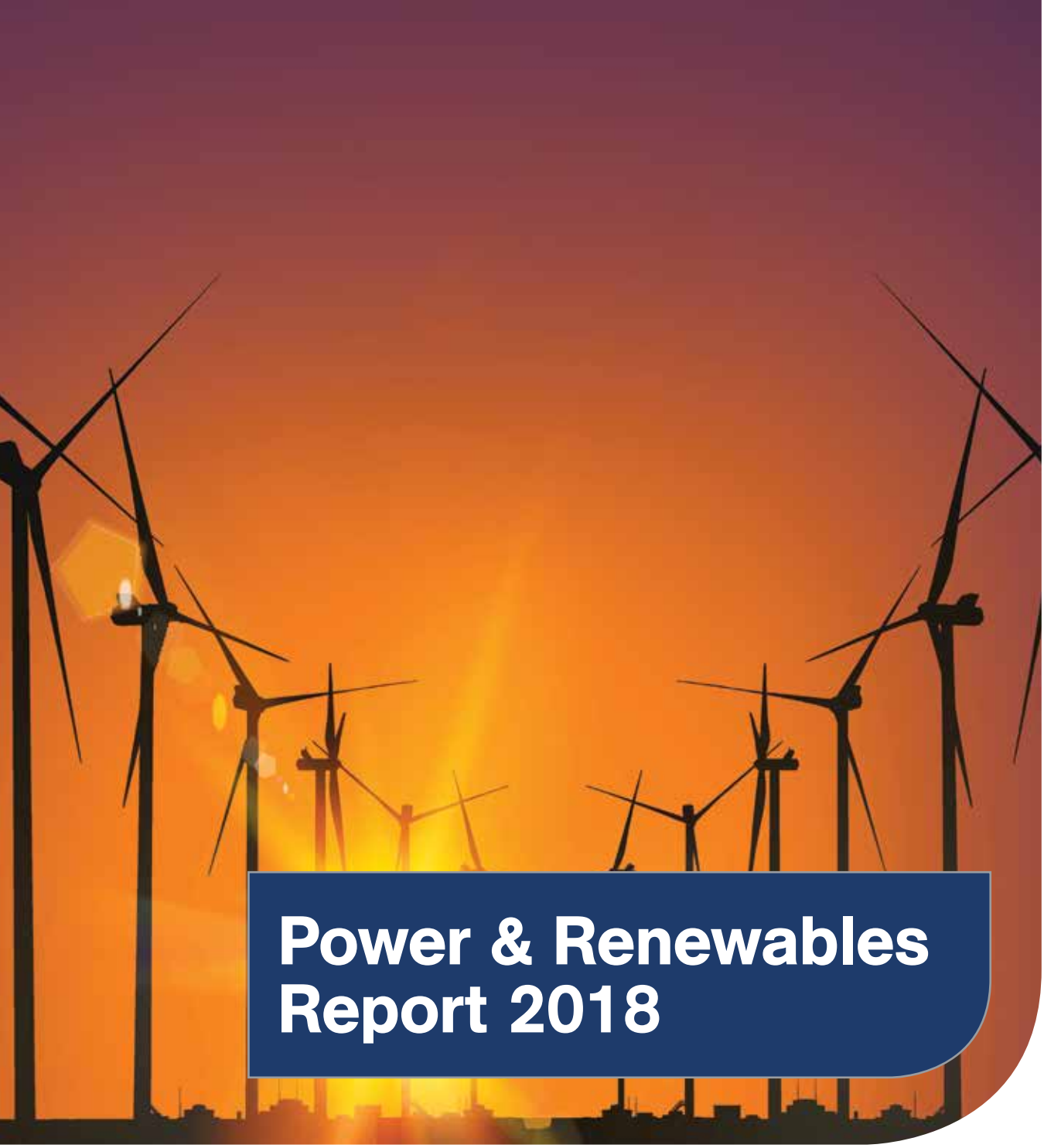

Power & Renewables Report 2018

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DNV·GL

IJGlobal

Project Finance & Infrastructure Journal

project financing renewables

around the world

TAIWAN - JUNE 2018

Ørsted, Macquarie, SWANCOR

FORMOSA I

NTD 17,740,000,000

128 MW Offshore Wind Project Financing

MLA, Lead Documentation Bank, Intercreditor Agent, Commercial Facility Agent, EKF Facility Agent & Sole FX Hedge Arranger

ITALY – MAY 2018

SOLARE, EI, enel

EF SOLARE

EUR 1,020,000,000

308 MW PV Solar Project Refinancing

MLA, Bookrunner & Hedging Bank

USA - MARCH 2018

TERRA-GEN

VOYAGER WIND II

USD 245,800,000

226 MW Onshore Wind Project Financing

Joint Bookrunner, Joint Lead Arranger, Administrative Agent & Green Loan Agent

UK - JANUARY 2018

BrookfieldRenewable

FIRST HYDRO

GBP 150,000,000

Leveraging of Minority Interest in 2.1 GW Pumped Storage

MLA & Initial Lender

ASIA & AUSTRALIA – JANUARY 2018

GLOBAL INFRASTRUCTURE PARTNERS

EQUIS

USD 620,000,000

Acquisition of a 1.5 GW Portfolio of Renewable Assets

MLA, Underwriter, Bookrunner & Hedging Bank

ABU DHABI - MAY 2017

Marubeni, JinkoSolar

SWEIHAN

USD 655,000,000

1.2 GW PV Solar Project Financing

MLA, Modeling Bank & Hedging Bank

GERMANY - FEBRUARY 2017

Siemens, EWZ, WPD

BUTENDEIK

EUR 955,000,000

288 MW Offshore Wind Project Refinancing

MLA & Hedging Bank

UK - DECEMBER 2016

DONG energy, Macquarie

RACE BANK

GBP 1,228,000,000

Acquisition of 50% stake in a 573 MW Offshore Wind Farm

MLA, Documentation Bank & Lead Bookrunner

CHILE - JANUARY 2016

SUNPOWER

EL PELICANO

USD 200,000,000

100 MW PV Solar Project Financing

MLA, Financial Advisory, Hedging Bank & Swap Coordinator

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Far from retirement

Renewable energy assets can go beyond planned operational periods, and lifetime extensions are becoming particularly popular for wind farms and solar plants.

