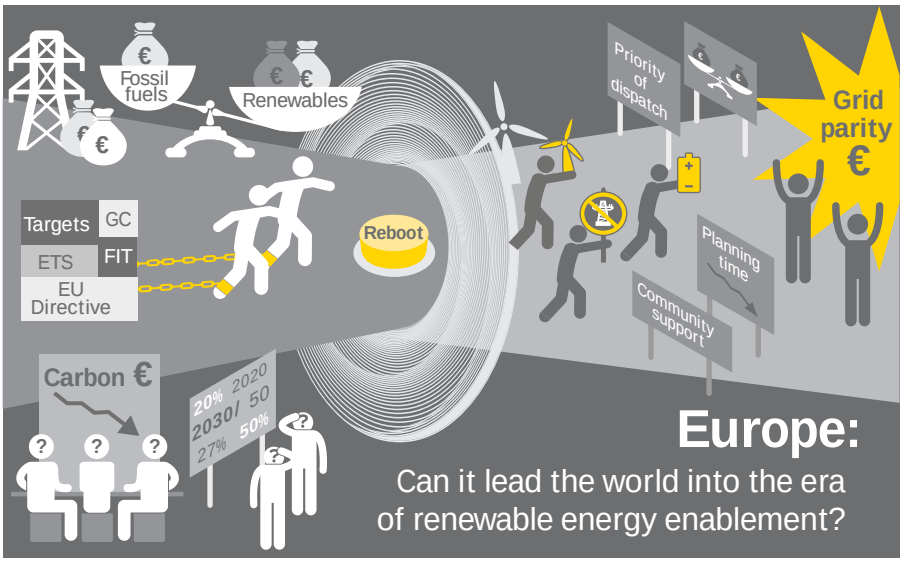
At a glance ...

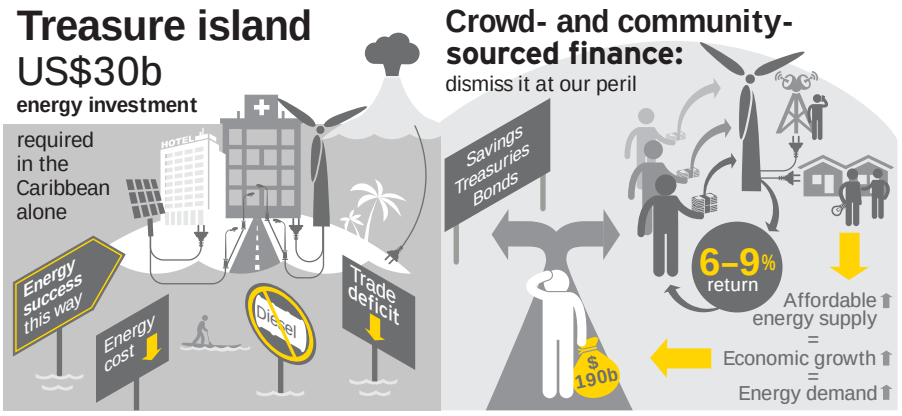
China takes the top spot in the index, while Europe's increasing renewable energy penetration prompts a focus on enablement. Island energy models and democratic finance signal that small is the new big.

Key index movements

( ) = *Previous ranking*







Quarterly developments

Where's ***"hot"*** ...

China
Chances offshore

France
Begins the march

India
Reboots

... and ***"not"***?

Australia
Makes its mark

Italy
Goes retro

Japan
Revisits nuclear

Summary

An overview of this issue

Enabling Europe

With increasing levels of renewable energy penetration beginning to strain existing infrastructure and supply capabilities across much of Europe, now is a sensible time to take a step back and examine the energy path it finds itself on.

The region's long-standing reliance on an array of support mechanisms has been both a blessing and a curse, galvanizing significant investment and deployment activity, but also locking the sector into a cycle of lobbying to continue or restore past levels of support. The industry must therefore throw off the shackles of the past and refocus its efforts not on maintaining subsidies, but on enabling grid parity by leveraging the region's inherent competitive advantages.

At the same time, policy-makers at both an EU and country level must direct their efforts toward enablement rather than fiscal support, as well as creating a level playing field across all energy sources to foster greater cost transparency. With carbon pricing and targets also arguably nothing more than a distraction, enablement that addresses both supply and demand challenges will result in a more efficient, cost-effective and self-regulating energy market that will naturally achieve grid parity sooner rather than later. And in doing so, Europe will once again have established itself as a pioneering market for the global energy sector.

Local power, local finance

With crowd- and community-sourced financing typically supporting small to medium-scale projects or creating aggregated investments that are measured in thousands of dollars rather than millions, it is easy to dismiss such capital sources as niche or insignificant in the context of the global energy transition.

Yet, with smaller-scale distributed applications becoming more critical to both developed markets facing grid and balancing constraints, and emerging economies trying to address rural electrification challenges, the outlet for localized financing models has suddenly expanded. The pool of capital available for such financing also has significant potential to increase if the risk/reward profile can be structured such that it becomes a viable alternative to other retail investment channels.

There is also scope for such models to be scaled up to support larger projects or collaborate with more mainstream investors, as well as encouraging innovative business models, particularly in emerging markets. In short, far from being a dot on the landscape, local finance has an important role to play in driving not only the democratization of energy, but also channeling significant volumes of capital to where it is most needed.

Treasure island

Many of the world's island nations have energy markets characterized by high fuel costs, high emissions and vulnerable energy security, principally by virtue of their size and location. They are facing an unprecedented energy crisis, with imported fossil fuel costs creating a burden on trade deficits and energy security representing a major risk for indigenous industry and tourism. In this environment, renewables are an affordable alternative.

The challenge, and the opportunity, is therefore to help these islands transition, not only benefiting the countries themselves but also creating models for success that can be applied globally. Robust economic foundations will also potentially generate attractive investment and deployment opportunities for both foreign and domestic companies.

This issue's focus on island renewables also features the insights of José María Figueres, President of the Carbon War Room, and Lynn Tabernacki, Managing Director of Renewable Energy and Sustainable Development at the US Overseas Private Investment Corporation (OPIC).

Rise of the dragon

Aggressive targets, sustained levels of support and efforts to open up the market to foreign investors have launched China to the top of the index once again. With signals that the Government is keen to attract increasing levels of private investment, this opens the doors for a wider range of stakeholders to participate in the significant growth that is still expected across the country's renewables sector. Having already dominated the onshore wind and utility-scale solar PV sectors, China is now setting its sights on other sectors, such as offshore wind, tidal and distributed solar.

US caught in a jam

Meanwhile, congressional gridlock is continuing to hamper progress in the US, failing to provide investors and developers with long-term certainty. In spite of Capitol Hill's paralysis, the market's significant investment and deployment potential keeps it in second place.

Top 10 reshuffle

This issue also sees the UK and India switch places to take seventh and sixth place respectively. India's new government looks set to galvanize public and private investment in the sector as it sets out to develop its long-term energy strategy, while mixed signals, dwindling budgets and political apathy contribute to the UK's fall down the rankings.

The official repeal of the carbon pricing legislation in Australia, a reflection of the Government's current attention on removing subsidies from the market, pushes the country down to tenth place. The road ahead remains uncertain, as investors make clear that planned investment will stall in the absence of clear signs that renewables will be supported by the Government in some form. The final decision has not yet been made, but a further winding back of support mechanisms seems likely.

Europe's ups and downs

Outside the UK, Europe has experienced mixed fortunes. Germany holds on to 3rd place as we wait to see the effects of the latest amendments to the renewable energy law, while the Netherlands jumps up to 13th place thanks to its role as host to the largest ever offshore wind financing, the US$3.8b 600MW Gemini project.

Spain and Italy, however, fare less well, falling to 15th and 22nd place, respectively. Retroactive subsidy changes in Italy and the enactment of a previously announced cap on project returns in Spain represent yet more setbacks, though it will be interesting to see whether Spain in particular can find other ways to reignite investors' interest in the years ahead.

New market, old news

In what is becoming an increasingly consistent theme, we again see the likes of Brazil, Chile, South Africa and Kenya ascend the index as policy support remains focused and the deployment outlook strengthens. Morocco also joins the list of countries rapidly climbing up the index thanks to structured tendering programs, while the financing of a mega CSP project in Israel boosts its attractiveness in the index.

Europe: enablement and beyond

Europe is at an inflexion point. After decades of supply-side investment, it has achieved some of the highest levels of renewable energy penetration in the world. But with the challenges that this brings, what's next for Europe and can it once again become a pioneer of the global energy transition? Our guest columnist Jonathan Johns explores.

Pioneering move

Since 1990 and perhaps even earlier, Europe has set out to rapidly increase the proportion of indigenous energy using zero-carbon resources, creating new industries and cleantech employment, and challenging the existing energy infrastructure with a more distributed energy model.

This pioneering initiative has been partly driven by concerns over climate change, as reflected in Europe's leading role in Kyoto and subsequent agreements, and by hardheaded memories of the 1970's oil price shocks, which affected many EU economies due to their heavy reliance on fossil fuel imports. Europe's world-leading renewables growth has been fostered by a number of country-specific and EU-wide support mechanisms, ranging from feed-in tariffs (FITs) as used to great effect in Germany, to the less successful EU Emissions Trading Scheme (ETS) designed to set a price for carbon. And of course, the 2001 and 2009 EU directives, with the latter setting binding country-specific targets for the proportion of renewables to be achieved by each country by 2020 and underpinning the most recent surge in development.

No other major economic region has had the benefit of such a wide range of support mechanisms and, partly as a consequence, mastering and arbitraging regulatory regimes and lobbying for change – or resistance to change – has been as much part of the business model as technical excellence and cost reduction.

Feeling the squeeze

Post the credit crunch crisis, as a new age of austerity lingers, the emphasis on climate change has waned and much of the political impetus that gave renewables a unique seat at the energy policy table has dissipated.

Value for money, or indeed minimizing financial support for established technologies and in some cases clawing back past returns, has become a dominant driver for legislative bodies. This has been most pronounced in Spain, with many investors affected and Iberdrola recently reporting, for example, that regulatory changes since 2011 will have an accumulated gross negative impact of €1.4b (US$1.9b) on its results in 2014.

With the ascendancy of attractive Asian, African and Latin American markets, the EU is no longer the default new-build destination of choice, save perhaps in offshore wind.

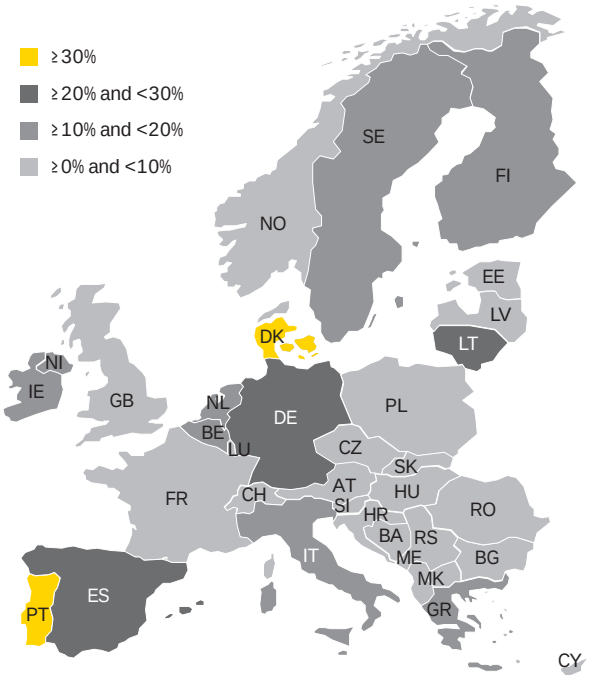
In simple dollars invested, China rules the roost both in its own markets and increasingly overseas. The US also presents significant opportunities when the production tax credit (PTC) is not in limbo, with onshore wind delivering power at a record low of US$25/MWh in 2013.

Stop, think and reboot

While it is tempting to keep lobbying to continue or restore past levels of support, a forward-thinking European renewables industry needs to press the reset button and aggressively jump forward to a time when it stands on its own feet. After all, it is building on success: with renewables in many jurisdictions nearing or already exceeding the 20% share of electricity supply (see Figure 1 below) that tends to drive down wholesale electricity prices, the benefits of long-term investment in the sector are increasingly visible.

In some countries, this price effect is already challenging the economics of conventional power, leading to the early retirement of some plants. Once a 20% share is exceeded, radical changes in energy infrastructure become both a natural progression and a necessity – especially in the context of newly resurgent cheap fossil fuel, which is exacerbating the trend. This is particularly the case if winters are mild, often squeezing imported gas capacity out of the equation.

Figure 1: Renewables (excluding hydro) share net electricity generation in 2013



Source: "Electricity in Europe 2013," ENTSO-E, May 2014.

Looking within

The future of renewables lies not with tariffs, but within its own inherent competitive advantages. These include:

- Free indigenous resource, offering huge economic upside if fully captured
- Skills to build out quickly and at a variety of scales
- Ability to infill and support local grids
- Potential for own-use renewables to achieve grid parity at retail price rather than wholesale price, favoring the built environment and private wires
- Mobilization of consumers, communities, businesses and industry seeking to be producers as well as consumers and take more direct control of their energy destiny by integrating renewables with energy efficiency and demand management
- Capital-friendly business models with low operational and maintenance risks

Additionally, in a context where financing for energy infrastructure as a whole is challenging, renewables have the unique ability to access investors at multiple levels: from consumers and communities to small businesses, specialist funds, yieldcos, pension funds and utilities.

Intelligent and interconnected

Regardless of whether the size of the energy market grows due to increased prosperity, whether renewables will be the preferred source of that incremental power or whether there will be a shift toward electricity for transport and heat, demand management, energy efficiency, smart grids and storage will become the new norm, forming a new ecosystem driving the energy industry. Europe, by virtue of its renewable mix, will of necessity pioneer techniques that will be invaluable even to those economies that prefer a resurgent fossil fuel status quo.

