



Where to go from here: The race for decarbonization

Strategic choices for infra investors and the energy sector

Content

Executive summary	3
1. The world is looking to decarbonize – what should infra investors and energy companies do?	4
2. Transactions under the microscope	7
3. Initiating development creates significant value	8
4. Focus on Vestas – move into development and infra funding	12
5. So what will be your company’s answer to this strategic challenge?	13

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Executive summary

Unlike Mark Twain, who once famously quipped, “Reports of my death have been greatly exaggerated,” the same cannot be said of the oil and gas (O&G) sector. Look no further than the supermajors – ExxonMobil, Chevron BP, and Shell recorded over US \$50 billion of losses between them in 2020. Already under extreme pressure due to today’s energy transition, stranded carbon assets, and demand destruction playing out, market capitalizations of the supermajors almost halved in 2020. When Larry Fink, CEO of BlackRock, the world’s largest asset manager with \$8.7 trillion of assets under management, or around 9% of global stocks, makes climate change and sustainability central to his letter to CEOs for two years running, then you know we have reached a carbon tipping point.

Certainly, decarbonization has never been higher on the corporate agenda than today. Strong decarbonization trends at the corporate level are being driven by power stock market value creation and value-destruction stories. Carbon-heavy assets are underperforming in stock markets, while green and clean energy companies and their supply chains are broadly outperforming markets.

When we add to this a significant wall of environmental, social, and corporate governance (ESG) investment capital trying to find a home in the clean energy world, we find valuations being stretched for clean energy assets, even at the preoperational development phase for both listed and unlisted assets. Moreover, governments, particularly in the offshore wind market, have realized that significant development premia can be charged for access to development sites, increasing the cost of development.

In this report, we examine where infra investors and energy companies should turn when the world looks to decarbonize – and all are running in the same direction – and when demand for clean assets hikes the price of those assets. We examine key pain points and strategic considerations that investors and energy companies should consider in order to construct meaningful, value-accretive business models to enter the market and to accelerate growth in the sector.

1. The world is looking to decarbonize – what should infra investors and energy companies do?

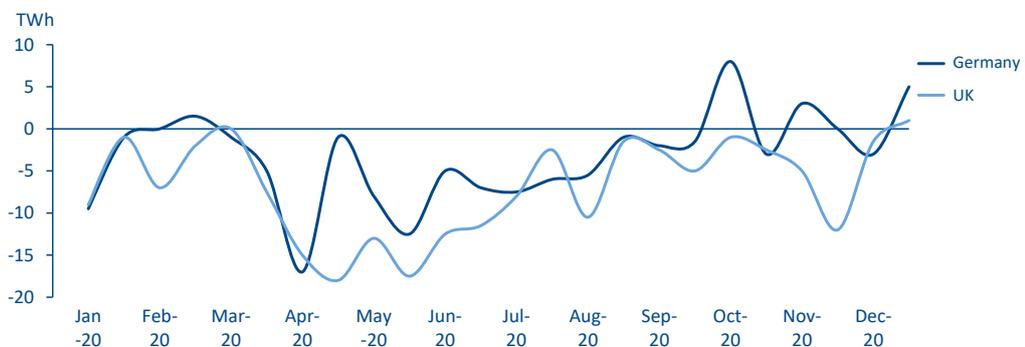
The trends have been clear for some time. Many European independent power producers (IPPs), utilities, and developers began their energy transitions back in the mid-2000s – and even former O&G companies such as DONG Energy (now Ørsted) and ERG started their moves in 2006-2008. Given this timeline, we can reasonably call today’s supermajors the laggards, especially given the relative weakness in the price of oil since 2014. And then, of course, we have the dramatic effect of the COVID-19 pandemic accelerating the stock market value creation/destruction process, resulting from a lockdown-induced V-shaped electricity consumption drop and recovery in both the EU and North America in 2020. Figure 1 highlights this trend in the UK and Germany, specifically.

The latest trends have also powerfully illustrated the benefits of green business models. Over the course of 2020, green utilities, developers, IPPs, and wind/solar original equipment manufacturers (OEMs) have significantly outperformed in the EU stock markets. Key trends include:

- Principally, better pricing and priority dispatch have emphasized resilience and growth for green utility models.
- Installations of new renewable capacity have been relatively unimpacted and continue to grow, driving the share performance of OEMs and developers.
- Development and operating assets remain in high demand.
- Renewable auctions have continued with minimal interruptions.
- Add to all these points is the estimated \$350 billion of fund inflows into ESG funds and the chasing of green stocks (doubling over the last two years), as reported by Bloomberg Green. Thus, it makes sense that renewable valuations have continued to rise. This is true of listed and unlisted assets.

In addition, given that government pandemic recovery packages have contained a green element – even if limited in the case of a few countries (e.g., UK, Germany, France, and South Korea), the net zero carbon rhetoric and ambitions in key markets such as the EU and the US have been vocal.