By Carlos Albero, Global Segment Leader – Finance, DNV GL

A lot has changed in the last 20 years, not least in the power generation sector. When the first commercial wind farms were developed few would have predicted how quickly renewable energy technologies would become established, how widely they would be adopted, and how far their costs would fall.

Those first projects are now reaching or have just passed their certification periods. When completed two decades ago, the plan might have been to decommission them at the end of their contracted life. Asset owners just needed to consider how best to decommission and what value they could extract from the leftover hardware.

It might not always be the smartest option to decommission existing wind and solar projects, as there are benefits of extending the lifetimes of their projects.

The principal resources for renewable energy generation – wind and sunlight – persist beyond the end of existing contracts, and the oldest sites are usually the best ones. Some hardware may need replacing, but keeping an existing plant operational is likely to be far more profitable than building a new one. Not least because project debt facilities should have been repaid, meaning any further income is pure revenue.

Asset owners also benefit from knowing the site conditions, with extensive operational performance data making it easier to project future outputs, and experience of how hardware ages in those conditions. Additionally, extending necessary environmental permits and land rights is usually achievable, and the plant will already be connected to the grid.

The lifetime extension model has been established by hydropower plants, with some operating for over a century now thanks to periodic upgrades and hardware replacements.

There are a range of different options available for extending the life of your project, but a number of issues need to be considered.

Assessing health

The performance of the project to date will inform lifetime extension decisions, but this requires extremely detailed analysis.

- *Environment:* The speed at which equipment has been degraded and how long its life can be safely extended for is dependent on the specific environmental conditions at each project site. Actual conditions since project commissioning must be compared against predicted conditions pre-construction. If a project has been operating in conditions it was not designed for, this could significantly limit lifetime extension opportunities.

  For wind farms this means analysing data including average wind speeds, extreme events, and the turbulence intensity at the site. For solar PV plants, data such as ultraviolet radiation, ammonia, humidity and salt levels need to be assessed, as do local wind speeds and the prevalence of mist.
- *Maintenance:* As well as natural factors, the level of maintenance enjoyed by the project over its life is also important to assess. Predictive, preventive and corrective maintenance must be carried out to the highest standards and accurately monitored to enable realistic lifetime assessments.
- *Operation:* Depending on the resource availability and connection circumstances at the site and its ancillary equipment, the effects of the asset's operation can vary. Assessment can be made either through direct inspections (visual, videoscope and vibrations) or through data analysis.
- *Design:* Understanding the design, manufacture and installation of the asset is also crucial. Each stage can create issues related to lifetime extension but by tightly controlling processes, quality problems can be avoided.

  Information availability is key. No matter if the asset has been changing hands, there is information, such as resource availability, maintenance, root cause analysis, and serial defect reports, which needs to be available for this process. Some information might be sourced out separately, but if it does not come from the site, it increases the uncertainty of the process. Another concern is the drive to reduce the levelized cost of energy during bidding processes as we are seeing in many markets these days, leading to designs which can limit the possibilities for lifetime extension. This will surely impact the life extension processes of the future.
- *Manufacturing:* Ideally you want to be able to track each component from drawing board, through factory and transportation, to construction. In our experience, these are just a few checklists that have been kept from the purchase period. Knowing the market, its practices and where the components were manufactured is the best information we can have at this point. DNV GL has been present in these processes in markets all over the world, and we are aware of the different issues and impacts.

  Every manufacturer has their own criteria, practices and safety tolerances,

and processes can range from high manual, such as manufacturing wind turbine blades, to tighter controlled machining and welding, as well as PV panels or inverters.

Being able to assess this process from drawing board to installation becomes increasingly important due to ongoing pressures to reduce costs. For example, new tower foundation designs, which use less concrete and steel, are becoming increasingly prevalent. These designs create much higher requirements on materials and therefore stricter control of the onsite conditions for the concrete plants and closer monitoring of the steel bars arriving at the site.

Outside forces

While you may be satisfied that the physical condition of the asset allows for lifetime extension, other factors also need to be considered.

Not least of these is the regulatory environment, which may have changed since the project was originally developed. This may mean any refurbishment, retrofit or expansion requires new permits.

In most markets rental contracts are easily extended and interconnection permits have no expiry date but environmental impact assessments (EIAs) can be more problematic, as the last two decades have seen significant changes in environmental regulations.

For example, regulations may have tightened so much that it would be impossible to erect wind turbines today at existing wind farm sites. In such circumstances, extending the life of the existing infrastructure, rather than new construction, may be the only option.

Either way, a new EIA could be needed and this would need to be completed before the end of the existing project's planned life. This enables swift execution of extension plans.

Extended assets are also likely to be more exposed to merchant risk. Any existing power purchase agreements (PPAs) will probably expire after year 20 of the asset's life, removing certainty of revenues. New PPAs could be negotiated – with a corporate offtaker, for example – but if not the asset will be exposed to the open market and power price volatility.

Extended projects are partially protected from these risks by being debt free, but the need to understand and stress test a project's financial model is essential.

Before any investment in an asset, inputs from tax, technical and legal advisers will be used by the project's financial team to create its long-term financial model. This model needs to be tested against all of the assessments on the project's health described above, and benchmarked against similar assets of the same age, for their likely impact on its future economic performance.

While lifetime extension is a live issue for that first generation of renewable projects, assets owners of newer projects would be smart to prepare for the end of planned commercial operation periods. ■

Importing experience

How European experience can be used in the upcoming round of US offshore wind projects. By Crédit Agricole CIB managing directors Jim Guidera, Eugene Kasozi, and Jerry Vincitore.

Offshore wind projects are coming to the North American project finance market. Sites have been obtained, and importantly revenue-sources have been awarded to support major investments in several developments on the Northeastern seaboard. The next round of US offshore wind project finance could begin later this year or early next. A template for these deals is certain to be informed by the extensive experience among the European players.