By placing itself at the center of this new ecosystem, the renewables industry will be able to ensure that all of its value is harvested either within a country or in neighboring countries, rather than spilled onto the grid (or simply not used). This past winter (late 2013 – early 2014), for example, energy prices in the Netherlands declined not only due to cheap coal but also due to its ability to draw on German wind.

Government and EU support should prioritize grid improvements locally, nationally and internationally as support for tariffs is understandably reined in. An elusive single market for electricity will likely be achieved only by physical connection rather than by elusive regulatory harmonization, allowing renewable electricity to flow from Spain to Italy and France, for example, and from Ireland to the UK during periods of peak generation (partly reversing historic flows).

The US$7b invested in Texas on a vast expansion of its grid infrastructure stretching nearly 3,600 miles and able to send 18.5GW of wind power across the state, is a good example of how a robust and far-reaching transmission network can stimulate capacity build-out. This approach potentially leads to improved economies of scale and greater developer interest, compared to the costly piecemeal enhancement of grid infrastructure preferred in some other jurisdictions less willing to invest up front, which can lead to areas with good resources becoming stranded.

Supporting enablement

The nimbleness of renewables as a means of energy infrastructure deployment is one if its core strengths, provided the industry is remorseless in getting its cost base right and does not lose connection with the communities that give it planning and political support – something that tariff chasing has sometimes risked.

Consumer, taxpayer and government support will be needed to ensure an orderly regulatory path to grid parity and to provide the enabling measures needed to allow energy markets to fully capitalize on the benefits of intermittent energy, through for example, the backup capacity markets envisaged by markets such as France and the UK (see Figure 2 below).

Absorbing price shocks

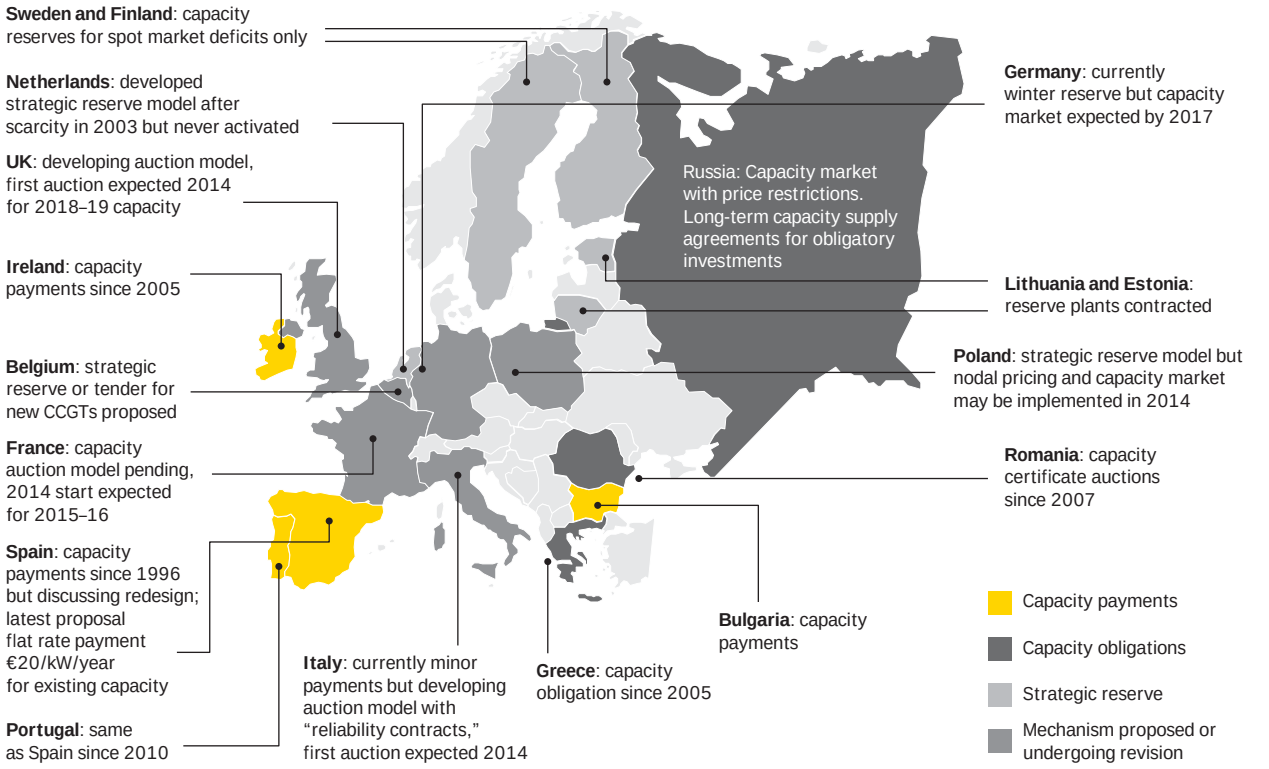
Therefore, the industry needs to have due regard to the absolute price of electricity, including the cost of support measures, to advance its arguments and not rely on the "carbon card" alone.

While security of supply arguments have some currency in Europe, it is the case that newly plentiful supplies of fossil fuel have absorbed recent shocks in the Middle East and the Ukraine that would not have been possible a few years ago.

By meeting the challenges of the new energy economy head on rather than relying on rhetoric, however well-founded, renewables in Europe will again lead the way. A number of players already embrace this broadened approach, as exemplified by wind manufacturer Enercon's involvement in a 10MW lithium ion storage facility to facilitate the grid in northern Germany.

For many legislators, reverting to fossil fuels is a tenable choice. Just as the UK, Spain and Poland are now keen to promote fracking, other countries have shown a quiet affinity for coal, with several GW of additional, albeit more efficient, plants due to be commissioned in Germany for example.

Figure 2: Summary of existing and planned capacity systems in Europe



Source: EY, based on various public sources.

Today, tomorrow and beyond

So, what are the implications and lessons to be learned both for Europe and other jurisdictions less advanced on the renewables path?

End of an era

The era of FITs as the default route to support capacity build-out is rapidly ending for established technologies – auctions are the new norm. Where renewable support costs prejudice the fuel-poor and high-energy users, the industry should consider how they can be mitigated rather than simply chasing tariffs.

In some jurisdictions, governments have gone further with issues of affordability, leading to the clawback of project returns. Well-documented retrospective tariff changes and other measures in Spain, and now Italy, are causing solvency issues for some renewable independent power producers and leading to a plethora of international legal claims by overseas investors, understandably making the point that they expected to rely on published tariff rates when investments were made.

More significantly, EU state aid pronouncements mean that, with some exceptions for smaller projects, market-based auction mechanisms for established technologies will need to be in place post 2017, attempting Europe-wide harmonization by the application of competitive market forces to disparate schemes.

The effect has been immediate in the UK, where the recent introduction of a FIT moved immediately to an auction mechanism. Even in Germany, the new laws providing for continued but capped support facilitate a transition to auctions post 2017.

If auctions are appropriately constructed and not over complex, the industry should view this approach as a means of achieving transition to grid parity, rather than something to be resisted. Regulators and governments, however, need to ensure that sufficient capacity is auctioned to provide the volumes to allow time and scale for grid parity to be achieved (an area where the UK's new contract for difference (CfD) FIT mechanism arguably falls short). Further, it is important that tender mechanisms do not drive prices down so far that projects become unbankable and delivery is withdrawn, as has been a concern for some projects participating in auctions in South Africa and Brazil.

In addition, smaller community-level projects are vital to distributed models and political acceptance, and are likely to require more conventional support as they are less suited to the auction process. Equally, it is important that auctions do not favor only large market players and that adequate routes to market, for example, through priority of dispatch, are more widely available. Figure 3 shows that, while some markets have already embraced grid priority, many have not.

Carbon conundrum

Carbon pricing or trading is not a silver bullet in current forms.

Carbon mechanisms have proved difficult to enact. The EU ETS remains in disarray. Notwithstanding backloading, the carbon price consistently hovering around €5/tonne (US$6.6) is well short of the €30 to €50 (US$40 to US$66) that would lead to a shift from coal to gas. In the UK, the carbon floor price has been capped due to political pressure and in many jurisdictions, carbon taxes or levies have proved politically problematic. The issue is unlikely to be solved in the short or even medium term. Perhaps a carbon value-added tax would assist in the long term, giving credit to industries in those jurisdictions that have decarbonized, though such debates are a distraction as the industry prepares for grid parity. If ETS prices remain low, it is not unthinkable that the scheme should, in the interests of industry simplification, be abandoned as the impact of high penetration of renewables on wholesale prices seems to have a greater effect.

Against this backdrop, the industry should perhaps not be too worried that the proposed 27% Europe-wide 2030 target for renewable energy is unlikely to require binding individual country targets, even though this would give less scope for specific state aid support mechanisms post 2020 with possible implications for offshore wind and tidal. The move toward grid parity is the best way to secure success, with overall carbon targets providing comfort for the direction of travel rather than being absolute requirements. Plus in practice, the 2020 targets will be difficult to meet, with Figure 3 below illustrating that some markets still have some way to go to achieve their target proportion of electricity generation from renewable energy sources including hydro (RES).

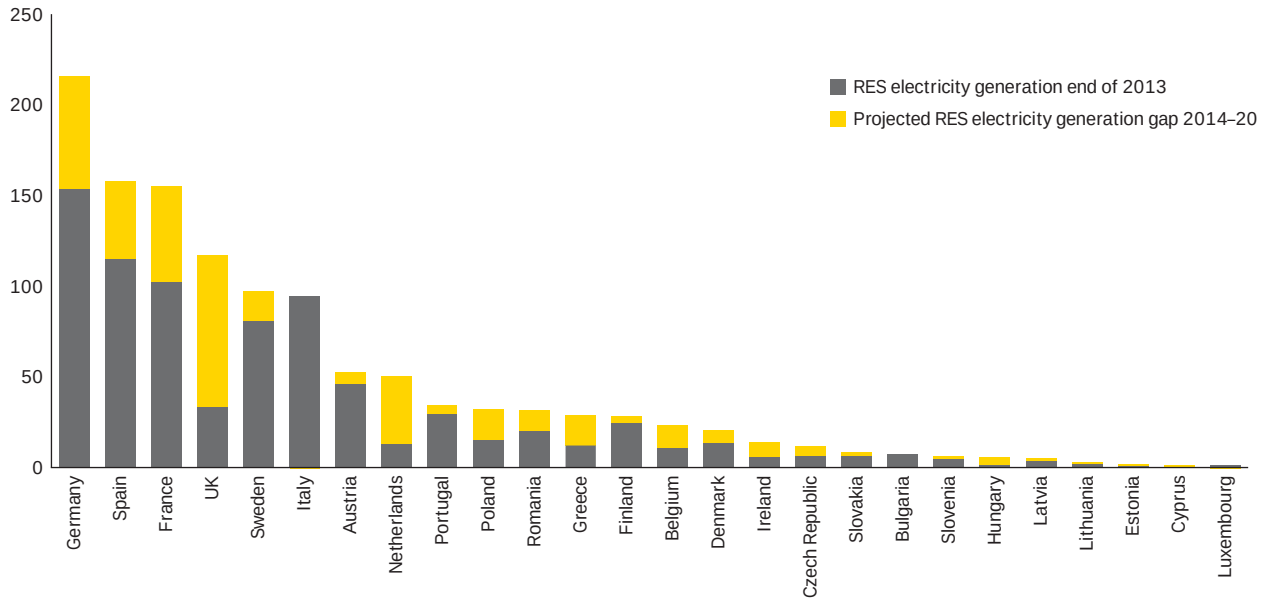
Figure 3: Priority of connection and dispatch for renewable energy by country

Country	Priority of connection	Priority of dispatch	Country	Priority of connection	Priority of dispatch
Belgium	●	●	Ireland	●	●
Germany	●	●	Poland	●	●
Hungary	●	●	Portugal	●	●
Italy	●	●	Romania	●	●
Lithuania	●	●	Bulgaria	●	●
Malta	●	●	Croatia	●	●
Slovakia	●	●	Estonia	●	●
Slovenia	●	●	Finland	●	●
Spain	●	●	France	●	●
Czech Republic	●	●	Latvia	●	●
Turkey	●	●	Luxembourg	●	●
Austria	●	●	Netherlands	●	●
Cyprus	●	●	Norway	●	●
Denmark	●	●	Sweden	●	●
Greece	●	●	UK	●	●

Priority ● No priority ●

Source: EY analysis based on various public sources.

Figure 4: Actual versus gap to 2020 target, RES electricity generation (TWh)



Source: EU Member State REAPs; "Statistical Factsheet 2013," ENTSO-E, April 2014.

Achieving equilibrium

Beyond 20% share, renewable generation starts to drive down wholesale electricity prices in peak periods of production, posing challenges for the economics of conventional generation and for grid stability. But, it also provides significant opportunity if that demand can be time-shifted or supply sold into other markets, and more focused investment made in grid infrastructure to enhance capture.

For renewables, storage of supply and time-shifting of demand gives the greatest economic opportunity going forward. The elimination of energy demand through increased efficiency and the time-shifting of demand to periods where costs are lowest, or the storage of energy for release in periods when it is best used, or the transfer of energy to other districts or jurisdictions, offers a huge productivity gain for the electricity industry as a whole and renewables in particular. In this way, intermittent electricity starts to become the new base load.

As government support ebbs away from tariff mechanisms, it is important that targeted measures are undertaken to enable the hard and soft infrastructure required by the new energy economy, ranging from cross-continental grid infrastructure and interconnections to local grid reinforcement, demand management and storage (as encouraged in Germany for example).

This also requires new thinking regarding cost, however. Renewable generation will be at risk of being burdened with these additional costs while traditional centralized generation continues to benefit from existing transmission and distribution infrastructure. In the pursuit of grid parity, our understanding of costs needs to ensure a level playing field.

Market entry

Large utilities no longer have the balance sheet capacity to act as the exclusive underwriter of large-scale renewable deployment or indeed for other forms of energy infrastructure.

