SPECIAL REPORT

EUROPEAN PPA TRENDS

Q1 2019

A WORD ABOUT WIND

IN ASSOCIATION WITH

AUGUSTA & CO

POWER SURGE: WHY PPAS WILL DRIVE EUROPE'S GREEN FUTURE

/ ANALYSIS OF EUROPE'S KEY WIND MARKETS

/ DATA ON CORPORATE PPAS IN 2018 AND 2019

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EDITORIAL

By Richard Heap, Editor-in-Chief

'Sea levels are rising – and so are we.' It is with slogans like this that school pupils around the world have been walking out of lessons and taking to the streets, most recently on 15th March, to protest against the failures of politicians and others on climate change.

If you wanted a physical representation of the growing pressure on governments to take action on climate change then this was it. When combined with clamour from the investment community for companies to divest from fossil fuels, this should help to keep renewables, including wind, high in the minds of politicians and businesses.

There is no shortage of positive targets for how far wind and solar are set to grow in the next 20 years. This year, we have seen a forecast from Bloomberg New Energy Finance that renewables could make up more than 50% of global power generation by 2050. BP was more reticent with its 30% by 2040 figure, while McKinsey & Co. is looking at 50% by 2035 and 75% by 2050.

The numbers may diverge but the trend is clear, and this should give some cause for optimism among the young protestors.

That leads us to the question of who's going to pay. Generous government feed-in tariffs are a thing of the past in the established markets in Europe, and this means that wind developers have been pursuing other ways to take their projects to financial close.

In this special report, which we are publishing in association with financial advisory Augusta & Co., we look at one of the main ways that companies have been doing this: power purchase agreements with corporate energy users. We analyse the trends that are set to drive the growth of PPAs in Europe and the challenges to make them happen. We will also look at how wind companies need to adapt to this new world.

Those of you who read our 'Europe's PPA Revolution' report, which we published in July 2018, will know the background. The use of corporate PPAs in Europe begun to take off in Scandinavia six years ago, and the region is still seeing the biggest deals. You can find corporate PPA data for Europe since the start of 2018 on page 9.

This growth started in Sweden in 2013 when Google signed its first PPA in Europe at OX2 Wind's 72MW Maevaara wind farm in Sweden. The use of corporate PPAs has evolved since then, as industrial giants have concluded deals to take advantage of low power prices and the predictable regulatory regime in Scandinavia.

We also saw small PPAs in the Netherlands, the Republic of Ireland and the UK from 2013 to 2017.

But it was in 2018 that corporate wind PPAs in Europe moved from a niche interest to the start of a revolution. For example, Mercedes-Benz concluded a 45MW deal in Poland in July that was Europe's first automotive PPA. It followed this in December with a 46MW deal at six projects in Germany, which was that country's first corporate PPA. There were also debut corporate PPA deals agreed in Denmark and Spain.

And where does it go from here? We have looked at why Germany, Spain and the UK could all be important drivers of widespread growth of corporate PPAs at wind farms in Europe over the medium-term. But there are hurdles too. For example, governments in Europe are now legally responsible for removing barriers to these PPAs, but it's tough to see what this means in practice.

We also look at the pressure that this is set to put on investors, including the need to accurately forecast power price changes in the long-term, among other challenges.

Europe may be on the cusp of a PPA revolution – but that doesn't mean it will be an easy journey. There will be plenty for the pupils to keep lobbying about. ■

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Analysis

WHY PPAS CAN HELP REIGNITE GROWTH IN EUROPE'S WIND INDUSTRY

Europe's wind sector had a tough year in 2018. The end of centrally-set feed-in tariffs in major markets such as Germany and the UK, and political changes in nations including France, drove wind to its lowest year for new installations in seven years.

Industry association WindEurope reported in February that gross installations in both offshore and onshore wind were 11.7GW in 2018 (see Figure 1), the lowest annual figure since 10.3GW in 2011. Things were even worse onshore: just 9GW were completed in 2018, making it the slowest year since 8.5GW in 2008.

We also expect 2019 to be a challenging year. The three most active wind markets – Germany, the UK and France (see Figure 2) – are adapting to new market conditions. Competitive auctions in Germany, limited government support for UK onshore and the lack of a coordinated permitting body in France have created delays and uncertainty.

One important data point that will give market participants hope is that clean energy investment has actually risen in Europe in 2018. New capital flowing into the sector is slightly up on 2017. If you include acquisitions, 2018 was also marginally better than 2017. This means the period of 2012 to 2018 has been largely stable in terms of total capital invested.