The first, and so far only, US offshore wind project was the modest-sized 30MW Deepwater Wind's Block Island Wind project off the Rhode Island coast which was financed in 2015 and started up operations in late 2016. There have been no further US projects since then, but projects off the coasts of Massachusetts, Maryland, Rhode Island and Long Island, New York have been passing milestones that should lead to financial closings in 2019.

These states, along with New Jersey and Maine, all have ambitious goals for offshore wind capacity in the next decade.

The coming projects

In Maryland, two major projects are in development offshore Ocean City. The 750MW US Wind project would be built in phases with costs estimated at around $2.5 billion. Deepwater Wind's Skipjack project would be a smaller $720 million project. The two projects have been awarded ocean renewable energy credits (OREC) purchase agreements in 2017 that would generate revenues at $167 per MWh for each project for 20 years, starting in 2021 for the US Wind project and at an inflating price in 2023 for Skipjack. US Wind has projected that it's first 250MW phase would be completed in time for the OREC entitlement, so a financing is expected in the beginning of 2019.

Gerard Vincitore

In May this year, a Massachusetts-run procurement process settled on the 800MW Vineyard Wind Project proposed by a joint venture of Avangrid Renewables and Copenhagen Infrastructure Partners (CIP). The selection of the Vineyard Wind project allows the sponsors to go forward with negotiations for transmission services and PPAs. Permitting applications are in process to position this project for a construction start in late 2019 and operations in 2021.

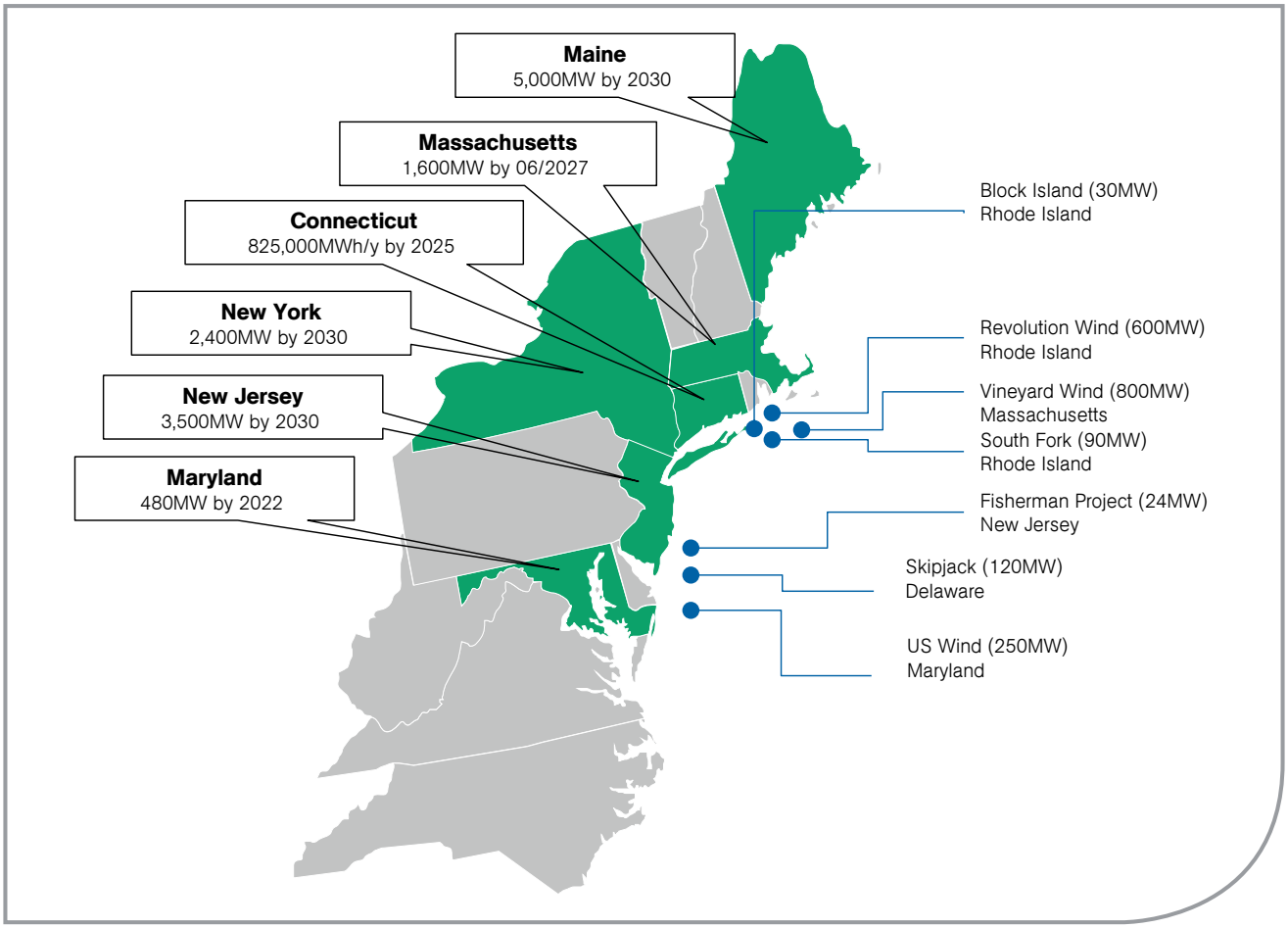
At the same time, Rhode Island selected Deepwater Wind's 400MW Revolution Project in a parallel procurement process that paves the way for the Revolution Wind developer to negotiate a services and power sales with National Grid that will ultimately be reviewed by the Rhode Island Public Utilities Commission. Deepwater hopes to be in a position to start construction in 2020 with start-up expected in 2023. Shortly after Rhode Island's offshore wind award announcement, Connecticut also selected Deepwater's Revolution Project to supply an incremental 200MW of wind energy to the state. Deepwater Wind will negotiate with two Connecticut electric distribution utilities, Eversource and United Illuminating, to reach agreement on 20-year contracts. If successful, the contracts will be brought to Connecticut's Public Utility Regulatory Authority (PURA) for final approval.

In New York State, Deepwater Wind was awarded a 20-year PPA with the state-owned Long Island Power Authority (LIPA) for its 90MW South Fork project proposed for the south eastern shore of Long Island. Deepwater is currently working with the local town board on obtaining transmission easement rights and hopes to commence construction on its Long Island project in 2021, with start-up planned for 2022.