Even if they do, they are likely to request very direct government support (as has occurred in the UK with nuclear, large biomass and offshore wind), with the consequence that restricted national budgets may be easily exhausted, thereby reducing the financial resource available for more distributed renewables.

The impact of renewables on wholesale electricity prices has challenged the very economic underpinning of older, and some new, fossil fuel plants, with the past few years providing a regular diet of multibillion euro asset impairment charges by European utilities forced to retire plants. According to EY analysis conducted last year, around €30.6b (US$42b) was wiped off European power and utility balance sheets between 2010 and 2012.[1]

The German regulator, for example, reports that operators plan to shut down stations accounting for more than 11GW of generation capacity by the end of 2018. Although some of these are old coal and even oil plants, gas plants have also been impacted by the low price of coal as well as the impact of renewable generation.

Many utilities have adopted business models whereby renewable assets are developed, sold to and managed for third-party investors, including pension funds and yieldcos, allowing earnings to be bolstered by mark-to-market disposal gains. This trend is likely to accelerate (and indeed be applied to conventional assets rather than just new-build renewables plants), with utilities moving to a service rather than asset-owning model.

1. *Benchmarking European power and utility asset Impairments Lessons from 2012*, EY, June 2013.

For governments, it is likely to mean further overhaul of regulation to facilitate new entrants, new services and new sources of capital. The new energy economy is leading to well-documented tensions between established utilities and governments for a variety of reasons, and these may well continue. The competition review being undertaken in the UK is not likely to be the only pressure toward unbundling felt by the larger utilities. It is likely to be in their interests to embrace change as profits are likely to flow from the old to the new business models.

Checking the boxes

The European renewables sector now finds itself at an inflexion point, striving to become a global leader once more but somewhat distracted by what has gone before. To transition to the next phase of its evolution, therefore, industry will need to:

- Avoid the temptation to chase attractive support mechanisms
- Focus on strategies that engender taxpayer consumer community support as fundamental to the transition to grid parity
- Consider wider business models, including demand management and storage services that enhance the value of each kWh generated and avoid spill or energy loss

So, with industry learning that it must liberate itself from the shackles of legacy support mechanisms to go in search of grid parity as the fastest route to secure and affordable energy, what then is the role for policy-makers at both an EU and individual country level? In short, to enable this to happen.

✕ Don't

- Over-regulate or continuously tinker with existing policies
- Let the process of target-setting overshadow what those targets are trying to achieve
- Allow the monetization of carbon and the associated mechanisms to become a distraction from the end goal
- Let the debate on an EU energy market integration become an all-or-nothing proposition – leverage political and geographical synergies to the extent required
- Focus on energy generation and revenue support mechanisms

✓ Do

- Educate and enable with the goal of empowering consumers, encouraging innovation and streamlining bureaucratic processes
- Create more flexible transmission systems, encompassing microgrids, distributed generation and priority of dispatch
- Create conditions for effective and targeted capacity market, storage and demand management solutions
- Level the playing field with other energy sources through transparency on legacy as well as current and future costs
- Create investor-friendly capital markets that support wide-ranging financing models
- Ensure that support mechanisms facilitate the flight path to grid parity, avoiding stop-start-stall economics that disrupt transition

Exciting times ahead

For those of us who have been engaged in the renewables industry for some time, the exciting thing about the past winter (late 2013-early 2014) has been the record share of the overall energy mix that renewables has achieved in a number of countries, and the vigorous downward impact on wholesale electricity prices that has occurred as a result in those markets with the greatest renewable penetration.

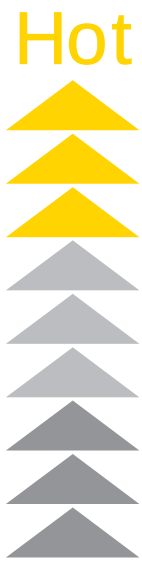
For those entering the industry, the exciting prospect is that renewables is at the heart of a radical transformation of the European energy industry, opening up new markets at local, national and international levels.

We should all relish the challenges ahead in demonstrating that the renewables industry does not need to live by tariff alone, but can enable a low-cost flexible-energy economy and a clean electricity future.

For comments or queries to the guest columnist Jonathan Johns, Director of ClimateChangeMatters Ltd, please contact the RECAI editor, Klair White.

Key developments

Country-specific highlights



China chances offshore. China has finally introduced higher tariffs for offshore wind in a bid to galvanize a thus relatively undeveloped sector. Non-auction projects operational before 2017 will receive up to CNY0.85/kWh (US$0.14), while projects in intertidal waters will receive CNY0.75/kWh (US$0.12). A 13GW solar capacity target for 2014 has also been confirmed, with a heavy focus on distributed projects. Having already introduced a series of tax incentives in June, further measures calling for additional subsidies and favorable financing to help reach the estimated 8GW target for off-grid solar installations in 2014 are expected.

France begins the march. France's long-awaited energy law will finally make its way through parliament after being approved by the cabinet in late July. The bill will crystalize President Hollande's goal of reducing nuclear to just 50% of total electricity by 2025 from around 75% now, as well as target 32% of energy from renewable sources by 2030 (more than double the current share) and 75% emissions reduction by 2050. The draft proposes measures such as tax breaks and low interest loans as a means of achieving these goals, with the Government expecting around €10b (US$13b) of investment to be mobilized as a result.

India reboots. Despite being in office for only a few months, India's new government has certainly re-energized the country's clean energy ambitions, having already reintroduced accelerated depreciation for wind projects and begun exploring the potential for more than 300GW of wind and solar developments in the country's desert regions, requiring around US$33b of investment by 2022. Prospects are further boosted by expectations that large-scale solar will achieve grid parity with coal by 2017, five years earlier than projected. Critically, the Government has also launched an US$8b grid upgrade program to address a weak infrastructure that has hindered renewables development so far.

Australia makes its mark. Having officially repealed its carbon pricing legislation in July, Australia has made clear its intention to revise the mechanisms that have subsidized renewable investments. The latest budget proposing the scrapping of dedicated clean energy funds and the ongoing review of the national Renewable Energy Target (RET) has created an environment of uncertainty. While it seems likely that the RET will be revised downward, the issue has become extremely political and clear outcomes are difficult to anticipate (see our article on page 30).

Italy goes retro. Early August saw a series of retroactive measures impacting Italian solar PV projects above 200kW pass into law, asking asset owners to accept an 8% tariff reduction or opt for a larger decrease of 17% to 24% while receiving payments for an additional four years. The changes, which would be effective from January next year, will impact an estimated 11GW of capacity (out of a total 18GW), though the legislation has already become the subject of legal challenge (see our article on page 32).

Japan revisits nuclear. Notwithstanding Japan's significant renewable energy potential and sustained levels of project activity, the transition to renewables is still taking longer than expected. Further, an apparent weakening of the country's resolve to shift away from nuclear, despite public opinion, is giving out mixed signals. A new energy plan approved by the Government in April identified nuclear as a key baseload power source and gave coal a prominent role in the energy mix, while failing to set specific renewable energy targets.

Key developments

Deal, investment and policy highlights

Fighting the yieldco fatigue

One would be forgiven for stifling a yawn as the words "yieldco" or "IPO" are uttered yet again, though it is difficult to ignore the stream of listings continuing to hit the headlines. While there is still some skepticism about the depth of the capital pool these funding models can really leverage, and their fate inevitably remains intertwined with interest rates and economic recovery, it is still proving to be an attractive option, with Q2 alone seeing eight clean energy IPOs totaling US$1.1b.

In July, SunEdison's yieldco spin off, TerraForm Power, raised US$502m after surging 32% on its trading debut, while Abengoa Yield also achieved a higher-than-expected price, raising US$721m in its June IPO. In the same month, NextEra Energy Partners, a carve-out of NextEra Energy, raised US$406m. Solar developer Sungevity, Inc. is also reported to be considering an IPO following SolarCity's successful listing in late 2012. And so it would seem that if enthusiasm for the IPO is waning, no one has yet told the market.

Bound to the bond

Perhaps the same can be said of the continued surge in green bond issuances, though with around US$22b raised in the first seven months of the year alone, it is not a market to be easily dismissed Alta Wind. In August, NRG Yield issued a US$500m bond to part-fund its US$870m acquisition of the largest wind farm in North America, Terra Gen Power's 947MW AltaWind project. Meanwhile, late July saw the German development bank KfW raise €1.5b (US$2.0b) in its first-ever green bond issuance, following strong demand that took orders to more than €2.6b (US3.4b). At the same time, Switzerland's largest insurer, Zurich Insurance Group, announced plans to allocate as much as US$2b for green bonds, double its previously announced commitment.

BNEF expects the total volume of green bonds issued to reach US$40b this year if the current pace is maintained, almost triple the US$14b issued in 2013 and significantly higher than the US$25b predicted by market analysts at the beginning of the year.

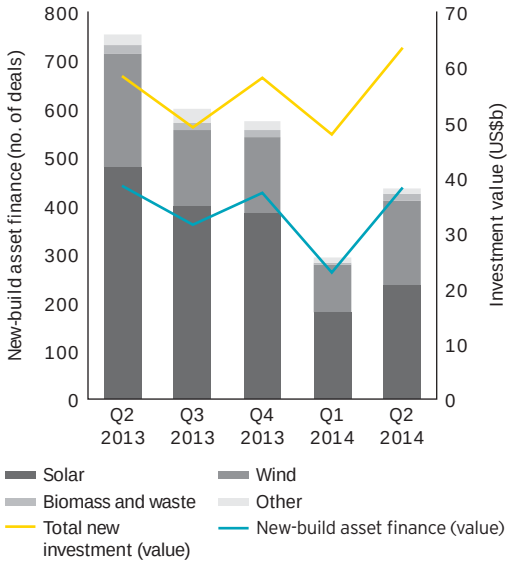
Offshore record

Representing the largest offshore wind financing to date, the US$3.8b financial close of the 600MW Gemini wind project off the coast of the Netherlands reaffirms that non-recourse project finance is more than a memory of a bygone era. The transaction, led by Canada's Northland Power, involved 12 commercial banks (providing €1b (US$1.3b) in total, also the largest commercial tranche ever), the European Investment Bank, and three export credit agencies.

The deal sends strong signals that banks continue to be willing to take construction risk for well-structured projects, but also that new types of investors are becoming increasingly interested in the sector. The acceptance of the Netherlands' CfD mechanism by the lending community is also encouraging for other offshore markets, such as the UK, that are depending on similar models. Elsewhere in the sector, French nuclear and clean energy equipment maker Areva and Spanish wind turbine maker Gamesa have signed a binding agreement to combine their offshore wind units to create a 2.8GW pipeline and secure market share of close to 20% in Europe by 2020.

New clean energy investment worldwide, Q2 2014

New clean energy investment of US$63.6b in Q2 2014 represents the strongest quarterly performance in two years, increasing the likelihood that full-year figures will reflect a rebound in global investment. With most sectors and geographies experiencing an uplift in Q2, total investment was also boosted by large financings, such as the 600MW Gemini offshore wind project and Israel's US$818m 121MW Ashalim CSP plant. Small-scale solar deployment, up 41% on the same quarter last year, has also contributed to the strong performance.



Source: BNEF project database; "Global trends in clean energy investment – Q2 2014 fact pack," BNEF, July 2014.
Values include BNEF estimates for undisclosed deals.

Our index

RECAI scores and rankings at September 2014

(See page 35 for an overview of the RECAI methodology.)

Rank	Previous ranking	Country	RECAI score	Technology-specific indices rankings							
				Onshore wind	Offshore wind	Solar PV	Solar CSP	Biomass	Geothermal	Hydro	Marine
1	(2)	China	75.1	1	2	1	4	1	12	1	19
2	(1)	US	73.8	2	3	2	1	3	1	3	9
3	(3)	Germany	67.0	3	4	5	26	8	9	10	27
4	(4)	Japan	64.4	10	9	3	27*	2	3	4	12
5	(5)	Canada	60.3	4	11	7	24	12	19	5	4
6	(7)	India	60.2	8	19	4	3	15	13	7	11
7	(6)	UK	59.2	7	1	11	27*	5	18	26	1
8	(8)	France	58.5	12	8	8	17	10	15	16	5
9	(10)	Brazil	57.0	6	26	14	9	4	32	2	24
10	(9)	Australia	56.7	16	17	6	6	22	11	18	10
11	(11)	South Korea	55.4	21	13	10	25	11	28	17	3
12	(13)	Chile	54.3	25	24	9	2	20	10	14	14
13	(15)	Netherlands	54.2	11	6	21	27*	9	26	31	30
14	(14)	Belgium	52.8	20	5	19	27*	16	20	30	31*
15	(12)	Italy	52.5	22	20	15	11	14	6	11	22
16	(17)	South Africa	52.3	26	29	13	5	37	35*	21	18
17	(16)	Denmark	51.7	14	7	30	27*	13	35*	37	16
18	(18)	Portugal	50.8	23	21	23	18	24	16	20	7
19	(20)	Turkey	50.7	15	25	26	12	32	5	9	20
20	(21)	Thailand	50.5	31	39	12	20	17	29	34	28
21	(22)	Sweden	50.4	9	12	37	27*	7	24	12	13
22	(19)	Spain	50.2	28	23	18	10	26	34	29	15
23	(23)	Taiwan	49.4	30	16	17	23	29	21	23	26
24	(25)	Mexico	48.7	24	31	25	19	31	8	28	21
25	(24)	Austria	48.6	19	39	24	27*	18	22	15	31*
26	(26)	Peru	48.0	34	27	20	15	27	14	6	31*
27	(28)	Israel	46.6	39	37	16	8	38	35*	35	25
28	(29)	Morocco	46.4	27	35	28	7	39	35*	39	31*
29	(27)	Poland	46.3	18	18	36	27*	19	17	25	31*
30	(30)	Norway	45.5	13	14	38	27*	25	27	8	8
31	(32)	Ireland	45.3	5	15	40	27*	21	33	32	2
32	(31)	Romania	45.1	29	32	31	27*	34	25	27	31*
33	(33)	Greece	45.0	33	36	27	14	35	23	38	31*
34	(35)	Philippines	44.7	37	30	29	22	28	7	22	6
35	(34)	Saudi Arabia	44.6	35	38	22	13	40	30	40	31*
36	(37)	Kenya	44.3	32	34	32	16	30	4	24	29
37	(36)	Finland	44.2	17	10	39	27*	6	35*	33	31*
38	(40)	Russia	40.9	38	22	35	27*	36	31	19	23
39	(39)	Indonesia	40.9	40	33	33	21	23	2	13	17
40	(38)	Ukraine	40.4	36	28	34	27*	33	35*	36	31*

Index highlights

After several months of edging closer to the US, China reclaims the top spot in the index for the first time since May 2013. The last year has seen something of a transformation as China's new government set about opening up the market to foreign investors. Earlier this year, the National Development and Reform Commission detailed 80 infrastructure projects that will be open to private investment, more than half of which are energy-related with some 35 in renewable generation.