There are real bright spots for installations too. The fourth-largest nation for installations in 2018 was Sweden, where we are seeing a host of big onshore schemes. Norway came seventh, with similar factors underpinning its activity. And a surge of projects in Spain with the political support of the national government should propel that sleeping giant up the rankings in future years – unless the market is derailed again by April's general election.

> *"Most of that growth will not come from from government subsidies."*

There is one thing that unites these three countries: the growth of power purchase agreements with corporate and other long-term energy buyers. Wind developers and investors in these nations have increasingly been turning to PPAs to reduce merchant risk and take schemes to financial close.

These deals are still a rarity in Europe – the joke is that there have been more PPA breakfasts in Europe than signed corporate PPAs – but there is momentum in the market that suggests that these types of PPAs will be vital in driving more rapid growth in European wind, and enabling firms to hit ambitious growth targets.

There will be no shortage of investors looking at these structures. WindEurope also reported in February that, in 2018, companies invested €26.7bn in new wind projects in Europe (see Figure 3), excluding refinancings, which is the second-highest year on record. This is set to support 16.7GW of new capacity (see Figure 4). This shows that there is still a huge amount of interest from companies in taking projects to financial close, and we increasingly expect these deals to be underpinned by corporate PPAs.

For example, the schemes that reached financial close last year included some large PPA-backed wind farms in Scandinavia, where corporate PPA deals have been key.

In this article, we look at potential growth of these PPAs in European wind, and the hurdles to achieving that growth. We also look at the practical challenges that this is set to cause for wind companies and how they can be overcome; and potential innovations we can expect to see in PPA deals.

Evolution of PPAs in Europe

Mortimer Menzel, partner at financial advisory and investment firm Augusta & Co., tells us that PPAs will have to be a critical driver of growth in Europe if the continent is to hit a target of doubling renewable energy capacity over the next 15 years.

"Most of that growth is not going to come from government subsidies," he says. Augusta has been involved in corporate PPAs in Europe for five years, and has completed over 1GW of them, including deals with Google, Facebook, Alcoa and Norsk Hydro.

So far, these deals have been concentrated in Scandinavia, but in 2018 we saw the use

Figure 1: Gross annual onshore and offshore wind installations in Europe (GW)

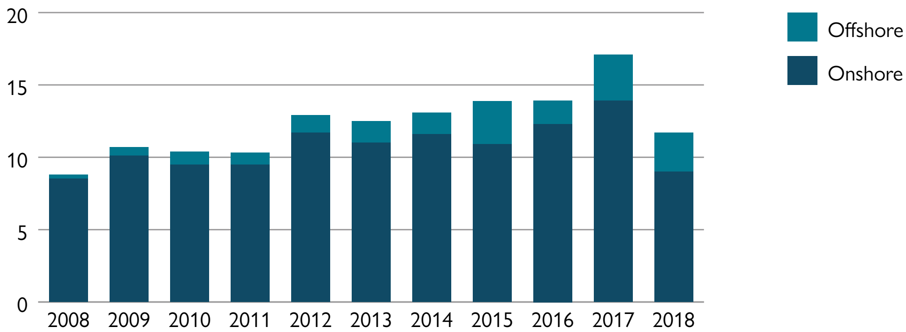


Figure 2: 2018 gross annual onshore and offshore wind installations in Europe (MW)

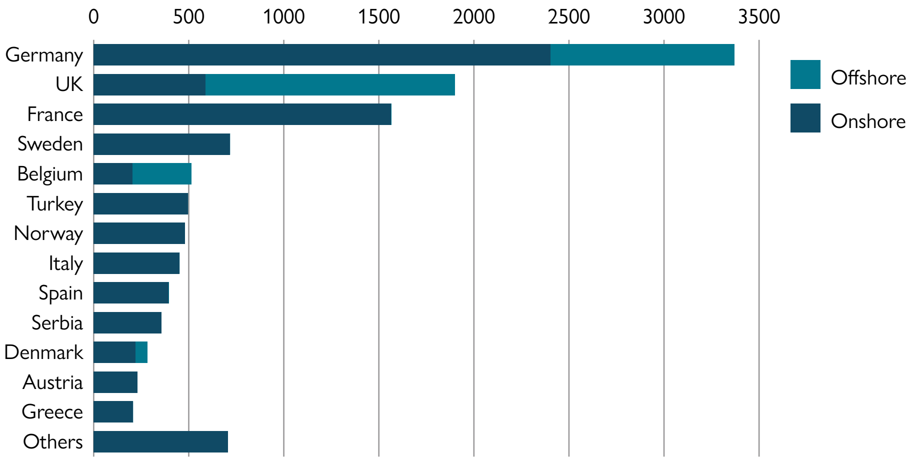


Figure 3: New asset finance (€bn) in wind energy in Europe
(excludes refinancings)