In New Jersey, the new Gov. Murphy administration has refocused on incentivizing offshore wind projects. Virginia is another mid-Atlantic state with ambitions for an offshore wind industry to take hold, and recently ran an RFP for consulting expertise to analyze maritime infrastructure and assets with the goal of informing the state's policy related to the OSW industry.

European experience

While new to the US, offshore wind projects have been a regular source of investment and project finance activity in the European market for almost 20 years. The first offshore wind turbines were installed off the Danish and Dutch coast in the 1990's by Denmark's DONG Energy (now named Ørsted). The first utility-scale offshore wind installation was the 40MW Middelgrunden project in Danish waters in 2001. Offshore wind projects were increasingly deployed in the North Sea and Baltic waters throughout



Source: *Crédit Agricole CIB*

the first decade of the 21st century with capacity additions materially accelerating after 2010. Along the way, individual turbine sizes and capacities have continued to grow from the 1MW turbines employed in the earliest deployments to 3MW turbines and 5MW turbines by 2017, with latest turbines now approaching 12.5MW. Along with higher capacity factors, the offshore locations can accommodate larger turbine sizes. The technology has also advanced to permit deployment up to 60km offshore in waters 20-60 meters deep.

Asian markets, such as Taiwan, have also seen significant deployment in offshore wind, and lessons learned in prior European and Asian offshore wind project finance are likely to be brought to the upcoming round of US projects. Ørsted, CIP, and Avangrid arrive in the US market with a wealth of experience from their European developments while many of the leading project finance banks in the US already are institutionally quite experienced in financing offshore wind in other geographies.

Completion risk mitigation

The European experience indicates that completion risk will be a primary project finance issue. In the history of Europe's build-out, completion delays and cost overruns presented challenges to early projects. In the first phase of utility-scale installations in the 2001-07 period, joint ventures of construction companies and marine companies would typically offer single turnkey equipment, procurement supply and installation contracts. However, many of these joint ventures absorbed material overrun costs, and the single turkey EPC became scarce in the early part of the present decade.

The completion risk made it impractical for developers to obtain the fixed-price turnkey contracts that have been the standard completion risk mitigation for onshore wind projects. Frequently, offshore wind projects were constructed on-balance sheet with project finance being introduced at the completion stage. Ørsted typically builds its projects using its own funding and recruits a financial partner that uses non-recourse finance for its investment.

While many developers elect to equity finance their projects during construction, non-recourse construction finance has also become available for offshore projects installed under the multi-contracting approach without a construction wrap. Multi-contracting involves sub-dividing the construction process into a number of manageable sub-contracts. Typically, this involves a total of five to 10 contracts in areas such as civil works, turbine erection and substations. These would be coordinated by an experienced sponsor or owner's engineer.

One advantage to this approach is it allows for area specialists with individually negotiated cost quotes, often leading to an overall lower cost compared to a fully-wrapped EPC contract.

A significant risk that arises under a multi-contracting or EPCI approach without a wrap is interface risk. In order to minimize this risk, developers generally seek to procure a limited number of EPCI contracts. For example, based on the European experience, projects have utilized three broad construction packages covering: 1) turbine design, supply, installation and commissioning; 2) foundation design, supply, installation and commissioning; and 3) balance of plant design, manufacturing, installation and commissioning, including inter-array cables, foundations, and offshore substation platforms. This approach achieves a good balance between limiting the number of contracts and selecting competent contractors for their relevant areas of expertise.

Leading European project finance banks have become comfortable with offshore construction arrangements without a wrap. These lenders closely examine the interface risks to ensure no contractual or physical gaps exist between contracts. Comfort is derived from sponsors that pro-actively manage the interfaces between contractors to assure the contracts are proceeding on the same project schedule. For such projects, lower leverage levels, well-sized contingency reserves and contingent equity have become routine for completion risk mitigation.

In the last few years, as the supply chain and installation techniques have become more flexible and reliable, some sponsors are now giving completion guarantees.

Ørsted's £1.3 billion, 660MW Walney Project in 2017 was financed at competitive rates in consideration of the completion guarantee provided by that developer, and its 1,300MW Hornsea 1 financing is in the 2018 market also supported by the developer's completion guarantee. However, other projects in the European market are still being financed under an EPCI approach.

What is not yet certain is whether EPCI contracts without a wrap will be required, or can be found, for the early US offshore projects. Specialized shipping, rigs and the rest of the required marine infrastructure will need to be built out to enable the US offshore installations achieve the relatively lower costs and predictability of European marine construction projects now have.

Revenue support

The build-out of the European offshore wind industry has been subsidised by above-market revenues assured by long-term PPAs or RECs.

European tariffs have been declining in recent years, down from €200 per MWh for contracts awarded in the 2010-12 timeframe to more recent LCOE estimates in the €50-70 per MWh range.

The US's only offshore wind project Block Island was supported by a PPA priced at $244 per MWh sourced before 2016, while the more recent contracts for the Ocean City and Skipjack projects have pricing starting at $167 per MWh in 2021.

Although these lower prices are due to the significant reduction in the cost of wind projects, they still represent a material increase over the wholesale power prices in these regional markets. The public policies adopted in the North Atlantic states aim to establish offshore wind as a job-generating industry so the early rounds of US offshore wind projects will likely benefit from above-market rates.

Capital sources

The US project finance debt market is already led by major European and Japanese banks that can import their global experience to finance the coming round of projects. Other US capital market participants, such as rating agencies and institutional investors, can be expected to catch up.

The other capital providers common to European projects are export credit agencies, particularly Denmark's EKF which is regularly involved in offshore projects employing Vestas or Siemens equipment. Export credit agencies have only occasionally appeared in US project finance, but given the large amounts of capital to be raised among the upcoming US offshore wind projects, a place may be found for experienced debt providers who can hold large tickets.

A class of capital providers unique to the US renewables finance market have been the tax-equity sources: investors whose returns are largely met by tax-savings generated from the tax credits and accelerated depreciation that comes with renewables investments. The investment tax credit is scheduled to phase out in 2020, so this capital subsidy may not be available for projects beyond those that may be grandfathered by equipment purchased in 2018-19. However, if not properly managed, advance equipment/component purchases to grandfather tax benefits may be at odds with obtaining the latest and cheapest technologies.