The Government has also set aggressive technology targets for 2017, sending signals of its commitment to continued high levels of capacity deployment, largely driven by its pollution-reduction program but also reflecting the sector's strategic economic value. A renewed focus on offshore wind also opens up a new market for private sector participation, particularly given the current lack of construction experience and immature supply chain in the country. Similarly, increased support for distributed solar projects and a reported 8GW target for 2014 alone, could replicate the phenomenal growth already seen in China's utility-scale solar sector. Looking ahead, the country is also planning a US$40b project to develop 15GW of tidal power.

While a fall to second place for the US should not undermine the significant deployment and investment opportunities the market still has to offer, it does reflect the increasingly crippling effect that congressional gridlock and drawn out approvals are having on its ability to provide investors with the necessary long-term certainty. Recent months have seen at least three instances of partisan politics keeping the sector in limbo, impacting both specific initiatives and investor confidence more broadly; (i) failure to renew the PTC for wind and other technologies in the Senate; (ii) blockage of the proposed US$150m loan guarantee for the flagship Cape Wind offshore wind project; and (iii) a Republican funding bill designed to topple the Clean Power Program targeting 30% carbon emission reductions by 2030.

Germany and Japan retain their third and fourth places respectively this issue. However, both markets should be watched closely over the coming months as the latest amendments to Germany's Renewable Energy Sources Act (EEG) take effect and the nuclear debate is reopened in Japan.

The UK, however, has not received any such reprieve. With proposals to cut subsidies for large-scale solar earlier than planned now attracting legal challenge, and a dwindling budget for future projects under the new CfD FIT regime already resulting in the cancelation of offshore projects, the UK slips down to seventh place below India.

India's jump up to sixth place reflects the development of a more strategic and long-term vision for the country's renewable energy sector by the new Government, with ambitions increasingly measured in billions of dollars and gigawatts of capacity. The recent launch of a major grid upgrade program and the reinstatement of tax incentives for wind projects are also expected to have a tangible near-term impact on investment and deployment activity.

The successful repeal of Australia's carbon pricing legislation in June and ongoing uncertainty over the future of the country's Renewable Energy Target has prompted another slip down the rankings for Australia to 10th place. While the road ahead is uncertain (see our article on page 30), it is proving difficult for investors to maintain confidence in the absence of clear signals and many projects are stalled pending the outcome of the review.

Australia's loss is Brazil's gain as it jumps up to ninth place, spurred by sustained high levels of interest in the country's latest energy auctions and an increasingly strategic approach to developing its burgeoning solar sector. Also in South America, Chile continues its ascent up the index, as it continues to attract mega-scale solar and wind projects that indicate a robust outlook for increased generating capacity. Combined with neighboring movements, Chile therefore replaces Italy in 12th place.

After sitting dormant just outside the top 10 for the past year as investors tried to weigh up what the future held for Italy's renewable markets, a slip down to 15th place provides the answer. Retroactive solar PV subsidy changes have been announced, prompting investor exodus, the threat of legal challenge and the onset of some inevitable restructuring.

The formalization of the "reasonable profitability" criteria replacing Spain's long-standing subsidy regime represents yet another setback for this troubled market, taking it down to 22nd place. This still somewhat higher-than-expected ranking for a market many investors now consider unbankable partly reflects an improving economic picture and high asset base. Further, it will be interesting to see whether distressed deals, subsidy-free renewables or greater European energy market interconnection can rekindle interest in Spain in the years ahead.

The Netherlands jumps up to 13th place having secured one of the biggest project finance deals of the year to date following financial close of the 600MW Project Gemini offshore wind project, worth €2.8b (US$3.7b). The US$430m financing of Westmeerwind's 144MW onshore project also reinforces the market's ongoing attractiveness for large-scale wind projects.

The opening of Round 4 of South Africa's renewable energy procurement program sees a further 1.105GW of capacity up for grabs, with preferred bidders expected to be announced in late October. The robust project pipeline supported by this structured auction process, and an increasing energy imperative reinforced by rolling blackouts for the second time this year, has boosted South Africa up to 16th place.

Financial close on the US$684m required for the 121MW Ashalim solar thermal plant in Israel, and the receipt of technical bids for five wind projects totaling 850MW in Morocco have helped take these markets up to 27th and 28th place respectively.

The removal of import duties on solar PV equipment in Kenya, though sparking outrage from domestic manufacturers, is likely to improve deployment prospects by pushing down project costs and offering developers greater flexibility. Coupled with a new 560MW geothermal tender, Kenya rises to 36th place in the rankings.

Global view

Increasing activity outside our top 40 RECAI markets reinforces that attractive renewable energy prospects are no longer the remit of only a few mature markets; they are truly global.

North America

- In the **US**, the renewal of the PTC for wind projects was blocked in the Senate in May, prompting 302 businesses to sign a letter to Congress urging the extension of the credit through 2015 to bring some stability to the market.
- The US Department of the Interior is continuing to auction off prime sites for offshore wind developments, the latest offering of almost 350k acres off the coast of New Jersey that could host as much as 3.4GW of capacity.
- At a state level, Southern California Edison has launched another round of solicitations for up to 290MW of small-scale distributed renewables projects, while New York is planning a US$250m fund to support wind, biogas and hydro projects.
- Ontario, **Canada** has opened up the next round of its procurement program, seeking bids for 440MW of wind and solar capacity. The province expects to add 3.5GW of new renewables capacity over the next 18 months.
- Mid-June saw **Mexico** officially enact its energy reform package, prompting Spain's largest utility Iberdrola to announce plans to invest US$5b in the country's generation, transmission, distribution and storage sectors over the next four years, including renewable energy projects.

South America

- **Brazil's** national development bank (BNDES) has announced the domestic content obligations that will be attached to its financing packages for solar projects, ahead of the country's first national auction that will separate solar capacity to prevent projects from being priced out by wind again (see our article on page 28).
- **Chile** is continuing to attract large-scale projects, with First Solar planning to build a 370MW solar PV plant in Antofagasta at a cost of US$823m and German developer WPD submitting plans for a 205MW onshore wind farm with a price tag of US$400m.
- Outside of the RECAI countries, **Costa Rica** has launched a national plan targeting 800MW of renewables capacity by 2017, while **Cuba** has approved the construction of more than 2GW of wind, PV, biomass and hydro capacity.
- In **Argentina**, domestic energy company Genneia is planning to invest US$1b in nine wind projects totaling 500MW. Meanwhile, Germany's ABO Wind is developing two wind projects of 100MW each.

Europe

- The EC approved the final amendments to **Germany's** renewable energy law (or EEG) at the end of July. The new law will impose technology-specific deployment caps and initiate a transition to competitive bidding. It will require the operators of new plants >500kW (reducing to 100kW from 2016) to market their electricity directly, supplemented by premium payments (i.e., a shift away from fixed tariffs). It also requires new power plants >10kW to pay 30% of the EEG surcharge on self-consumed power, increasing to 40% in 2017.
- The **Netherlands** has played host to two major wind financings in recent months; the €2.8b (US$3.7b) 600MW Project Gemini offshore wind project and the US$430m financing of Westermeerwind's 144MW onshore wind project.
- Despite a slowdown of activity in **Romania**, deals are still being done. Russia's LUKOIL-Ecoenergo and Italy's ERG Renew have signed a financing agreement for the €123.8m (US$168m) Topolog-Dorobanțu wind farm with a capacity of 84 MW, while German power producer STEAG has reached financial close on the €200m (US$271m) 108MW Crucea North wind farm.
- **Spain** has formally approved a clean energy bill that abolishes the current system of subsidies in favor of a cap on earnings for all existing renewable energy plants, equivalent to a return of about 7.5% over their lifetime. This rate may be revised every three years.
- In late June, **Russia** announced the results of its second renewable energy tender, approving 577MW of new capacity across 33 projects, the majority of which was dominated by solar power.

Europe (continued)

- Turkey's transmission company, TEIAS, has signed US$350m in loan agreements with the World Bank to integrate wind into the grid and strengthen the network.
- In late July, Bulgaria's Constitutional Court declared the provisions in the 2014 Budget Act that imposed a 20% fee on the FIT paid to solar and wind power electricity producers to be unconstitutional.
- For France and Italy, see our "Key developments" on page 12.
- For the UK, see our article on page 26.

Middle East and Africa

- South Africa has initiated Round 4 of its national renewables procurement program with the tendering of 590MW of wind, 400MW of solar PV, 60MW of small hydro and 40MW of biomass capacity.
- In early August, Morocco shortlisted seven bidders for two CSP projects with total capacity of 300MW. It is also planning to issue tenders for two solar PV projects; the 100MW Tafilalt and 200MW Atlas complexes comprise four and eight solar parks, respectively.
- In East Africa, Kenya is reportedly moving to a build-operate model to attract private power developers for its 560MW geothermal expansion plan, while Ethiopia has received World Bank approval for US$203m of financing to develop 500MW of geothermal capacity.
- The 121MW Ashalim solar thermal plant in Israel's Negev Desert has raised US$820m, representing one of the largest renewable energy financings so far this year.
- Algeria has introduced a 20-year guaranteed premium for wind projects, just months after the creation of its solar FIT. Separate rates will apply to projects above and below 5MW and the rates will reduce after the first five years.
- Egypt has selected local cable maker Elsewedy Electric as the successful bidder to build, own and operate six 100MW wind farms in the Al-Zayt Gulf.
- Jordan's Ministry of Energy and Mineral Resources has canceled the third round of its procurement program that would have seen 400MW of wind and solar capacity up for tender, with grid challenges likely to be the main cause.
- Kuwait is awaiting expressions of interest from developers to build the 280MW Al-Abdaliyah combined-cycle CSP project, valued at around US$3.3b and with a solar component of at least 60MW.
- Qatar has unveiled a mega-scale solar factory in Doha with 300MW capacity and the potential to be expanded to 2.5GW.
- The government of Zimbabwe plans to build three 100MW solar projects in the country over the next 18 months, at a cost of US$750m.

Asia-Pacific

- In Japan, four companies have agreed to develop a 430MW solar project on the island of Ukujima; and the Japan Wind Power Association has raised its forecasts for the country's wind capacity by half, expecting 75GW by 2050.
- The Philippines is seeking to increase the cap on projects eligible for its solar FITs 10-fold from 50MW to 500MW, citing a flood of applications. However, the plan has attracted some criticism amid concerns for rising energy prices, prompting a public hearing on the proposal scheduled for early September.
- The South Korean Government plans to invest a further US$2b in renewables to meet its targets, and create six new clean energy businesses promoting specific sectors. However, there are also signs that implementation of the country's ETS, scheduled for January 2015, could be delayed again after the new finance minister described it as "flawed."
- Indonesia has passed a long-awaited law declassifying geothermal from being "mining activity," which could unlock more than 12GW of electricity production potential from the source.
- The Government of Punjab in Pakistan has signed a memorandum of understanding with China's Zonergy to develop 1.8GW of solar power, including the 900MW Quaid-e-Azam Solar Park. Pakistan is also in the process of developing an upfront tariff for multiple scale solar projects.
- The Asian Development Bank has approved a US$150m loan to help Sri Lanka develop a transmission network able to deliver power from two 100MW wind farms.
- For Australia, see our article on page 30.
- For China and India, see our "Key developments" on page 12.

Finance market

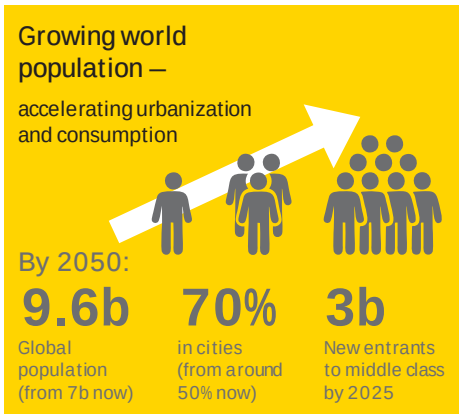
Empowering local

From micro to mainstream?

"Crowdfunding" = the aggregation of monetary contributions from a large number of people, usually via the internet.

With estimates putting total crowdfunding across all sectors at just over US$5b in 2013, compared with more than US$255b new investment in clean energy alone in the same period, it's easy to see why "microfinance" business models are often perceived as merely a footnote to the global energy transformation and a parochial funding vehicle for the environmentally conscious investor. In short, there is no escaping the fact that retail investment and community-led funding currently contribute only a small fraction of the global investment volumes.

Yet, faced with the startling reality that more than 1.3 billion people worldwide still have limited or no access to electricity, perhaps we should not be trivializing any contribution toward the estimated US$1t of investment required to achieve universal energy access by 2030. Factor in a surging population of potential energy consumers even beyond 2030 and the scale of the challenge becomes even greater. An even more intriguing thought is therefore whether consumer-led (or consumer-inspired) microfinance, far from being simply a footnote, is in fact becoming a significant narrative in the next chapter of the global energy revolution.