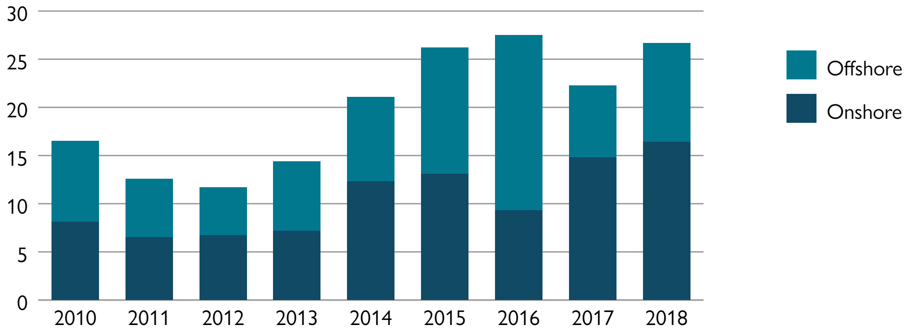
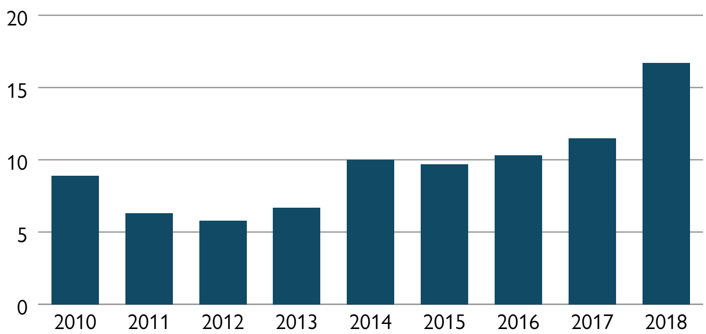


Figure 4: New wind capacity financed in Europe (GW)



Source for all: WindEurope

of these PPA structures starting to expand across continental Europe too.

Let's turn to the recent statistics again. In January 2019, WindEurope reported that almost 5GW of corporate PPAs have been signed in Europe since 2013, or 85% of all corporate PPAs signed in Europe at renewable energy schemes. This figure hit a record 1.9GW in 2018 (see Figure 5).

However, this is a small proportion of the 13.4GW of corporate clean energy PPAs that were agreed globally in 2018 according to Bloomberg New Energy Finance.

Norway led the corporate PPA figures for Europe in 2018, with aluminium company Alcoa concluding two big deals. The firm signed a 330MW deal at Øyfjellet wind farm and 197.4MW at the Guleslettene project. In addition, Facebook's 294MW deal at the Bjerkreim cluster shows the region is still of great interest to data centre operators.

In Sweden, we saw a 235MW PPA by Norsk Hydro at the Överturingen project, along with its deal for 60% of the output from the 353MW Blakliden Fäbodberget; and there were debut corporate wind PPAs for other buyers in Denmark, Germany, Poland and Spain (see Figure 6). The Danish transaction was notable as it was the first offshore corporate PPA: a 120MW deal agreed at Vattenfall's 600MW Kriegers Flak.

This has given Menzel confidence in the growth of PPAs: "The market in the Nordics lends itself more easily to PPAs, and we are expecting this to really take off now in other countries," he says, highlighting great potential in Spain and the UK in the short-term, and Germany in the longer-term.