Figure 1: Year-on-year change in monthly electricity demand in the UK and Germany (January 2020-December 2020)



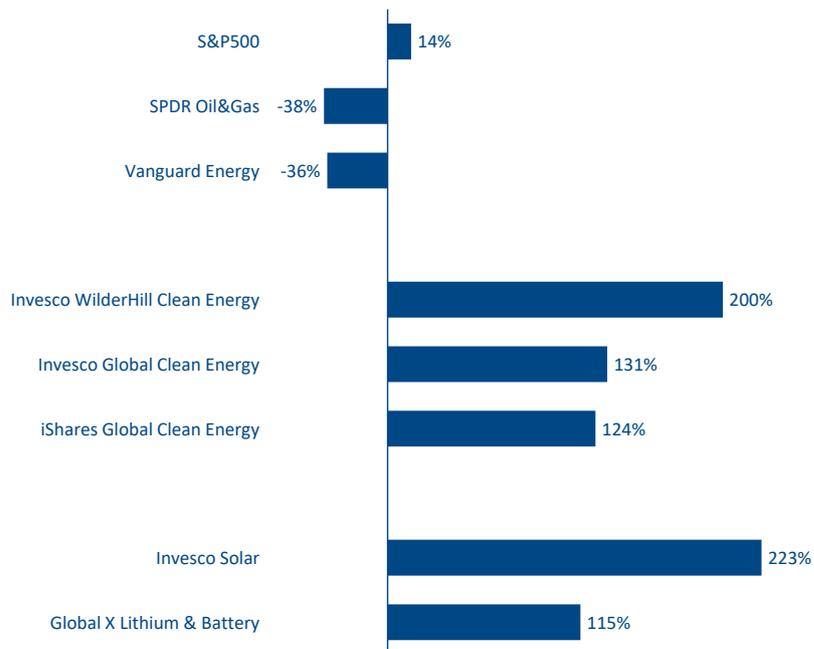
Source: IEA

That said, it appears that the green recovery agenda is being driven more strongly at the corporate level and by markets than at the government level as pure value creation and destruction plays out (see Figure 2). This, of course, sits behind several strategic trends – from decarbonization of the O&G sector and its push into areas such as offshore wind to the continued growth of low-cost capital funding structures in the financial services sector linked to decarbonization and sustainability.

But the key question for many management teams is how, what, and where you can effect strategic change toward economically profitable repositioning and growth. This question is vital not only for utilities and developers but also for CEOs of the O&G sector. In this report, we focus, in particular, on the need to acquire in-demand assets while avoiding the destruction of value in the process.

Importantly, many listed stock market valuations, recent transactions, capital raises, and auctions costs have led to myriad illustrations of overheating valuations, especially for development assets, as well as high costs of development as governments cash in (e.g., the UK offshore market). This leads to questions of where companies should focus in terms of jurisdictions, technologies, and position in the value chain, along with how companies should enter new markets and what they should be paying to do so. Selling undesirable carbon-intensive assets at low valuations and buying expensive clean assets is a tough strategy.

Figure 2: Absolute share price performance through COVID-19 (December 2019-December 2020)



Source: Bloomberg, Arthur D. Little analysis



2. Transactions under the microscope

Access to a renewable project pipeline, technology, and operating assets has rarely been more desirable. We are witnessing clean energy incumbents, investors, and those on the journey to net carbon zero adopt several techniques and strategies to achieve scale and access to future project pipeline and operating assets. Regulatory changes with more merchant exposure and competition for such assets have also distorted valuations and returns across the value chain, meaning business models must evolve for new entrants and incumbents alike.

As an example, Figure 3 illustrates some strategic considerations for the onshore wind asset development lifecycle. Key questions include:

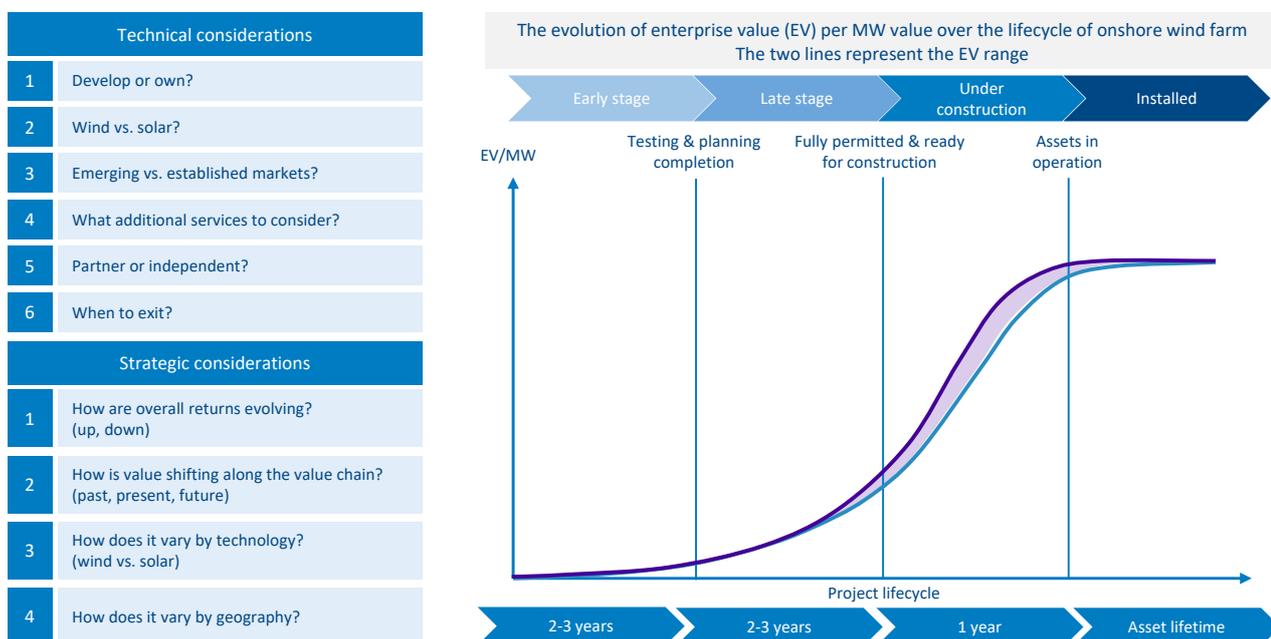
- How do we gain a meaningful position in renewables to decarbonize our portfolio without overpaying?
- What technology options should we pursue, where, and with whom? What role does floating wind, and even floating solar, play?
- How do we access project pipeline and operating assets and what do the returns look like? Are these investable?
- How does regulation and increasing amounts of merchant risk affect development and operating business models and finance?