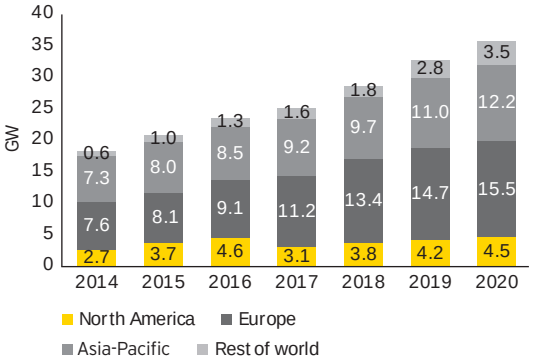


Small goes large

With grid and policy challenges in more mature markets making the build-out of large scale generating assets more difficult, and emerging markets finding themselves both desperate for energy yet also unencumbered by traditional centralized transmission infrastructure, localized and off-grid energy solutions are creating the necessity, and therefore the opportunity, for new finance models that can accommodate a large number of smaller projects. Far from being simply another source of capital therefore, microfinance may well have a role to play in financing deals that would otherwise not get done.

Yet the scale of the opportunity is far from small. Global distributed solar capacity is forecast to increase by 184GW between 2014 and 2020, requiring more than US$430b of investment (see Figure 1 below). Microgrid deployment is forecast to become a US$40b global business annually by 2020,[2] and IRENA expects renewable energy capacity in Africa alone to quadruple to 120GW by 2030 if investors dedicate "substantial flows" of funds to the region. Still parochial? Perhaps not.

Figure 1: Annual distributed solar PV installed capacity forecast by region, 2014–20



Source: *Distributed Solar Energy Generation,* Navigant Research, June 2013

1. *World Energy Outlook 2012*, International Energy Agency, November 2012.
2. *Market Data: Microgrids,* Navigant Research, April 2013.

Redirecting even 1% of the US$9t pool of US retail capital toward clean energy investments could yield US$90b for the sector.

A savvy investment model

Crowdfunding is not a new concept. However, the potential application to the renewables sector will likely challenge the scalability and geographic mobility of crowdfunding vehicles. Critically though, it is no longer just the remit of the "socially conscious" investor – it is now a smart investment vehicle offering similar and often higher yields than many other retail investment alternatives.

Analysis undertaken in 2012 by BNEF, in the midst of the economic recovery, indicated that US retail investors held almost US$9t in treasuries, savings bonds, money market funds and saving deposits. While crowdfunding does not yet match the low risk profile of such investments and is therefore not necessarily a directly competing alternative for retail funds at present, global and country-level efforts to increase investor protection and reduce risks are well underway. Given the anticipated accelerated growth of crowdfunding as an investment vehicle, with total global investment expected to double to US$10b in 2014 alone, its risk profile may well be reduced significantly in the coming years, taking it closer to these traditionally safe investment channels.

Should this happen, redirecting even 1% of this US$9t pool of retail capital toward clean energy investments via comparable yield crowdfunding platforms could inject more than US$90b into the sector. Just 0.5% of the bond market would yield an additional US$190b of capital.

Targeted policies can also help to position crowdfunding as an increasingly savvy investment model. Recent reforms in the UK for example, will enable savers to benefit from tax-free returns on peer-to-peer lending by permitting these investments to be held within individual savings accounts (ISAs), which analysts indicate could generate more than £6b (US$10b) for the crowdfunding market.

Taking its share

The renewables sector should therefore be leveraging its potential for long-term stable yields to attract a greater proportion of this increasingly liquid retail capital market. SolarCity, the largest solar power provider in the US, estimates that rooftop solar alone will attract more than US$5b from crowdfunding within five years, more than 50 times the amount raised to date.

But it's not just investors that stand to gain from the crowdfunding phenomenon. For businesses, it can provide affordable and attainable funding at a time when venture and seed capital to support technology or business model innovations are limited. Crowd-sourced finance can be more risk tolerant, with other social or environmental motivations often influencing the value proposition. It can also produce repeat investors and raise finance more quickly. In late 2013, for example, Windcentrale raised €1.3b (US$1.7b) in just 13 hours by selling shares in a 2MW wind turbine to over 1,700 Dutch households.

Perils for the masses

Crowdfunding still faces a number of significant barriers, however, not least the risk of fraud or cyber attack given the typical web-based model. Other challenges include the difficulty of standardizing the investment process, potentially high due diligence costs, the need for credit enhancement products to boost investor protection and a secondary market to increase asset liquidity.

Legislation also remains ambiguous across most markets, although specific regulations are being developed in the UK, China and India to name just a few. In the US, financial returns from crowdfunding are currently prohibited in most states, necessitating alternative payback models such as utility bill discounts. However, amendments to the US Jumpstart Our Business Startups (JOBS) Act, expected to be formally issued later this year, will permit businesses to provide a return on investment for projects of up to US$1m and allow an unlimited number of unaccredited investors without SEC registration to invest. This is expected to significantly boost the potential of US crowdfunding, though it does also bring with it concerns over both the protection of, and from, naïve or unsophisticated investors participating in deals that are assuredly less secure than, for example, treasury bills.

Germany and Denmark have demonstrated that citizen participation in decentralized energy generation can be the norm.

Blazing the trail

Notwithstanding the challenges, there are companies already successfully generating millions of dollars to boost clean energy deployment. US-based Mosaic, Inc. is one of the pioneers in this space, offering a typical rate of return of 4.5% to 7.0% for solar investments as small as US$25, with loans paid back over 10 years. In March, Mosaic launched its peer-to-peer platform allowing financing of residential solar as well as commercial projects.

In the UK, renewables platforms such as Abundance Generation and Trillion Fund predict returns of up to 9% for some projects. Abundance is the only UK crowdfunding platform to be regulated by the Financial Services Authority and is the first to use debentures as an investment vehicle. While the average project size is currently around £500,000 (US$830,000) it hopes to increase this to £1m to £4m (US$2 to US$7m), and eventually up to £10m (US$17m). Trillion Fund, meanwhile, aims to be owned by the crowd itself within three years, when it hopes to be providing US$100m of financing to the market annually.

Emerging from the crowd

Unsurprisingly, crowdfunding is also penetrating emerging markets, where distributed solar power in particular is having a significant impact. US-based SunFunder aims to raise US$1b for projects across Africa, Asia and Latin America by 2020, and is already close to half way with a 100% repayment rate to date. While the company is using crowdfunding to prove the sector is bankable, it's also seeking to make off-grid solar projects more attractive for larger private investors. Meanwhile, Milaap, a domestic Indian crowdfunder has disbursed almost US$2b of funds to individuals and small business enterprises across the country, a large proportion of which are energy initiatives.

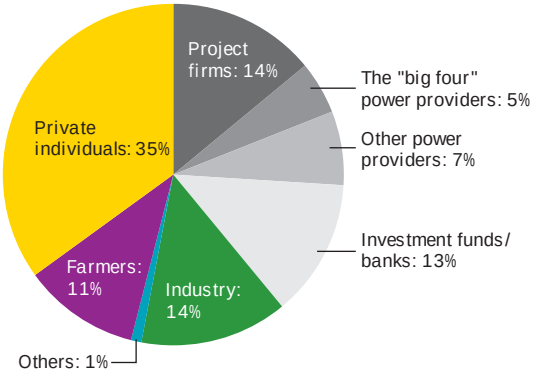
Community considerations

While crowdfunding has hit the headlines as an emerging phenomenon for clean energy financing, the broader concept of community ownership should also not be ignored. While not always necessarily driven by returns or restricted to third-party funding platforms, it is no less critical a driver in contributing to the global energy transition. Community-led ventures, whether wholly funded by the communities themselves or in collaboration with other investors (including crowdfunding platforms and socially responsible "impact investors"), are helping to engender changes in behavior and move the debate away from whether to install a single turbine, to how to deal with energy security at a local or regional level. Consumers are becoming more empowered to take control of their own energy supply and demand, and as a result, are also becoming increasingly motivated, and empowered, investors.

Setting a precedent

And for those tempted to dismiss community-led initiatives as niche or piecemeal, one need only look to Europe, where more people are invested in cooperatives than in the stock market. Germany and Denmark have demonstrated that citizen participation and regional value creation from decentralized renewable energy production can be the norm, not the exception. In Germany, there are more than 600 energy cooperatives and more than half of renewables capacity is community-owned, while in Denmark, over 100 wind turbine cooperatives have a combined ownership of three-quarters of the country's turbines.

Figure 2: Ownership distribution of Germany's installed renewables capacity for power production in 2012



Source: http://www.unendlich-viel-energie.de, citing trend research as of April 2013.

Democratic finance has arrived, small is big and people power will have its say in driving the global energy transformation.

In the UK, where community-led renewables has historically had less traction, energy cooperatives are increasingly seen as a way to challenge the monopoly of the "big six" utilities, with one local authority making a €1.2b (US$1.6b) revolving loan available to support local renewables projects. Organizations such as Energy4All, formed to support multiple cooperatives and help raise more than £25m (US$52m) through public share offers, are also valuable vehicles for pooling knowledge and resources across communities.

At a regional level, the recent announcement that more than €38b (US$51b) of EU Cohesion Funds will be available between 2014 and 2020 to support the shift to a more environmentally friendly economy, also provides a substantial pool of capital for community projects to tap into.

Competitive innovation

While there are fewer instances of communities funding projects themselves in emerging markets, the concept of community power is still galvanizing new business and financing models with the potential to attract investors and developers of all shapes and sizes.

Companies like Simpa Networks, for example, are evolving the solar leasing model popular in the US to bring low-income communities in India solar systems by requiring customers to make only a small initial down payment for the system and then pre-pay for the energy service, activated via a mobile phone. Each energy payment then also contributes toward the final purchase price of the system. Elsewhere, 10 clean energy projects developed by West African companies and entrepreneurs representing more than US$80m of investments were presented to investors at the West Africa Forum for Clean Energy Financing in late 2013 as part of a business innovation competition.

Making connections

Perhaps one of the most interesting and potentially transformative models for leveraging and creating community power that is both bankable and scalable, can be illustrated by a joint initiative between Bharti Infratel, India's largest mobile phone provider, and OMC Power. The venture sees Bharti's off-grid radio tower base stations acting as "anchor clients" that purchase the majority of the power output from small-scale renewable installations run by OMC, with excess power then sold to local communities via mini-grids, transportable batteries, or by directly charging applications (such as phones) on site.

The guaranteed revenue from the telecoms provider makes the project bankable, while the direct energy supply reduces the company's power bills, helps keep customers' phones charged and electrifies rural communities.

While the telecoms industry represents a perfect fit for such a model, its potential is more far-reaching, with most industries likely to benefit directly or indirectly from communities – in essence their potential consumer base – having increased access to cost-effective power. Further, with such business models, it is entirely feasible that the need for anchor clients will diminish, with community and individual power offtake driving the economics of the business.

The power of power

This affordable power has the ability to transform peoples' lives, and in turn transform whole economies, boosting economic growth, creating jobs and galvanizing further demand for energy – a self-reinforcing cycle. And with emerging economies in a unique position to leapfrog traditional infrastructure and more mature markets facing grid challenges and site saturation, it is becoming increasingly clear that small- to medium-scale energy projects led or inspired by communities and retail investors will play a critical role in shaping our future energy mix and creating the stimulus for new funding models to emerge.

It seems getting people to part with their savings and invest is not the barrier, nor is there lack of appetite for innovative business models. But the sector does need to be more proactive in ensuring clean energy initiatives become the obvious destination of choice for this crowd-sourced or community-sourced capital, as well as helping to address the broader microfinance challenges. It's no longer just about contributing to global clean energy investment, it is also about financing the deals that otherwise wouldn't get done.

But what is clear is that democratic finance has already arrived, small is big and people power will have its say in driving the global energy transformation. So, let's embrace it and get involved, or dismiss it at our peril.

In the market

Island renewables: Sink or swim?

Solid foundations

There are likely to be few places that represent a more suitable market for homegrown renewable energy than the world's island nations. Almost wholly reliant on imported fuel to support diesel-based power generation, islands face some of the world's highest energy costs, as well as greater exposure to price volatility and supply disruptions. It is estimated that the average cost of electricity in the Caribbean for example, ranges from US$0.32 to US$0.65 per kWh, around five times that of the mainland US. In the Pacific Islands, the tariff can exceed US$1.00/kWh. With many governments subsidizing the cost of electricity to protect consumers, high fuel costs have also contributed to weak economic conditions, exacerbating trade deficits and driving up the price of food and other essential items, as well as reducing investment for other infrastructure. In the Pacific Islands, imported petroleum products account for 40% of a country's GDP on average.

With power representing 20%+ of operating expenses for the energy-intensive hospitality and tourism industries, often the driving force of many island economies, as well as increased vulnerability to the impacts of climate change, the stability and resiliency of energy supplies have also become critical. In the Pacific, long distances separating sparsely populated islands and the cost of supplying rural areas have resulted in approximately 70% of the region's population still lacking access to electricity.

In short, domestic renewable energy, particularly in the form of distributed generation that can circumvent the aging power infrastructure, has become an economic, social and environmental imperative for most island nations.

Rocking the boat

But if it's so obvious, why have we not seen investors and developers flocking to these markets? Firstly, typically smaller renewables projects can result in relatively high upfront development cost on per kWh basis, and there is also some skepticism about the scale of the opportunity given the low energy demand of some islands in absolute terms compared with many mainland markets.

Secondly, the economic picture can be distorted. Venezuela's Petrocaribe initiative, for example, creates an alliance with 17 Caribbean states to purchase oil on preferential payment terms, with exports to these markets accounting for more than 40% of their total energy consumption in 2013. While the terms of the initiative are expected to become less attractive as Venezuela battles its own fiscal deficit, anticipated revisions have been delayed, allowing members to draw on subsidized financing for another year. Relatively weak credit ratings and limited borrowing capacity across some Caribbean states also make it vital to get organizations such as the World Bank and OPIC on board to help arrange low-cost financing for energy ventures.