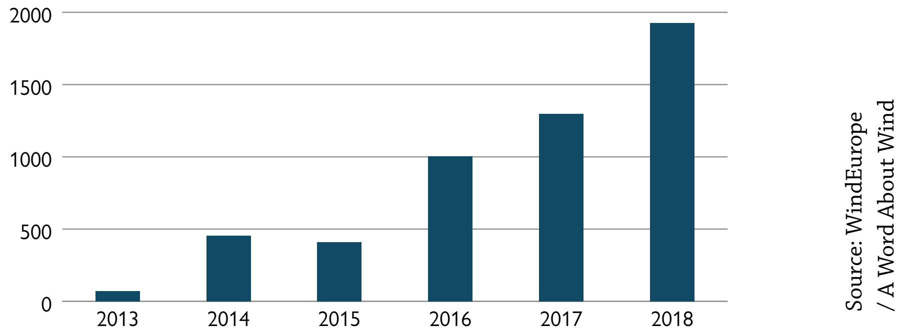
But what will be the main drivers of this growth – and will they happen?

German coal divestment

One big reason is political will. The removal of centrally-set feed-in tariffs in favour of auctions, including in Germany and Spain, was intended to lead to more competition between developers. This has forced developers to look at ways they can take their projects to financial close, and one way to gain that certainty is with corporate PPAs.

In February, German chancellor Angela Merkel confirmed that the country is looking to end its reliance on coal power stations by 2038, in order to hit targets in

Figure 5: Corporate wind PPAs signed in Europe (MW)



the Paris climate change agreement that Germany ratified in September 2016. This is set to put more pressure on the country to move to renewables, backed by PPAs.

"If you shut that off – currently 40% of German generation – and you've already shut off 12% of German generation in nuclear, you're taking away 50% of generation between now and 2038. That's massive in Europe's single biggest electricity market. It is expected to positively affect both the power prices in related markets and the willingness and necessity to do PPAs."

He continues: "You are also adding possible capacity constraints in Germany to a power price that has already risen substantially as a result of a rally in the carbon price, when allowances were taken out of the market under the market stability reserve. The higher price of emitting carbon is expected to favour both natural gas and renewables."

> *"The perception is there will be off-take mechanisms, including PPAs, for Scottish wind."*

The Spanish government has been pursuing a plan announced in November to set the country on course for 100% electricity from renewables by 2050. That is one of the most aggressive government renewables growth targets in Europe, but it is also subject to political uncertainty. Spanish prime minister Pedro Sanchez called a snap election in February to happen on 28th April, which could lead to policy changes.

Menzel says these aggressive plans had made Spain "one of the most interesting markets in Europe now" but said it also raised questions for investors about whether developers could achieve those targets and whether there would be enough PPAs – and PPAs of sufficient duration.

This brings us to the second reason to expect a rise in PPA-led development activity in Europe: companies in the wind industry are looking to facilitate it. The industry has a strong record of financial innovation, and this is an area where they will apply it.

For example, UK onshore wind has suffered a decline since the government decided to end financial support for most new projects in 2015, and last year was the slowest for seven years. Despite this, Menzel sees strong demand for UK development assets.

He says: "We're selling one portfolio of UK wind farms, all development assets, and that has had a fantastic reception because investors are comfortable that PPAs can be found. The perception is there will be market off-take mechanisms, including PPAs and other hedging products, available for Scottish wind, as there should be."