The presence of tax-equity sources has made tax-equity bridge loans and back-leveraging partial partnership shares common features in US renewables finance, and they are expected to feature in early US offshore wind projects as well. Since tax-equity sources only become available once projects become operational, commercial banks are called upon to bridge the tax-equity commitments during the construction periods.

A US template

A template for structuring US offshore wind projects will likely emerge among the first of the upcoming projects drawing on the capital sources and elements unique to the US market, as well as the lessons learned in Europe and Asia. European developers and lenders are in the best position to set the standards for US offshore wind finance. ■

What's in storage?

In the evolving sector of battery storage, where predicting future developments is difficult, the importance of contractual structures and the ability to validate them is significant. By Paul Gardner, Global Segment Leader – Energy Storage, DNV GL

New technology can be exciting and often revolutionary, but it can also be unpredictable and short-lived. Early adopters can be left with products that are soon out-of-date or markedly more expensive than later iterations. If you are really unlucky you can end up sinking a lot of money into a technological dead-end – like a MiniDisc player, Sinclair C5, or Betamax cassette (depending on your age).

While conventional and renewable generation, along with distribution and transmission assets, have mature supply chains and standardised processes, stationary battery storage is still very much a new technology, with much greater variety in development process, business models, financing and procurement. The industry is still very young and developing fast, with various options open to investors and developers.

Differences among actual hardware is just one variable. Picking the right contractual structures, with the necessary guarantees, is also essential for a successful battery storage project, but the vast array of options can be bewildering.

And the speed at which the market is developing makes it harder still to keep track of. Utility scale battery storage projects are now being developed across a range of jurisdictions and markets, and are progressively increasing in size.

At the start of 2017, AltaGas and Tesla were unveiling 80MWh projects in California and by the end of the year the latter had delivered the 129MWh Tesla South Australia battery storage project.

The first Enhanced Frequency Response (EFR) battery projects in the UK have been constructed over the last 12 months. They were awarded

Paul Gardner

in a pilot auction in 2016, resulting in surprisingly low prices. The market has now moved on: future contracts for similar frequency-response services will be specified differently.

This speed of development and change can be daunting but it also means precedents are being set, and the growing collective experience of DNV GL's team makes it perfectly placed to advise on the sector.

> The lifetime performance of a battery storage project can be highly unpredictable for a variety of reasons

Contractual structures

There is some consensus on contract structure for battery storage projects, with a number of common features to be found. These include performance guarantees, liquidated damages assessments, and lifetime estimation and warranty. You would also expect to see a flow-down of an EPC wrap to supplier warranties and guarantees, which makes the role of an EPC contractor with sufficient balance sheet critical. Experienced EPC contractors are also, in our experience, a route to lower costs.

In addition to these recurring features, there are also a number of special considerations that any developer needs to bear in mind:

- *Is it utility scale?* A utility scale contract may require specific guarantees related to one or more contracted revenue streams.
- *Is it co-located with solar or wind generation?* Specific attention needs to be paid to grid connection requirements, and round-trip efficiency. There may also be a reliance on combined operation of the wind or solar plant controller and the storage control system in order to meet specific conditions of the connection agreement.
- *Is it located 'behind the meter' on an industrial or commercial site?* There may be a need for a guarantee for peak demand reduction, or other issues critical for the business case.

Principal contractual guarantees

The lifetime performance of a battery storage project can be highly unpredictable for a variety of reasons, and developers will want some level of guarantee in the contract to protect against all of the following:

- *Lifetime/capacity degradation* – The power and energy capabilities of a battery will degrade over its lifetime. It is important to understand not just

how quickly this will happen but also the major influencing factors. Some guarantees will not provide the protection you imagine, if usage in the real application is different from the (usually simple) charge/discharge cycle assumed in the supplier's guarantee.

- *Availability* – Depending on application, it may be desirable to specify higher availability at some times of year, or time of day (for example, for peak shaving). This could drive the supplier to schedule planned maintenance accordingly, or to increase the spares holdings on site.
- *Round-trip efficiency* – This is the ratio of energy retrieved to the energy put into the storage system. There can be great variety between broad technology types and specific products. Losses occur in the batteries, in the power electronics, and in any external transformer, and will depend on the application: for certain applications, the form of the guarantee may need to be written carefully, in order to provide the required protection.
- *Location environment* – The environment the asset will be operating in is important. The batteries may be required to operate in high ambient temperatures. If exposed to high temperatures, the performance of cooling system will also need to be tested. Industrial sites may require guarantees on corrosion or dust ingress, for example. The environment also includes conditions on the electricity system: robustness against harmonic currents and voltage transients may be important.

Performance guarantees are typically formula-based to determine liquidated damages. It is possible for the supplier to earn a performance bonus if the equipment performs better than expected.

Future developments

Very large investments are being made in battery R&D, and further substantial technology development is expected. However, gradual evolution of preferred contractual structures and guarantees are more likely than major changes. This evolution will be helped by the development of 'best practice'. An example is the GRIDSTOR Recommended Practice RP-0043, developed by an industry consortium led by DNV GL.

One exception could be the emergence of mass-market household storage as a consumer product, possibly in conjunction with residential PV. If this becomes popular, and if aggregators develop business models to make use of the combined storage capacity to provide services to energy suppliers, generators and network operators, then it could displace the need for utility-scale storage. The contractual arrangements for such small devices will be those appropriate for consumer products. The aggregators' obligations to provide services will rely on the 'portfolio effect' of multiple similar devices. ■

DATA ANALYSIS: New York State turns away from coal with a chunky renewables project pipeline and ambitious clean energy targets. By Yavor Guerdjikov.

New York sees green

New York State made its priorities clear when it in March 2018 announced that it was awarding 26 large-scale renewables projects worth $1.4 billion, and that it had requested to be excluded from the federal offshore oil and gas drilling programme.

The awarded projects comprised 22 utility-scale solar farms, three wind parks and one hydroelectric facility. All projects are expected to be fully operational by 2022.