Thirdly, non-economic barriers such as community land ownership and spacial constraints can make permitting and build-out at scale more challenging, while a tradition of vertically integrated and state-owned utilities weakens the incentive for competition.

Help on the horizon

In the face of such challenges, it's tempting to write off island renewables as a niche investment for entrepreneurs and multilaterals. And yet, it's not that easy to ignore the opportunities. Warren Smith, President of the Caribbean Development Bank, claims the region is looking to attract as much as US$30b of investment to expand and upgrade the power sector, with potential to replace 4,750MW of fossil fuel generation with renewables by 2019.

Further, the sector is not battling these challenges alone. Specific initiatives are already underway to galvanize increased investment and deployment of renewables. Co-founded by billionaire and entrepreneur Sir Richard Branson, the Carbon War Room aims to transition a group of islands to 100% renewable energy by accelerating commercial investment, with the Ten Island Renewable Challenge, creating a formal framework for fast-tracking this process and aggregating energy demand. Together with the Rocky Mountain Institute, World Bank and OPIC, it has already earmarked US$300m for new projects, while Branson's home of Necker Island will serve as a demo for the initiative, with major US energy company NRG Energy lined up to develop a renewables-driven microgrid for the whole island. The Clinton Foundation's Climate Change Initiative has also already voiced its support for Caribbean renewables.

With islands effectively microcosms of larger markets facing similar energy crises, they can become models for success.

Elsewhere, the Asian Development Bank has recently announced that it will invest US$228m in Pacific island energy projects over the next three years, and the International Finance Corporation has unveiled plans to get solar generated electricity to half a million people in remote parts of Papua New Guinea.

More than treading water

It also should not be ignored that some islands themselves are already spurring on renewables deployment, and on a larger scale than might be anticipated.

Aruba, whose top industry is tourism, now gets 20% of its energy from renewable sources having invested US$300m in expanding its wind power capacity including a 30MW project, and cut diesel consumption by half in only two years. Meanwhile, Cuba, the Caribbean's largest island nation, is reportedly pushing through policy changes that could open the door for new renewable energy investors, with pending legislation expected to allow wholly owned foreign companies to exist in Cuba for the first time.

In June, the Dominican Republic approved US$150m of new renewables projects, including a 30MW wind farm and 25MW biomass plant, while Germany's Wirsol is also developing a 62MW solar park in the country, the largest in the Caribbean. The country has already received US$800m in investment since 2007, having set legislation targeting 25% renewables generation by 2025, providing tax breaks for imported equipment and mandating the purchase of renewable power by distributors. In the same month, Jamaica's Energy Minister claimed that the country will be the leading nation for gross production of renewable energy thanks to an anticipated additional capacity of 78MW by the middle of next year.

Beyond the Caribbean, Spain's Ence Energia y Celulosa plans to build 210MW of biomass plants in the Canary Islands at a cost of US$730m, while the British Channel Islands are continuing to explore the potential for marine energy, aiming to install a 300MW tidal array off Alderney by 2020.

Stabilizing conditions

Enablement technology is also coming to the fore as a means of facilitating the transition to renewables-led island economies. Hawaii, which plans to obtain 40% of its current power consumption from renewables, recently launched a request for proposals for 60MW to 200MW of storage capacity. Meanwhile, Puerto Rico, which has committed to co-invest US$290m in renewable energy projects and other initiatives over the next 10 years via its Green Energy Fund initiative, has introduced new minimum technical requirements that mandate all new renewable energy projects to meet specific storage requirements.

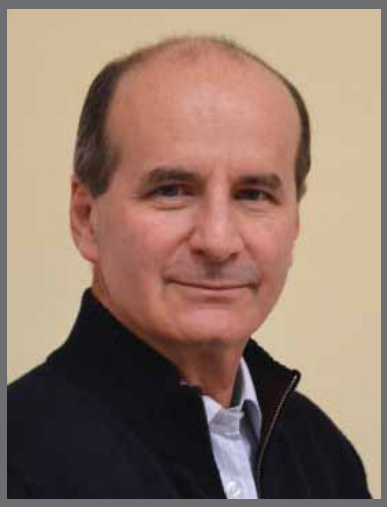
Creating a wave

Island nations are therefore already well on their way to demonstrating that an economically viable clean energy transition is possible and desirable. However, significant commercial investment and deployment activity is still required to fulfill this potential.

Further, with such islands effectively microcosms of larger markets facing similar energy crises, and their potential as living laboratories to demonstrate and scale innovative solutions as well as circumvent traditional grid infrastructure, there is much to recommend such investment as a means to establishing a template for the successful transition to a fossil-fuel free economy at a global level. Initiatives to establish greater collaboration between islands to aggregate demand, foster stakeholder engagement and reduce cost and policy barriers, will also help to make projects more bankable and attractive to a wider array of participants.

The question is therefore whether today's investors, developers and innovators want to be at the forefront of creating an island model of energy with potentially far-reaching implications for the global energy sector, or just wait to ride the second wave as micro goes macro.

We asked José María Figueres, President of the Carbon War Room, and Lynn Tabernacki, Managing Director of Renewable Energy and Sustainable Development at OPIC, what they see as the key challenges and opportunities facing island nations in their quest for affordable and secure energy.



José María Figueres

President, Carbon War Room

After a successful business career in the 1980s, José María served as Minister of State and was later elected President of Costa Rica in 1994, a role which established publicly his passion for technology and sustainable development. He coined the now famous phrase "there is no planet B" during his time as CEO of the World Economic Forum in the early 2000s. José María went on to join the Carbon War Room in 2009 and was appointed as president in 2012.

In short, why island nations and why now?

In the Caribbean, the stars have aligned: the high price of electricity, affordable renewable energy infrastructure and enthusiastic governments make renewable energy a great investment, offering almost double the returns of an equivalent investment in the US and Europe.

What is the significance of islands in the global energy transition?

Caribbean and Pacific islands can provide the perfect blueprints for the sustainable cities of tomorrow as well as models for isolated communities everywhere. Facing high electricity costs, the threat of rising sea levels, and other effects of climate change, islands have reached a tipping point where the motivation, political will, and economic conditions exist that can guarantee successful renewable projects. By leading the way, islands can demonstrate the economic viability of renewables to both governments and utilities, and provide real-world case studies on how to transition to a low-carbon economy.

Who do you expect to galvanize this increased investment and deployment activity?

The transition to a low-carbon economy requires creative entrepreneurship – questioning business as usual and finding new, profitable ways to grow the economy while reducing emissions. But we don't think that entrepreneurialism only comes from start-ups and small- to medium-size enterprises. The world's largest companies and developers have an essential role to play as entrepreneurs looking to reduce their costs, develop sustainable ways to operate their businesses and stay profitable. Realizing a low-carbon economy will also require heavy involvement from mainstream investors, since they can mobilize capital into renewable and energy efficiency projects and witness positive returns.

> "By leading the way, islands can provide real-world case studies on how to transition to a low-carbon economy."

In the Caribbean, we would like to see more major players follow the lead of NRG Energy, Vestas and others, by coming into the market. We are actively seeking the biggest and best engineering firms and project developers to bid on the projects we are working with to "test drive" their latest technologies. It is imperative that the foreign capital that is attracted to the islands is kept there, and that real job growth as well as a reduction in imported fuels is the result.

What is the greatest barrier to achieving greater renewables penetration across the islands?

The greatest barrier is the appeal of natural gas as a short-term solution to high electricity prices. The immediate appeal of natural gas could undermine more sustainable, longer-term renewable projects. This could divert funds away from a more secure low-carbon future.

Natural gas is not a viable solution financially or environmentally. The volatility of natural gas prices, as well as long-term lock-in to natural gas infrastructure, make it financially untenable. Meanwhile, natural gas is a fossil fuel. The extraction and burning of natural gas presents a substantial risk to air and water quality, and leads to methane gas emissions, which have a more detrimental impact on the atmosphere than carbon dioxide. Methane gas is 25 times more potent over a 100-year timeframe and 72 to 105 times more potent over just 20 years – an important distinction given that the world's emissions over the next few decades will have a decisive impact on our climate for centuries to come, and natural gas could sway the balance in coming years.

What needs to be done at a policy or regulatory level?

Right now, most Caribbean countries do not have a consistent policy framework that specifically speaks to independent power production: a homeowner (let alone a company) cannot install solar PV on their roof, for example, in most of the Caribbean. This policy framework – or lack thereof, presents a lot of risk to a developer because it does not provide the long-term security required to engage in a power purchase agreement (PPA), which normally lasts 20 years or more. By creating specific policies that speak to renewable energy, island governments would allow independent power producers to make investments with confidence. For example, in the Bahamas, our project is the driving force behind the government's intention to revise their current electricity act to enable independent power providers to produce and deliver power to the government.

Lynn Tabernacki

Managing Director of Renewable Energy and Sustainable Development, OPIC

Since joining OPIC in 1995, Lynn's efforts have focused on supporting investments in clean energy and energy efficiency, and projects directly benefiting the environment. She also has a special interest in off-grid and distributed energy generation. Lynn's background includes work with Price Waterhouse Poland, Citicorp, and Arthur Andersen.

Why island renewables?

As a development finance institution, renewable energy has become a springboard for OPIC's mission, given the extent to which costs associated with fossil fuels are contributing to the difficult economic situation many countries are facing. Governments are either pushing this cost to consumers or else trying to subsidize it, channeling funds that could be otherwise used for schools or hospitals. But when you introduce renewable energy, to islands in particular, you're effectively cutting the cost in half. In short, availability of energy is needed for economic development, and if that is going to happen it might as well be done in an economically and environmentally friendly way.

We also see that we're at the pinnacle of interest for all parties involved. Local governments are recognizing that this has to happen now, and there has been a greater willingness to work together to make some of these changes happen.

Is there a danger that OPIC is crowding out private sector investors?

OPIC, like other finance institutions, is demand driven. We are willing to fund as many projects as are financially viable but we aren't competing for projects that we know the private sector will support. Our mission is to mobilize the private sector, not to monopolize the market.

In fact, we are trying to demonstrate to the private sector that the deals can be done. Beyond simply financing projects, we are also working with governments to identify ways in which deals can be made more bankable, for example, by creating the right PPAs and request for proposal (RFP) frameworks. In essence, OPIC is using its credibility and close relationship with governments to lay the foundations for others to come in. Partnering with OPIC can also offer some investors the additional security they require, particularly where projects involve smaller or less experienced stakeholders.

What are the main challenges to increased penetration of renewable energy?

The economics of the projects are there, so I can only think that it is more the development risks that are discouraging investors. Two critical factors are time and the finite number of deals on each island. This means that the market is currently attracting mainly small- to medium-size enterprises rather than the larger players, and investing a lot of time to finance only one or two deals on an island can also be costly. This can be harder for these smaller businesses to handle; therefore, we really need to focus on cutting development time and cost down.

Creating quality bankable PPAs upfront is one way of doing this, making it easier for lenders when they come into the project and avoiding unnecessarily lengthy negotiations.

Further, while islands are often lauded as test-beds for innovation, and newer technologies should absolutely be worked into the spectrum, we must also ensure that it doesn't delay the overall process. Given so many factors go into evaluating these projects, if the technology hasn't been financed before or isn't proven, it's harder to get deals done in a timely manner, if at all. So, we also need to exploit the low hanging fruit. Reducing demand is as important as adding new plants – it can have the same impact but is US$20m you haven't spent. Establishing a sensible timeline for addressing both energy efficiency and renewable energy generation needs, whether replacement or new sources, is therefore key.

> "Creating bankable PPAs makes it easier for lenders coming into a project and avoids lengthy negotiations."

Do you foresee a strategy of aggregation or replication being most effective?

In a way, both approaches are trying to reduce cost and time. An aggregation approach would be more attractive to larger players and could create some economies of scale. However, it also requires significant commitment from many stakeholders, and any form of regional infrastructure or interconnectivity would take years to develop, even if started today. It's easy to envisage a situation where the first island is ready to go but has to wait for the last to catch up, given the islands' different development requirements. This brings us back to the issue of time.

Showing that it can be done on one island and replicating elsewhere might therefore be faster. As such, the US Government is partnering with Grenada in a pilot program, where we are focusing support on developing a road map, creating a template PPA, developing more effective licensing and permitting frameworks and ensuring that the right renewable energy, financing and investment protection legislation exists. Further, anything we achieve in the Caribbean can also be replicated on other islands globally. There will be no limits.

Country focus

UK

Highlights

- **Annual support of £205m (US$340m) has been proposed for the first CfD FIT allocation in October, split between established and less-established technologies.**
- **The UK auditor has concluded that early CfD contract awards in April totaling £16.6b (US$28b) were unnecessarily high and may undermine future bidding rounds.**
- **The UK has surpassed the 5GW mark for solar capacity and looks set to become the fourth-largest market in the world for new installations in 2014.**
- **Offshore wind continues to experience mixed fortunes but Green Investment Bank plans to launch a £1.0b (US$1.7b) offshore fund which could help spur new developments.**

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Clearing the EC hurdle. The UK's transition to a competitive auction mechanism that awards contract for difference (CfD) FITs received state aid clearance from the European Commission (EC) in late July, representing another milestone in the execution of the Government's Electricity Market Reform (EMR). While this is welcome news for the market, it needs to be seen in context, i.e., just another small step in what appears to be an almost pedestrian transition under the UK's EMR.

Pots of cash. Notwithstanding, within days of this EC approval, a draft budget for October's first CfD allocation round was released proposing £205m (US$340m) of support split between two categories; "established" technologies such as onshore wind and solar PV awarded contracts for project delivery beginning 2015-16 will receive £50m (US$83m) annually, while "less-established" technologies such as offshore wind, wave and tidal energy will be allocated £155m (US$257m) for projects beginning 2016-17. The draft budget also reinforced a decision in May to not allocate any subsidy support for coal to biomass conversion plants.