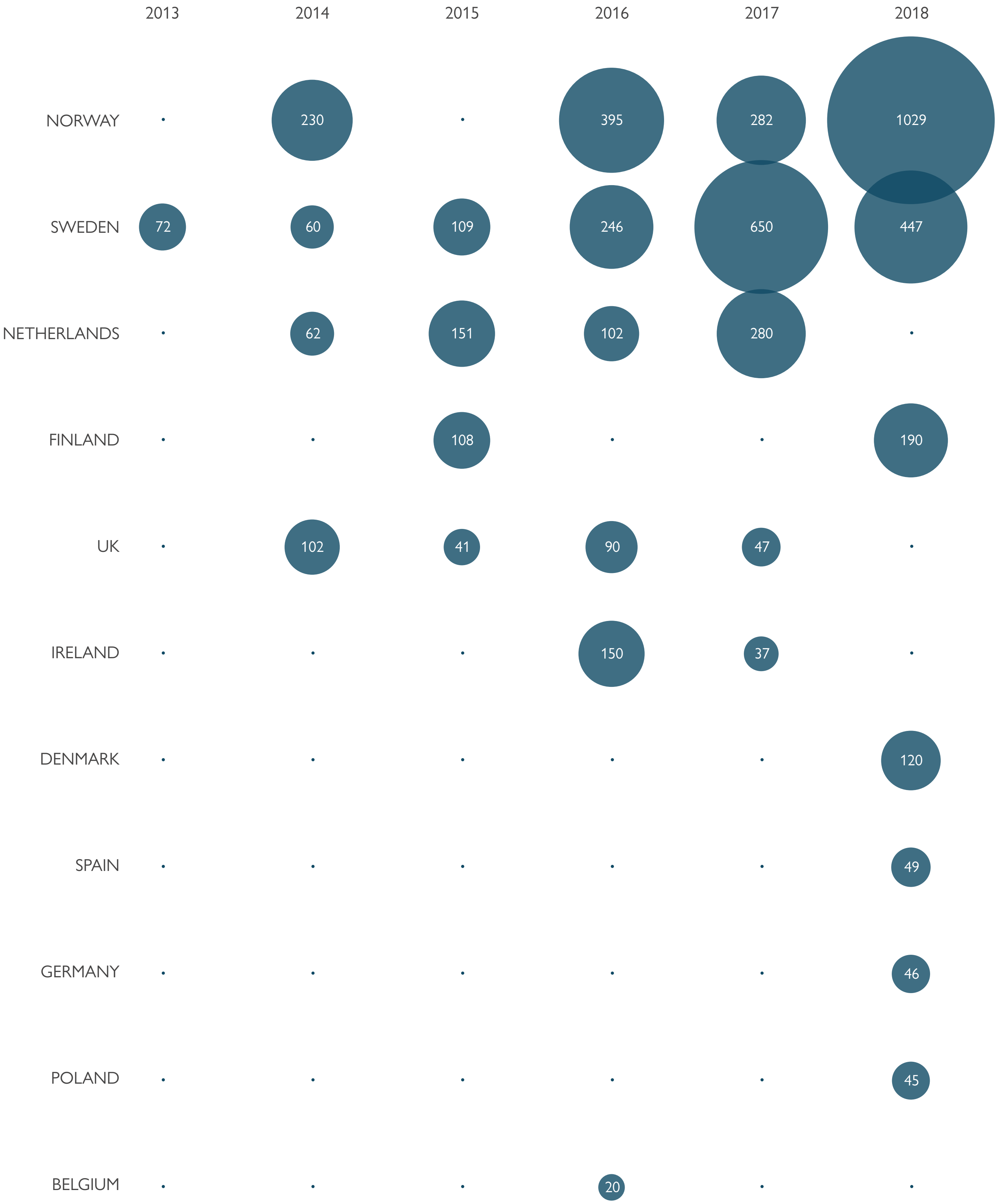
This hints at a third reason to expect more PPAs in Europe: off-takers want them.

Corporates are looking to sign PPAs to support 102GW of new wind and solar farms globally by 2030 according to BNEF, as they seek to show off their green credentials and lock in long-term energy costs. This demand is also growing beyond technology and industrial companies, into sectors including automotive.

This is set to put pressure on companies in the wind industry to find innovative ways to deliver these deals, including offering flexibility on length. Fixed-price deals of

Figure 6: Wind PPAs by country per year (MW)

Source: WindEurope / A Word About Wind



Source: Mercedes-Benz

Get motoring: Mercedes-Benz signed PPA deals in Germany and Poland in 2018

15 years are now the norm, although Norsk Hydro concluded a 29-year deal last July (see Figure 7).

Menzel says corporate PPA demand in Europe started after the introduction of guarantees of origin (GOOs) for renewables in European Union directive 2009/28/EC. This enabled companies to prove the energy they were buying came from renewables, although GOOs have only emerged as a valuable commodity, traded independently from the underlying power, fairly recently.

This is significant because almost all corporate PPA deals are 'synthetic', which means there is never a cable running directly from the wind farm to the PPA off-taker's building, and so being able to prove the provenance of the energy they are buying is key.

Menzel says GOOs are a good system that enables companies to trade green energy across borders. As they mature in their new market they are beginning to represent a separate potential income stream for a generator. This supports the growth of PPAs.

Obstacles and innovation

Slow progress from national governments is one hurdle for PPA deals. Member states have been delaying the production of their draft energy and climate plans for after 2018, with seven of the 28 current EU member states failing to file them with the European Commission by the end of 2018 and others being blasted for a lack of detail.

The EU is now compelling governments to identify and remove barriers to corporate PPAs, under the terms of the EU Clean Energy Package that was confirmed in mid-2018. This should help, but relies on nations taking the actions they're meant to. We're yet to see what it means in practice.