The state's Governor Andrew M Cuomo has since announced a second solicitation for the mobilisation of $1.5 billion in private investment for 20 large-scale projects.

According to figures from the US Energy Information Administration, in 2016 renewables made up 24% of New York State's total energy generation, an increase from 19% in 2011. Hydroelectric plants provide the bulk, roughly 80%, of this capacity.

New York State is now turning its attention to wind and, in particular, solar due to plummeting technology costs. The Governor's Reforming the Energy Vision 2030 scheme, launched in 2014, has the ambitious goal of reducing the state's greenhouse gas emissions by 40% and for New York State to generate 50% of its electricity from renewable sources by 2030. As part of the initiative, the state is to phase out coal power plants by 2020.

IJGlobal data shows that the state of New York has been gradually moving towards renewable energy generation over the past 20 years.

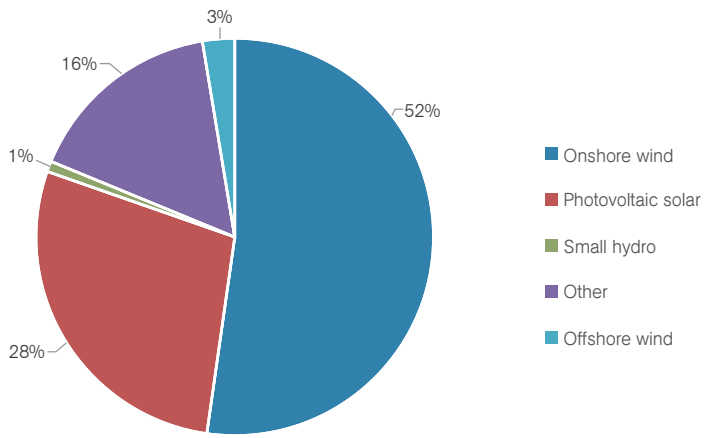
Currently the renewable energy mix contains operational assets mainly in two sub-categories: onshore wind and small hydro of up to 20MW of capacity. Remaining generation is mostly provided by waste-to-energy, landfill-gas-to-energy and biomass plants.

IJGlobal pipeline data shows that the solar sub-sector in the state is seeing the largest portion of growth. The largest operational solar farm to date is the 32MW Long Island project, commissioned in 2011. Newly-awarded projects in the pipeline have similar or even larger capacities, completely dwarfing some existing solar facilities.

The planned investments in large-scale solar and wind projects are essential to New York's ambition to become a leading US state in terms of clean energy generation. Achieving Governor Cuomo's scheme pivots on attracting sufficient private sector investor interest.

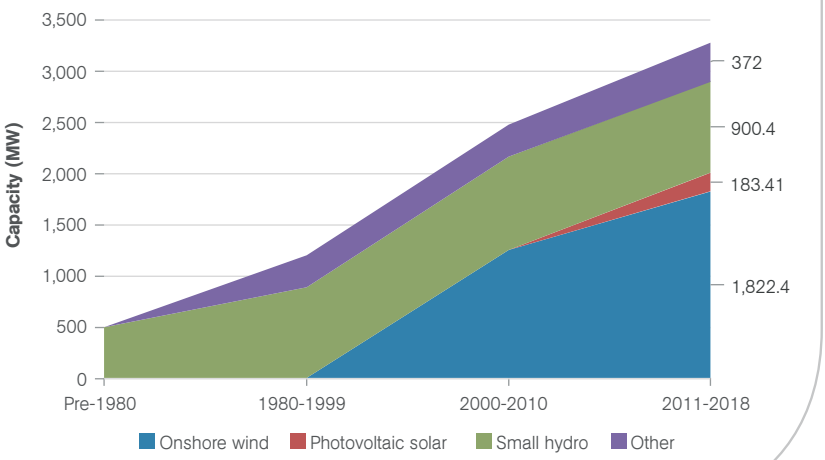
All eyes will be on the responses to the Governor's latest request for proposals. ■

New York State renewables capacity pipeline



Source: *IJGlobal*

New York State total renewables capacity



Source: *IJGlobal*

DEAL ANALYSIS: This is the largest project financing of a greenfield offshore wind farm to date to reach financial close. By Angus Leslie Melville.

Borssele III/IV, Netherlands

Blauwwind II reached financial close on Dutch offshore wind farms Borssele III/IV on 28 June 2018, concluding the two-year procurement on the €1.439 billion ($1.7 billion) greenfield deal that stands out for achievements on many levels.

Borssele III/IV is the largest project financing of a greenfield offshore wind farm to date to have made it to financial close, successfully arranging €1.034 billion of PF debt with 12 lenders, achieving impressively-low pricing. Beyond that, the speed of procurement – from bid to financial close, including equity sell-down – was "intense" according to one source close to the deal, having progressed from launch in 2016 to close just before the midpoint of 2018.

From a project perspective, one of the most interesting elements has to be the adoption of cutting-edge turbine technology, powering the wind farms with 9.5MW MHI Vestas model – the first project to do so, though not likely to be the first deployed as it is slated for operations in late 2019.

The 9.5MW turbine received its Rotor-Nacelle-Assembly Component Certificate towards the end of June, clearing the way for the deal to close.

As Vestas head of product management Henrik Baek Jorgensen says: "Announcing the world's most powerful turbine and then receiving final certification one year later is no small achievement. This is a very important chapter in the growing legacy of the V164."

Vestas says that scaling up the V164 involved minimal design modifications and it is a significant step towards double-digit units, a key development as the largest turbines currently being deployed weigh in at 8MW.

The project

MHI Vestas and Van Oord led the consortium to win Borssele III/IV from inception, joined later by Royal Dutch Shell and Diamond Generating Europe (DGE), and then Eneco, to close the 731.5MW offshore wind farm that will be powered by 77 of Vestas' 9.5MW V164 turbines.

The project was brought to market in 2016 and the Dutch Government awarded it to the Blauwwind Consortium on 12 December the same year. The initial consortium – Vestas and Van Oord – won the right to develop, construct and operate Borssele III/IV under a 30-year lease, and assumed 25-year operational life after construction.