Meagre portions. While the final budget won't be announced until late September, it has already attracted criticism. While recognizing the need to hold back budget for future years, there's also a sense that the allocation is overly cautious and falls short of what is required to drive down the cost of renewables in the long run. The UK's Solar Trade Association (STA) has described the draft allocation as "absurd," as even applying the whole "established" budget of £50m (US$83m) to solar PV would support only 1GW of capacity, a considerable reduction given the market's current growth potential. The £155m (US$257m) allocation for "less established" technologies would also barely cover one small offshore wind project. These budgetary constraints are likely to further exasperate the stalling investment in new UK projects driven by the EMR stalemate. Some cynics may think this is a deliberate intension of the policy-makers.

Rankings snapshot	Issue 42	Issue 41
Total RECAI	7	6
Onshore wind	7	6
Offshore wind	1	1
Solar PV	11	8
Solar CSP	27*	27*
Biomass	5	4
Geothermal	18	18
Hydro	26	23
Marine	1	1

The UK has now become only the sixth nation to surpass the 5GW installed capacity mark for solar PV.

Value for money. The industry's disappointment is likely to be all the more bitter after the UK National Audit Office (NAO) concluded that the Government has overpaid CfD subsidies to the five offshore wind and three biomass projects awarded early Final Investment Decisions in April. The NAO is "not convinced" that the decision to award £16.6b (US$28b) of contracts – equivalent to around 58% of the UK's total available funding for renewables between 2015 and 2020 – is worth the risk to taxpayers, and claims that it may have undermined future bidding rounds by expediting contracts without ensuring sufficient price competition.

Foreign FITs. The threat of yet further policy upheaval also looms large as the Government considers offering CfD support to foreign renewables projects to aid the achievement of the UK's 2020 target. While it has reassured the sector this will not occur before 2018, acknowledging that the challenges and complexities of such a change will require most aspects of the EMR policy design to be reviewed, even the prospect of further changes could be too much for an already fragile market fatigued by ongoing policy tinkering.

Solar pleas. Nowhere has this been felt more recently than in the solar sector. Four of the UK's largest solar companies have launched a legal challenge in response to the Government's surprise announcement in May of its intension to withdraw Renewables Obligation (RO) support for solar projects above 5MW two years earlier than planned, forcing them to compete for CfDs with other mature technologies. The challenge came just weeks after a coalition of more than 150 businesses petitioned the Government to give solar extra time and policy stability to compete with conventional fuels and avoid putting the UK's current position in the booming global solar market at risk.

Big statistics. The UK has now become only the sixth nation to surpass the 5GW installed capacity mark for solar PV, according to NPD Solarbuzz. Around 1.5GW of new capacity has already been installed in the first half of 2014, more than the whole of 2013 and putting the UK on track to become the world's fourth-largest market for new solar deployment this year. Martifer Solar, a Portuguese clean energy developer, plans to develop 100MW of new capacity in the UK by early 2015, and a joint venture between China's Znshine Solar and UK-based MAP Environmental has agreed a US$680m deal to develop a 400MW solar portfolio.

Large to small. The Government's unexpected solar intervention therefore comes despite record levels of public popularity and industry appetite. The rationale offered is the need to shift development toward commercial and domestic rooftops amid concerns that large-scale installations threaten to monopolize the RO budget, claims the STA say are ill-founded given solar currently accounts for just 5% of total RO expenditure. Few in the sector are disputing the importance of the small- to mid-scale solar projects but point out that such projects still lack clear policy and incentive drivers to unlock their value.

Choppy waters ahead. The UK offshore sector is also continuing to experience mixed fortunes, with a mismatch between the potential 37GW project pipeline and the Government's target for 10GW to 20GW by 2020. The proposed CfD budget could reduce this ambition further, while the announcement in early August that Centrica and DONG Energy are abandoning the 4.2GW Celtic Array in the Irish Sea is another blow to the sector. The developers have cited challenging seabed conditions that make the project economically unviable with current technology, though some are speculating that policy backsliding may also be a factor.

Project pipeline pickup. Projects are still flowing, however. Statoil and Statkraft are to proceed with the £1.5b (US$2.5b) Dudgeon wind farm after receiving CfD approval in April for the 402MW project, and E.ON has received the green light for its proposed 700MW Rampion wind farm with an estimated price tag of £2.0b (US$3.3b). JV partners ScottishPower Renewables and Vattenfall Wind Power have also recently received planning consent for the 1.2GW East Anglia One project, part of a wider 7.2GW development granted under Round 3 of the Crown Estate's offshore licensing program.

GIB takes offshore private. But perhaps the biggest boost for the sector in recent months has been the unveiling of plans by the Green Investment Bank (GIB) to launch a £1.0b (US$1.7b) offshore wind fund to help utilities refinance operational wind farms and start new developments. It will be the first private capital under the control of the bank following receipt of EC state aid approval in May 2014 to promote and manage funds and other co-investment structures. The GIB will contribute up to 20% of the capital and is now seeking a suitable group of strategic long-term co-investors to participate in this "innovative capital-raising exercise."

Country focus

Brazil

Highlights

- **More than 10GW of capacity has been shortlisted for Brazil's first national solar auction in October.**
- **The country hopes its significant solar potential will help it meet a 50% increase in energy demand over the next decade.**
- **National development bank BNDES is to offer low-cost funding to solar projects using locally produced equipment, targeting 60% by 2020.**
- **Already stringent domestic content rules for wind manufacturers are identifying supply chain bottlenecks.**
- **The two pending 2014 auctions have attracted more than 30GW of wind projects in total.**

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Solar scores big. After hosting the first-ever FIFA World Cup game to be powered by solar energy, thanks to the 6,000 solar panels installed on the Mineirão Stadium, Brazil's solar ambitions are about to get even bigger. Around 400 projects representing 10.8GW of capacity have already been shortlisted for the October reserve auction, the first national power auction to split out solar capacity from other technologies. Through such allocations, the Government expects to contract around 3.5GW of solar power between 2014 and 2018, compared to just 11MW of installed capacity currently. Successful projects securing these 20-year PPAs will need to be operational by October 2017.

Seeking fair prices. Solar actually made its debut in Brazil's national power auctions last October, with around 6GW of projects cleared to bid. However, with average solar PV prices of R$250/MWh (US$112), projects have been unable to compete with wind bids averaging just R$130/MWh (US$58) in recent auctions, resulting in no solar contracts being awarded. The decision to ring-fence solar projects within October's reserve auction therefore represents a very deliberate move by the Government toward a technology that it previously deemed to be too expensive.

The solar rationale. Prolonged drought has left the country's hydro reservoirs at less than 40% capacity at a time when energy demand is forecast to grow by 50% over the next decade. With federal elections looming in October, the threat of electricity rationing and rising energy bills (as the need for more expensive back-up power increases) is understandably causing political angst and prompting alternative energy sources to be explored. Further, solar projects can typically be brought online faster and with less reliance on transmission networks compared with wind installations. The initial low share of solar in the energy mix should also minimize the impact on consumer energy bills despite the much higher generation cost at present.

Rankings snapshot	Issue 42	Issue 41
Total RECAI	9	10
Onshore wind	6	7
Offshore wind	26	26
Solar PV	14	15
Solar CSP	9	10
Biomass	4	5
Geothermal	32	32
Hydro	2	4
Marine	24	24

Bottlenecks will need to be addressed to accommodate the 22.4GW of wind capacity expected to be online by 2023, from just 3.5GW today.

Creating local value. Recent announcements that the Brazilian Development Bank (BNDES) will offer cheaper funding to solar projects using locally produced equipment also reinforces the country's ambition to create a strong domestic solar value chain. Favorable financing from 2020 onward will only be available to developers buying solar equipment with at least 60% domestic content, though obligations for specific components will be phased in over the period. Cells will be the final element to be subject to the maximum local content requirements.

Making savings. Developers may be able to finance up to 65% of their projects via BNDES's 20-year credit lines with rates ranging from 6.4% to 9% per year. A further 15% may be available from Brazil's BLR560m (US$245m) Climate Fund, offering 16-year credit lines at just 1.4% to 3.9% per year. Both represent a significantly lower cost of capital than the country's annual base interest rate, currently around 11%.

Getting ready. Such domestic content obligations will also put pressure on the Government to ensure sufficient demand, with BNEF estimating more than 500MW of solar capacity per year will be required to support local panel production. Consumers will also need to be prepared to pay more for locally made panels. Meanwhile, the sentiment from many developers seems to be recognition that solar projects may not initially bring high profitability, but will be worth it to get a foothold in the sector early on given its significant growth potential.

Wind worries. However, with the Government simultaneously undertaking a study of the wind sector's supply chain to identify bottlenecks and investment needs as turbine manufactures struggle to meet BNDES's increasingly stringent domestic content obligations, the solar sector may want to start taking notes. With wind power continuing to experience significant growth – now a 2GW per year industry – and vendors facing a January 2016 deadline to meet up to 70% local content for core components on a phased basis, there are some concerns that there are insufficient local suppliers to provide specialist subcomponents to support this target.

Act versus wait. The apparent lack of supply chain efficiencies are prompting some turbine manufactures such as Alstom, Vestas and Impsa to set up their existing foreign suppliers locally to increase control over the quality and availability of components. However, some turbine makers also appear to be holding off placing orders with suppliers so close to the October presidential election, where a victory for the opposition could result in changes to the strict local content policy.

Strong pull. Though government support for the wind sector is likely to remain high, such bottlenecks will need to be addressed to accommodate the 22.4GW of capacity expected to be online by 2023, compared to just 3.5GW of installed capacity currently. Such growth prospects are inevitably keeping manufacturers and developers interested in the market, with India's Suzlon, recently poised to quit the Brazilian market altogether, now renewing its efforts in the country as it plans to open a new 400MW turbine factory.

Auction appetite. September's A-5 auction has already attracted 708 wind projects totaling 17.4GW, while the October reserve auction has shortlisted 15GW of projects, representing 58% of the total capacity registered. June's A-3 auction also saw a healthy 248 projects quality totaling 6.2GW, though actual contract awards were significantly lower at 986MW and primarily allocated to smaller players. Many larger companies registered but did not pursue contracts, citing grid connection and tight A-3 completion deadlines as barriers, although many of these projects will automatically be registered for the pending A-5 and reserve auctions.

Grid first. Brazil is also planning to auction 4,000km of transmission lines in order to avoid delays connecting wind farms to the grid and redress the 1GW of wind generation capacity currently lying idle. Transmission shortages have arisen largely due to the previous policy of only auctioning new grid capacity post completion of the generating assets.

Country focus

Australia

Highlights

- **There is significant excess generation capacity in Australia, with new generation not required for around 10 years.**
- **The Government plans to scrap the US$1.3b Australian Renewable Energy Agency and the US$9.4b public green investment bank are undergoing significant political debate.**
- **Sector growth remains strong regardless, with utility-scale solar costs forecast to halve in five years and small-scale PV to attract US$40b by 2030.**

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Changing fortunes. The Liberal Party election victory of September 2013 looked set to change the face of Australian renewables forever. With the new government setting a series of legislative and program overhauls in motion to remove and reduce subsidies and following reports that the Australian generation sector has enough capacity for over 10 years, an environment of uncertainty has emerged following the repeal of the carbon tax bill in June. The Government has not yet released its final decision on the Renewable Energy Target (RET), a decision that the industry is eagerly awaiting and which will provide it with much-needed certainty one way or the other.

The political debate begins. The Palmer United Party (PUP), currently holding the balance of power in the Senate by three votes, refused to pass the bill without an amendment enforcing companies to pass on savings from the repeal to consumers. Then, a last-minute attempt to block the repeal by the Australian Motoring Enthusiast Party (aligned to the PUP), was lifted after a deal was struck that saw that Party secure PUP support to save the Australian Renewable Energy Agency (ARENA), a potential victim of the Government's latest budget proposals. Scrapping ARENA would save the Government A$1.3b (US$1.2b) but would place in doubt 181 renewable energy projects worth around A$1.0b (US$0.9b) that ARENA has already committed to, and potentially an additional 190 projects in the pipeline.

Rankings snapshot	Issue 42	Issue 41
Total RECAI	10	9
Onshore wind	16	14
Offshore wind	17	17
Solar PV	6	6
Solar CSP	6	3
Biomass	22	19
Geothermal	11	11
Hydro	18	17
Marine	10	7

With overcapacity a feature of the current Australian wholesale market, the RET review involves difficult choices for the Government.

RET review. PUP's unequivocal refusal to support any change to the country's RET before 2016 has been a source of significant political debate. The Government's proposal to scale back the current target of 41TWh by 2020, in the face of reports that no new generation is required in the market for at least 10 years, will, if carried through, mean that less renewable generation will be financeable. Even the threat of an amended RET has already slowed investment, with Australia's spending on large-scale renewables projects falling to A$58m (US$54m) in the six months to June 2014 from almost A$1.3b (US$1.2b) a year earlier according to BNEF.

The Government's RET review has been completed and it is now considering its options. These are difficult policy choices, given that the review received more than 24,000 submissions with 99% in support of keeping or increasing the RET. The Government's rationale for reducing the targets appears to hinge on two factors: over capacity in the system reported by the national market operator in its recent "Statement of Opportunities," and reductions in consumer energy bills through elimination of subsidies. Political and economic issues are converging, making the road ahead difficult to predict with certainty.

Prepared for flight. It is evident, however, that investors are already forming positions. Suzlon is reconsidering its investment in the A$1.5b Ceres wind farm, Solar Systems Pty has suspended plans for a 100MW concentrated PV plant, potentially one of the largest in the world and Infigen Energy has indicated 1GW of projects are now under review. Other industry players vocal in their concern include Acciona, GE, First Solar, Vestas and AGL Energy.

Growth remains strong in small scale systems. The country's small-scale solar PV market has also shown surprising resilience despite years of subsidy cuts, with BNEF forecasting an additional 15.8GW of installations by 2030 requiring A$42.0b (US$39.1) of investment.