Menzel says the expansion of corporate PPAs would also put pressure on companies in the wind sector to analyse power prices accurately on a market-by-market basis, and for that they will be relying on accurate assessments of prices and wind resources.

"As you double renewables from where it is today to where it is forecast to get to you'll mainly do that with PPAs, alongside similar bankable private market hedging contracts. This shift to PPAs from subsidy systems is forcing market participants, namely off-takers, institutional investors and banks, to really think through the long-term power projections and what could influence this in each individual market.

"Those projections become the basis of your valuation but there are very few people in Europe who truly understand how to do this and who have track record and credibility on these issues. It's tens, not hundreds, and that is a structural risk for the market."

Menzel says the challenges for forecasting returns from wind farms are now no longer to do with understanding the wind resources or specific turbine technology.

He says: "We don't tend to get that wrong any more in terms of modelling or valuation assumptions. It now boils down mainly to power prices and you need to develop a sophisticated risk analysis around those to not get into trouble."

Menzel compares this to placing equity in projects, where returns are related to the power prices agreed at the start of the process: "We have been doing this for a decade and a half, but previously pure market – so-called 'merchant' risk – only manifested itself at the end of your tariff period. Now it represents the entire investment period or life of the asset and you need to have a sophisticated and defensible view on power pricing for 20-years-plus."

Menzel says that the sophistication among market participants is increasing exponentially and Augusta is involved with that. Most institutional investors can no longer rely on those few consultants relatively blindly and just "buy the curve" that the technical consultants are offering. Now Augusta and others are routinely involved in formulating a sophisticated series of stress tests and assumptions applied to the standard models and curves to allow the running of scenarios that a valuation or IRR target has to survive.

Justin FitzHugh, partner at Augusta who has been responsible for the firm's large Nordic wind deals, says "the Nordics is a great example of how, done well, a corpo-

Figure 7: Corporate wind PPA deals signed in Europe from Jan 2018 to Feb 2019

Source: A Word About Wind

	BUYER	PROJECT OWNER	PROJECT(S)	PROJECT SIZE (MW)	LOCATION	COMMENT
Q3 2018	Novo Nordisk / Novozymes	Vattenfall	Kriegers Flak	600	Denmark	Vattenfall wins 120MW PPA
Q1 2019	Northumbrian Water	Ørsted	Race Bank	573	UK	Water company signs 1TWh PPA
Q2 2018	Norsk Hydro	Vestas / PKA / Vattenfall	Blakliden Fäbodberget	353	Sweden	Norsk buys 60% of output
Q1 2018	Alcoa	Eolus	Øyfjellet	330	Norway	Alcoa inks deal for full output
Q2 2018	Facebook	Luxcara	Bjerkreim cluster	294	Norway	Facebook signs at Norwegian trio
Q3 2018	Norsk Hydro	GIG (Macquarie)	Överturingen	235	Sweden	Norsk Hydro signs 29-year PPA
Q3 2018	Hydro Energi	Engie / Susi Partners	Tonstad	208	Norway	Hydro Energi buys full output
Q2 2018	Alcoa	BlackRock	Guleslettene	197	Norway	Aluminium giant buys full output
Q1 2019	Nike	Iberdrola	Cavar	111	Spain	Nike runs off with 40MW PPA deal
Q3 2018	Google	Neoen	Hedet	81	Finland	Part of a three-project agreement
Q3 2018	Google	WPD	Kuuronkallio	59	Finland	Part of a three-project agreement
Q3 2018	Google	CPC	Lakiakangas	50	Finland	Part of a three-project agreement
Q4 2018	Mercedes-Benz	Statkraft	Six projects	46	Germany	Car maker signs key German deal…
Q3 2018	Mercedes-Benz	VSB	Taczalin	45	Poland	…as well as Poland's first wind PPA
Q3 2018	VDKL	Enercon	Four Projects	11	Germany	Logistics group buys full output
Q2 2018	Undisclosed	Energiekontor	Withernwick 2	8	UK	Consumer goods firm buys it all
Q1 2019	Telefónica	Acciona	Unnamed	-	Spain	Telefónica renews 345GWh PPA
Q3 2018	BBVA	Enel Green Power	Unnamed	-	Spain	BBVA agrees 80GWh transaction
Q1 2018	Unilever	Acciona	Unnamed	-	Spain	Unilever signs 23GWh/year PPA
Q1 2019	Air Products	Ørsted	Unnamed	-	UK	PPA to produce industrial gases

rate PPA market can function and serve the industry: bringing PPA off-takers, wind developers, equity investors and banks together, analysing and allocating PPA and merchant risks appropriately to bring these projects to close is a complex game of chess but it can be done and done at scale".