The main construction work is due to start in Q4 2019, with commercial production expected in early 2021. Total output will amount to 3,000GWh per year, powering more than 515,000 homes. The rotor diameter is 164 metres and the shaft is monopole. The water depth range (according to the developer) is 15-37 metres.

Shell and Eneco Group signed a 15-year PPA to offtake energy generated, under which they each buy 50%. Van Oord will execute the "balance of plant" for the project: EPC of the foundations and inter array cables.

The grid connections and offshore substation, Borssele Beta, are being designed and constructed by TSO TenneT.

During the first 15 years of operation, Blauwwind will receive a guaranteed price of €54.49 per MWh under the Dutch SDE+ scheme, after which the power will be sold at prevailing rates in the wholesale power market.

The Borssele Wind Farm Zone (BWFZ) is located 22km off the coast of Zeeland at the southern border of the Netherlands' Exclusive Economic Zone.

The consortium/equity

The project was won and taken to preferred bidder by the original SPV team members beating off competition from 26 applications submitted to the Netherlands Enterprise Agency (NVO). They were joined later by Shell and Mitsubishi subsidiary DGE, and then Eneco Group.

Five months before financial close, Partners Group bought in to the deal, acquiring 45% of the equity from across the original team for around €300 million ($375 million). At financial close the equity split on Blauwwind II was Partners Group (45%), Shell (20%), DGE (15%), Eneco (10%) and Van Oord (10%).

Prior to the equity sell-down, the split had been Shell (40%), DGE (30%), Eneco (20%) and Van Oord (10%).

Project finance debt

The lending team initially included 13

Timeline

banks, but this was reduced to 12 when Mitsubishi UFJ Trust and Banking Corporation earlier this year was merged into the parent MUFG Bank.

Sources close to the deal say that the debt was divided "fairly evenly" among the 12 MLAs that made it through to financial close: ABN Amro, Bank of China, BNG, BNP Paribas, ICBC, ING, Mizuho, MUFG Bank, Rabobank, SMBC, Sumitomo Mitsui Trust Bank and Société Générale.

The debt was arranged over three packages with the long-tenor senior debt amounting to €1.07 billion with a tenor that runs out to 2035, but a legal maturity on to 2038.

It is understood that two letter of credit facilities, with a total value of €180 million, were arranged and went to the Dutch lenders.

Green Giraffe and SocGen – in their dual role as financial advisers to the consortium – maintained competitive tension among the lenders, building from a core group of banks in the early stages of the deal to a round-dozen at financial close.

Shell leveraged strong relationships and brought to table an interesting spread of banks from China, the Netherlands, Japan and France.

It was particularly impressive to see two Chinese banks – Bank of China and ICBC – appear for the first time on the primary financing of a greenfield offshore wind farm in Europe. Meanwhile, it came as no surprise to see Dutch banks – ABN Amro, BNG, ING and Rabobank – fielded for a home transaction, supporting a headline national deal.

Japanese banks – Mizuho, MUFG, SMBC and SMTB – have long been comfortable with offshore wind though, arguably (like all other lenders), they have been driven up the risk curve by lack of opportunity and were happy for an opportunity to lend.

The two French banks – BNP Paribas and Société Générale – are comfortable with lending to offshore wind, while SocGen may have felt pressure to be involved thanks to its financial advisory role on the deal. With the French offshore wind programme gathering pace, it will stand them in good stead to have notched up this experience on such a landmark deal.

The debt package amounts to €1.35 billion and priced over Euribor at: 155bp – up to construction completion (early 2021); 135bp – operation years 1-5; 145bp – years 6-10; 155bp – years 11-15; and 175bp – for the remaining years, with a target maturity date of 2035.

The European Investment Bank (EIB) had long been associate with this deal, but it is understood that the multilateral was edged out by relationship banks and lively competition.

Advisers on the deal comprise Allen & Overy (lender legal), Clifford Chance (SPV legal), Société Générale and Green Giraffe (SPV financial), Mott McDonald (technical), JCRA Group (sole hedging adviser), and Marsh (insurance adviser to Partners Group). ■

MLAs

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	2	Mitsubishi UFJ Financial Group	1,173	2,151
2	3	Sumitomo Mitsui Financial Group	1,105	1,825
3	7	Mizuho Financial Group	930	989
4	N/A	Standard Chartered Bank	814	N/A
5	32	Citigroup	725	258
6	1	ICBC	694	4,326
7	17	HSBC	584	493
8	6	BNP Paribas	562	1,031
9	11	JPMorgan	400	864
10	8	Deutsche Bank	392	953
11	19	Groupe BPCE	370	433
12	4	Crédit Agricole Group	347	1,232
13	12	Morgan Stanley	345	761
14	14	ING Group	338	703
15	N/A	First Abu Dhabi Bank	325	N/A
16	28	Bank of Communications	300	260
17	13	Santander	286	710
18	41	Société Générale	278	170
19	56	Bank Hapoalim	263	65
20	N/A	Beal Bank	251	N/A

Financial Advisers

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	N/A	Bank of America	6,422	N/A
2	N/A	Moelis & Company	5,066	N/A
3	5	Royal Bank of Canada	3,693	3,645
4	6	Morgan Stanley	1,900	3,300
5	N/A	Barclays	1,879	N/A
6	N/A	PFR Advisors	1,830	N/A
7	N/A	Scotiabank	1,357	N/A
8	15	KPMG	1,106	901
9	14	Rothschild	930	985
10	N/A	Lazard	795	N/A
11	N/A	Leucadia National Corporation	735	N/A
=	19	JPMorgan	735	446
13	2	Macquarie	726	5,751
14	N/A	E3 Consulting (USA)	408	N/A
15	10	Crédit Agricole Group	331	1,177
16	18	Ernst & Young	282	703
17	N/A	Black & Veatch	268	N/A
18	N/A	Ironstone Capital	236	N/A
19	N/A	Mitsubishi UFJ Financial Group	233	N/A
20	N/A	General Electric	153	N/A