Carbon price alternatives. The Government's 2014–15 budget includes a proposal to allocate A$2.6b (US$2.4b) over 10 years to an Emissions Reduction Fund (ERF) effectively encouraging companies to reduce carbon emissions through taxpayer-funded grants. This is also being debated, with both PUP and Labour calling for an emissions trading scheme, though the former insisting that the carbon price be set at zero and only activated once Australia's key trading partners, such as the US and China, have taken similar actions.

Picking the direction. In an environment of excess capacity, reported customer hardship and price elasticity, Government must ultimately decide to either leave the regime as is, or to remove some of the subsidies inherent in the RET. Given the political difficulties in large-scale reductions in the RET, the industry appears to be anticipating the latter, through reductions in the targets from around 41TWh to between 25TWh and 30TWh per annum, rather than removal of the scheme altogether. We expect the debate will continue and that it may be some time before the investor community has the certainty it requires to consider new investments.

Country focus

Italy

Highlights

- **The Government has passed legislation applying retroactive subsidy reduction measures to solar PV projects over 200kW.**
- **Plant operators must nominate a subsidy reduction option; the alternatives represent a tradeoff between higher reduction rates and longer payment terms.**
- **Projects will only receive 90% of the fixed monthly payments through the year, with the remaining 10% paid via an annual reconciliation.**
- **The measures have already triggered legal challenges, with estimates that investors could lose up to €3b (US$3.9b) as a result of the new legislation.**

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Another one bites the dust. Italy has now joined the hall of shame for European countries applying retroactive measures to renewable support regimes, much to the dismay of both foreign and domestic investors. The legislation, passed by the Italian Parliament on 7 August after drafts of the amendments were first released in late June, will apply subsidy reductions to existing solar PV projects built since 2008 and larger than 200kW, with effect from 1 January 2015.

Scale of the problem. The move is intended to save €1.5b (US$2.0b) per year and help the Government meet its pledge to reduce energy bills by 10%. Italy's power prices are currently a third higher than the EU average, which the Government claims is harming small- to medium-sized businesses. Given the 200kW threshold, the legislative amendments are only expected to affect around 8,600 solar plant owners out of a total 200,000 in Italy. However, they will still impact roughly 11GW of the 18GW installed solar capacity given plants larger than 200kW currently receive at least 60% of total support.

Choices, choices, choices. Solar plant operators are faced with three options under the revised legislation and will be required to nominate their preference by 30 November 2014.

1. Maintain FIT for original 20-year term with rate reductions varying by plant size: 6% for 200kW to 500kW plants, 7% for 500kW to 900kW and 8% for >900kW.

2. Extend FIT term to 24 years with rate reduction of 17% to 25% depending on the remaining operational years (with a higher reduction for older plants).

3. Maintain FIT for original 20-year term with a variable rate reduction for the first part of the residual FIT period but an equivalent increase in the second part (specific rates and periods to be defined by 1 October 2014). This option addresses the challenge of extending payment terms (as per option 2 above) on leased land.

Rankings snapshot	Issue 42	Issue 41
Total RECAI	15	12
Onshore wind	22	21
Offshore wind	20	20
Solar PV	15	13
Solar CSP	11	11
Biomass	14	14
Geothermal	6	6
Hydro	11	11
Marine	22	22

There is speculation that the savings from the amendments will not outweigh the potential losses from costly legal action and abandoned projects.

In the detail. Critically, plant operators will now also receive only 90% of the monthly fixed payment, based on estimated annual electricity production. The remaining 10% will be calculated as an annual reconciliation adjustment based on actual production and paid at the end of June of the following calendar year. Plant owners are also permitted to seek early redemption of their incentives by selling up to 80% of the tariff rights to financial institutions via an auction system. The legislation also introduces provisions for the state-owned Cassa Depositi e Prestiti to either fund or guarantee financing to cover the difference between the current FIT and the reduced rate, to assist operators experiencing diminished cash flow as a result of the changes.

Up in court. As in Spain, the retroactive cuts have already triggered talk of legal action. More than 50 companies active in the solar sector, including institutional investors, lodged a complaint with the EC in late July, demanding an investigation into whether the changes are in breach of Directive 2009/28/EC. Appeals have also already been made before the Italian Constitutional Court, while aggrieved foreign investors may be entitled to seek redress under international instruments such as the Energy Charter Treaty. The legal firm representing the group of companies estimates investors could lose between €1.0b (US$1.3b) and €3.0b (US$3.9b) as a result of the new legislation.

Broader implications. There is some speculation that the relatively small savings from the amendments will not outweigh the potential losses from costly legal action and abandoned projects. This, combined with the stigma of a precedent for retroactive legislative changes, could potentially undermine the Government's drive to attract foreign capital to bolster Italy's fragile economic recovery. Further, lenders supporting projects that struggle to cope with the revised revenue streams may be forced to write-off non-performing loans or step in to take over assets.

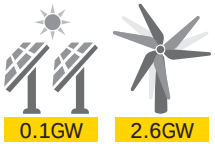
Too much. Italy's program of reduced financial support for renewables, and solar in particular, has already been underway for a number of years, as it seeks a more sustainable balance in the wake of long-lived generous tariffs. But, it remains to be seen whether the latest changes impacting existing projects will be simply too much for the sector to recover from.

Evolution of Italy's renewable support mechanisms

2002 -> Renewable energy quota and green certificate mechanism introduced

2005 -> First formal 20-year FIT for small-scale solar PV introduced via the first Conta Energia legislation, with rates deemed to be relatively generous

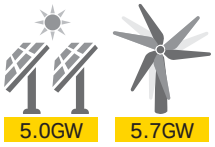
2007 FIT expanded to cover other technologies at small-scale



2008 Banding system for green certificates introduced to differentiate allocations by technology

2009 Country sets itself the landmark goal of 8GW solar capacity by 2020

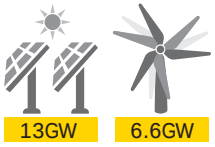
2010 Third Conto Energia proposes tariff reductions every 4 months during 2011 and every 12 months from 2012



2011 Further phased subsidy reductions and re-categorization of "large" projects to >200kW, reflecting increased focus on small-scale solar installations

Despite continuous phased tariff reductions, Italy's solar FIT remains almost double that of Germany and France: it is also the world's largest solar market in 2011

2012 Legislation passed to phase out green certificate regime by 2015 in favor of tariffs and auctions



Solar PV – effective from 1 August 2012

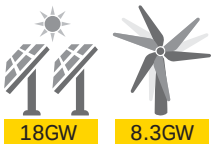
Premium tariff payments until annual subsidy cap of €6.7b reached

Non-solar – effective from 1 January 2013

- FIT for projects <1MW (though 1MW to 5MW can also choose premium)
- Sliding feed-in premium for projects 1kW to 1MW
- Feed-in premium via tendering process only for projects >5MW

2013 Cap reached in July 2013, effectively ending subsidies for new solar projects

Solar PV meeting 7.8% of Italy's energy demand, the highest solar penetration rate in the world



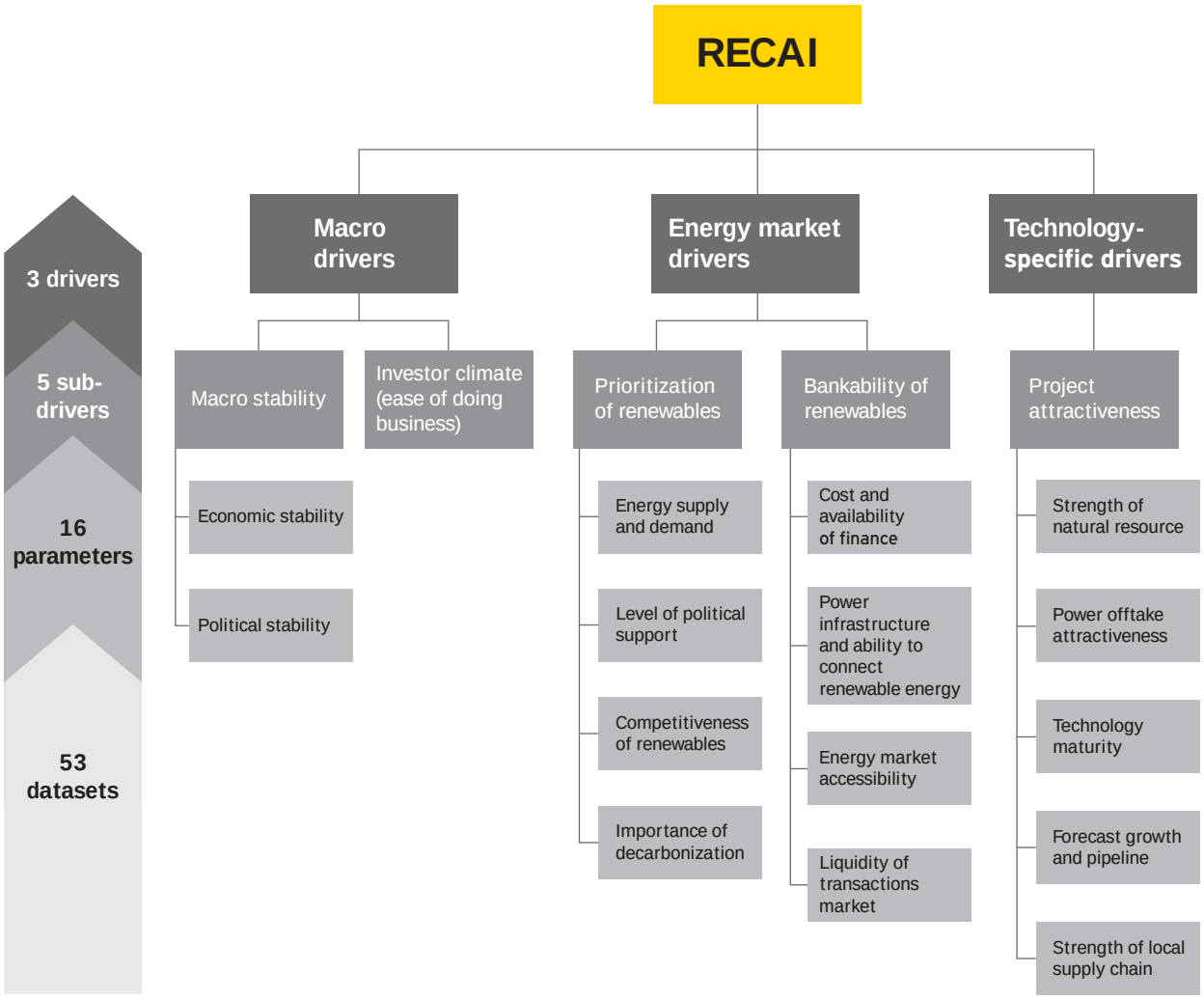
2014 Legislation passed to apply rate reductions to existing solar PV projects <200kW with effect 1 January 2015

Glossary

Abbreviation	Definition
ARENA	Australian Renewable Energy Agency
b	Billion
BNEF	Bloomberg New Energy Finance
CEFC	Clean Energy Finance Corp.
CfD	Contract for difference
EC	European Commission
ERF	Emissions Reduction Fund
EMR	Electricity Market Reform
ETS	Emissions Trading Scheme
EU	European Union
FIT	Feed-in tariff
GW	Gigawatt
JV	Joint venture
kWh	Kilowatt hours
m	Million
MW	Megawatt
MWh	Megawatt hour
NAO	National Audit Office (UK)
OPIC	Overseas Private Investment Corporation
PPA	Power purchase agreement
PTC	Production tax credit
PUP	Palmer United Party
PV	Photovoltaic
RES	Renewable energy sources
RET	Renewable Energy Target
RO	Renewables Obligation
STA	Solar Trade Association
t	Trillion

Methodology

What makes a market attractive?



Each parameter above comprises a series of up to 10 datasets, depending on the breadth or complexity of that particular parameter. These datasets are converted into a score out of five and weighted to generate parameter scores, which are then weighted again to produce driver scores and the overall RECAI score and ranking. Weightings are based on our assessment of the relative importance of each dataset and parameter in driving investment and deployment decisions. Each technology is also allocated a weighting based on its share of historical and projected investment. Datasets are based on either publicly available or purchased data, EY analysis or adjustments to third-party data.

The technology-specific indices rankings on page 14 reflect a weighted average score across the macro, energy market and technology-specific parameters, as some markets can be highly attractive for specific technologies but face other major barriers to entry.

We are unable to publicly disclose the underlying datasets or weightings used to produce the indices. However, if you would like to discuss how our RECAI analysis could assist your business decisions or transactions, please contact the editor, Klair White.

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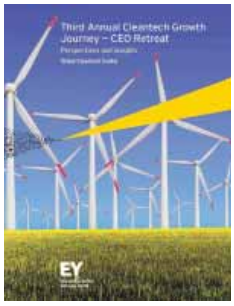

Summarized in this report are the insights and takeaways from the third annual EY *Cleantech Growth Journey: CEO Retreat*, which focused on the critical issues of capital, transactions, corporate partnering and global expansion.

From boiler room to boardroom: optimizing the corporate energy mix
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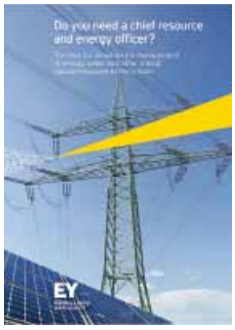
Utilities Unbundled
(2014)

Utilities Unbundled, our biannual global power and utilities magazine, provides new perspectives on the sector, insight from leading industry figures and analysis of the latest trends. The June 2014 issue explores how changes in nuclear generation and energy storage that could be truly transformational in a decade, and on the interconnected challenges of water use and energy production.

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.

Do you need a chief resource and energy officer?
(2013)



There is a compelling case for elevating corporate resource management to the highest levels of executive management through a chief resource and energy officer position. This report looks at the opportunities and the challenges for such a position.

Cleantech matters: IFRS in the solar industry
(2012)

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

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