Changing face of off-takers

Another emerging trend in PPAs is the use of structures that can bring in new types of investors as off-takers as alternatives to corporate power users, including large institutional investors such as pension funds, endowments and others. This would give wind generators and investors more options when seeking to secure the PPAs to take schemes to financial close.

"There is a lot happening in this area but it is too early to talk about this definitively. It has the potential to bring a whole new type of off-taker into the markets which is very exciting," says Menzel.

A further challenge for wind farm owners is they won't just need to make forecasts on power prices. They need to do it on their potential customers too, so they know the risks involved in dealing with particular buyers and whether they will be around for the duration of the PPA.

Covenant strength is rarely talked about in wind, but Menzel says that this will have to change, and he expects the growth of PPAs to drive more interest in counterparty insurance products.

He says: "You're seeing those things built into the structure much more than before. Bank guarantees, export credit, security products and insurance products to improve the offering."

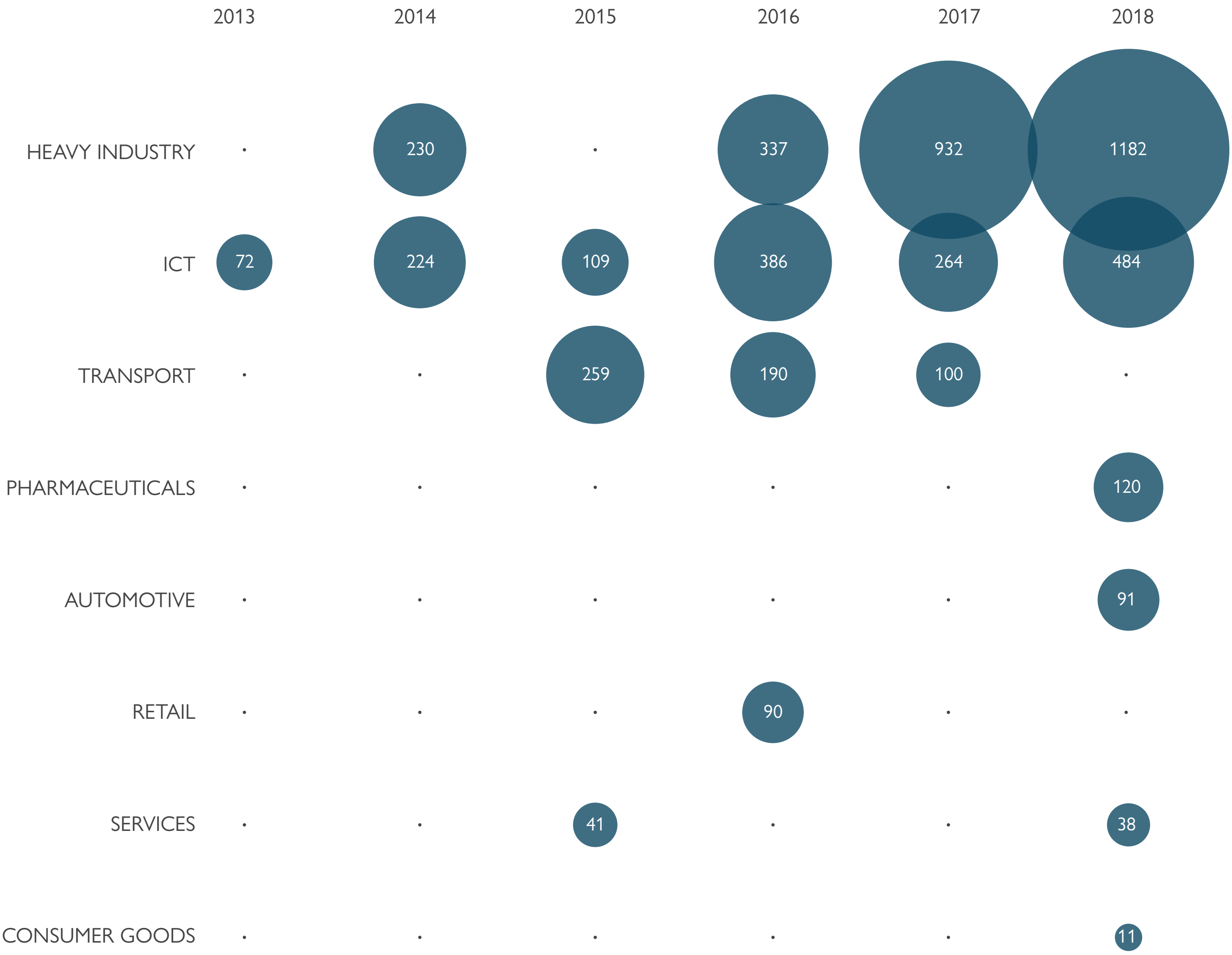
Most firms will be inexperienced when it comes to buying green energy, or have outsourced the responsibility to someone in their firm with limited experience. This will be an issue as companies in a wider range of industries look to wind PPAs (see Figure 8), and could derail the clean energy ambitions of firms with even the boldest plans.