Legal Advisers

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	N/A	Kirkland & Ellis	5,801	N/A
2	N/A	Bracewell	5,333	N/A
3	5	White & Case	5,327	6,061
4	14	Linklaters	4,588	3,586
5	2	Milbank Tweed Hadley & McCloy	4,144	13,336
6	N/A	Herbert Smith Freehills	4,119	N/A
7	9	Allen & Overy	4,046	5,623
8	N/A	Gilbert & Tobin	4,018	N/A
9	27	Morgan Lewis & Bockius	3,613	1,584
10	3	Shearman & Sterling	2,909	8,674
11	14	Simpson Thacher & Bartlett	2,362	3,598
12	1	Latham & Watkins	2,128	13,651
13	N/A	Machado Meyer Sendacz e Opice Advogados	1,830	N/A
=	N/A	Stocche Forbes	1,830	N/A
15	4	Clifford Chance	1,519	7,328
16	10	Norton Rose Fulbright	1,378	4,743
17	N/A	Galicia Abogados	1,357	N/A
=	N/A	Gonzalez Calvillo	1,357	N/A
19	N/A	Pinsent Masons	1,280	N/A
20	11	Pillsbury Winthrop Shaw Pittman	1,261	4,300

Sponsors

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	N/A	Sempra Energy	10,430	N/A
2	N/A	Hydro One	5,178	N/A
3	N/A	CVC Capital Partners	4,585	N/A
4	N/A	Fortum Oyj	4,452	N/A
5	62	State Grid Corporation of China	2,790	280
6	N/A	EDP Group	2,781	N/A
7	N/A	Saudi Electricity Company (SEC)	2,600	N/A
8	N/A	San Miguel Corporation	1,900	N/A
9	N/A	NextEra Energy	1,594	N/A
10	23	Enel	1,493	819
11	114	State Power Investment Corporation (SPIC)	1,480	44
12	N/A	China Southern Power Grid	1,300	N/A
13	N/A	Edison International	1,250	N/A
14	N/A	Elia	1,189	N/A
15	N/A	Zimbabwe Electricity Supply Authority	1,106	N/A
16	N/A	Engie	1,103	N/A
17	N/A	SGN	1,060	N/A
18	N/A	Gas Natural Fenosa	1,055	N/A
19	49	Brookfield Asset Management	1,002	359
20	N/A	Australian Super	1,000	N/A
=	N/A	Israel Electric Corporation	1,000	N/A

MLAs

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	3	Sumitomo Mitsui Financial Group	1,554	1,157
2	1	Mitsubishi UFJ Financial Group	1,264	1,441
3	6	ING Group	1,249	784
4	8	BNP Paribas	1,220	746
5	4	Société Générale	877	861
6	5	Crédit Agricole Group	803	832
7	11	Rabobank	644	622
8	2	Santander	644	1,223
9	22	HSBC	536	311
10	23	Commonwealth Bank of Australia	494	298
11	15	Deutsche Bank	458	516
12	7	Mizuho Financial Group	445	764
13	10	NordLB	436	634
14	45	JPMorgan	430	153
15	N/A	Citigroup	429	N/A
16	55	Goldman Sachs	414	113
17	24	Morgan Stanley	388	269
18	18	National Australia Bank	369	383
19	34	Siemens	349	189
20	36	Key Bank	338	180

Financial Advisers

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	1	KPMG	3,714	2,226
2	13	Bank of America	2,557	799
3	34	Société Générale	2,038	179
4	2	Macquarie	1,712	1,972
5	5	Green Giraffe	1,664	1,311
6	41	Barclays	1,357	91
=	N/A	Scotiabank	1,357	N/A
8	16	Astris Finance	1,300	705
9	22	HSBC	1,250	475
10	17	Credit Suisse	1,200	660
11	N/A	Royal Bank of Canada	1,036	N/A
12	31	BNP Paribas	1,003	221
13	44	Marathon Capital	610	44
14	7	Ernst & Young	597	1,246
15	20	Mizuho Financial Group	540	588
16	N/A	Lazard	469	N/A
17	N/A	Eaglestone	376	N/A
18	11	Crédit Agricole Group	345	889
=	N/A	CaixaBank	345	N/A
=	9	Santander	345	916

Legal Advisers

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	8	Clifford Chance	8,726	3,167
2	1	Norton Rose Fulbright	6,933	6,368
3	16	White & Case	4,626	1,216
4	7	Allen & Overy	4,502	4,207
5	3	Milbank Tweed Hadley & McCloy	4,413	5,551
6	10	Herbert Smith Freehills	2,329	2,374
7	2	Linklaters	2,275	6,081
8	5	Latham & Watkins	2,155	4,467
9	29	Cuatrecasas	2,023	799
10	N/A	Galicia Abogados	1,937	N/A
11	6	Shearman & Sterling	1,801	4,386
12	14	DLA Piper	1,794	1,245
13	9	Ashurst	1,679	2,456
14	45	Mayer Brown	1,567	476
15	76	CMS	1,358	182
16	N/A	Gonzalez Calvillo	1,357	N/A
17	11	Allens	1,328	1,624
18	27	King & Wood Mallesons	1,314	849
19	63	Bonelli Erede Pappalardo	1,260	273
20	41	Assegaf Hamzah & Partners	1,250	588
=	N/A	AZP Legal Consultants	1,250	N/A

Sponsors

Rank 2018	2017	Company	Value (USDm) 2018	2017
1	27	Macquarie	3,638	367
2	4	Capital Dynamics	2,640	1,091
3	7	Enel	2,503	830
4	N/A	First Pacific Company	1,600	N/A
5	1	Engie	1,411	1,912
6	N/A	China Investment Corporation	1,240	N/A
6	N/A	Public Sector Pension Investment Board	1,240	N/A
8	21	Brookfield Asset Management	1,200	437
9	N/A	I Squared Capital	1,054	N/A
10	N/A	ContourGlobal	1,036	N/A
11	41	EDF	1,017	292
12	N/A	Canada Pension Plan Investment Board	996	N/A
13	N/A	Louis Dreyfus	954	N/A
14	35	Goldwind Global	954	328
15	N/A	TPG Capital	953	N/A
16	N/A	Proman Group	825	N/A
17	N/A	Partners Group	801	N/A
18	N/A	China Resources Holdings	778	N/A
19	N/A	EIG Global Energy Partners	758	N/A
20	N/A	General Electric	704	N/A

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