Menzel explains: "Even in the corporate PPA market there are very significant constraints on growth – mainly around a lack of understanding of these complicated power market price issues. Many corporates, although they may strongly desire a fixed-price power contract, even a long-term one, do not have the expertise to find, structure and execute one."

The need to work closely with all partners is a challenge for wind investors as Europe enters an era of PPA-driven growth. ■

Figure 8: Wind PPAs by industry in Europe (MW)

Source: WindEurope / A Word About Wind



ABOUT THE AUTHORS

Mortimer Menzel

Mortimer has 17 years of expertise in placing equity finance in renewable energy deals and over 28 years of investment banking and legal experience.

Before joining Augusta in 2002, he was in the investment banking division of Goldman Sachs and a solicitor with Bruckhaus Westrick in Frankfurt.

At Augusta, Mortimer has originated and executed some of the leading renewables transactions in the European market including the sale of wind turbine makers, a blade manufacturer, M&A on 20-plus offshore wind projects, and various other portfolio sales. He has led transactions throughout Europe for clients including Deutsche Bank, Unicredit, Goldman Sachs and RWE.

James Knight

James co-leads Augusta's renewable energy practice. Since joining the company in 2003, he has been dedicated to the sector and worked across the spectrum of clean energy technologies.

James has worked on the company's first renewables transactions and led some of Augusta's largest and most complex transactions with some of the industry's leading players including Vattenfall, RWE, GE Capital, ERG and Platina Partners.

He has focused on asset and corporate finance in the renewables sector for the past 14 years and worked for 20 years in investment banking. Prior to joining Augusta, James spent five years in the investment banking division of Goldman Sachs.

Justin FitzHugh

Justin spent six years in industrials M&A/ investment banking at JP Morgan in London, where he worked on a broad range of private and public sector transactions including United Technologies' acquisition of Chubb plc.

After JP Morgan, he gained an MSc in energy policy from Imperial College London before moving to ILEX (now Pöyry) Energy Consulting, where he worked on management and economic consulting projects in the power sector.

Justin joined Climate Change Capital in 2006, working on project finance, private equity and M&A mandates across the clean energy and carbon credit sectors. He moved to Augusta in 2008.

AUGUSTA & CO

About Augusta & Co.

Augusta & Co. is an independent London-based specialist financial advisory and investment house serving the European renewable energy sector.

Augusta has successfully closed over 90 transactions to an aggregate value in excess of €10bn, and for 16 years has been at the forefront of pioneering transactions in the sector.

It has placed over 1GW of PPAs with major corporate players in the Nordics and throughout Europe.

For more information, please visit: www.augustaco.com

A WORD ABOUT WIND

A Word About Wind

A Word About Wind is the world's only membership organisation for people working on the financial side of the wind industry globally. Founded in 2012, we have built a 2,500-strong community for our market intelligence briefings, reports and live events; and now primarily operate in Europe and North America.

Our headline events of 2019 include Financing Wind North America in Denver on 24th-25th April; and our Financing Wind Europe conference and European Wind Investment Awards events in London on 31st October. These allow our members to hear from and network with key players in the global wind industry.

Richard Heap

Richard joined A Word About Wind in 2014 as the company's first full-time editor. He became editor-in-chief in 2018 to take a wider role on editorial, events and marketing.

His key projects have involved launching new reports including the Legal Power List, North American Power List and Women's Power List; developing the company's data operation; and developing and hosting the company's live events.

His previous roles include five years at the award-winning magazine Property Week, including as assistant editor; and research manager at Sunday Times Fast Track.

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