- How will auctions evolve - will they become technology-agnostic with just firm baseload power at a price, which has profound ramifications for renewables?
- At what point do we sell development assets, or should we hold them beyond the commercial operation date (COD); if so, for how long?
- What downstream asset management, trading, and offtake risk management capabilities do we need to get our development assets to market?
- Must we hybridize assets (i.e., add storage and/or multiple technologies to eliminate variability in production) at the portfolio or project level to achieve a quasi-baseload profile?
- How can dispatchable renewable power purchase agreements (PPAs) be achieved?
- Do we need to partner with a balance sheet?

For those looking to acquire assets and project pipeline:

- What constitutes good value for development assets?
- What stage must we enter development?
- In which markets, with what technologies, and with whom?

Figure 3: Strategic considerations for onshore wind asset development lifecycle



Source: Arthur D. Little analysis

3. Initiating development creates significant value

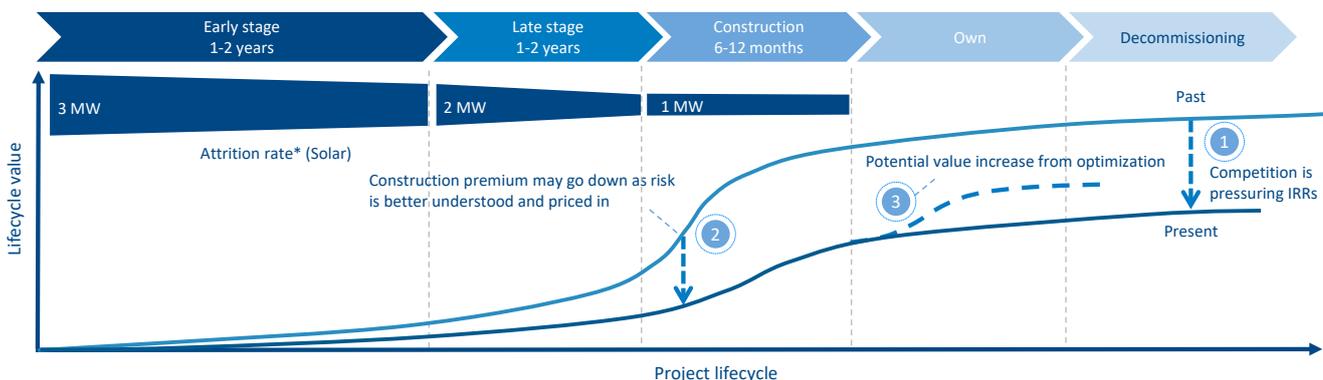
The most obvious point to start when building a renewable project pipeline is at the beginning – and, in our opinion, that means becoming a greenfield developer. Greenfield development creates maximum value across the asset lifetime. We believe that the highest investment returns across the value chain from development through construction and subsequent operation come from greenfield development, as opposed to acquiring late-stage, ready-to-build, or even operating assets. Competition at these later stages is fierce and the returns available today for fully de-risked assets are similar to regulated assets at an internal rate of return of 5%-7% we estimate. Double-digit returns for greenfield development admittedly come with a higher degree of risk, but also balance sheet is required to bring assets through construction.

Consequently, many players are moving into development to capture this value, including companies where development is outside their core skill set, such as manufacturers (e.g., Vestas) and financial investors (e.g., Copenhagen Infrastructure Partners [CIP] and Macquarie). Such moves only come with the acquisition of people or companies.

The difficulty of entering development is that development takes time to deliver – up to 10 years for offshore, at least five for onshore wind, and three for solar PV. For those seeking to decarbonize and move their portfolios, investing in development assets is a mid- to long-term option and requires the addition of specialist skills and competences often outside preexisting skill sets or the rapid acquisition of such skills through M&As or partnerships.

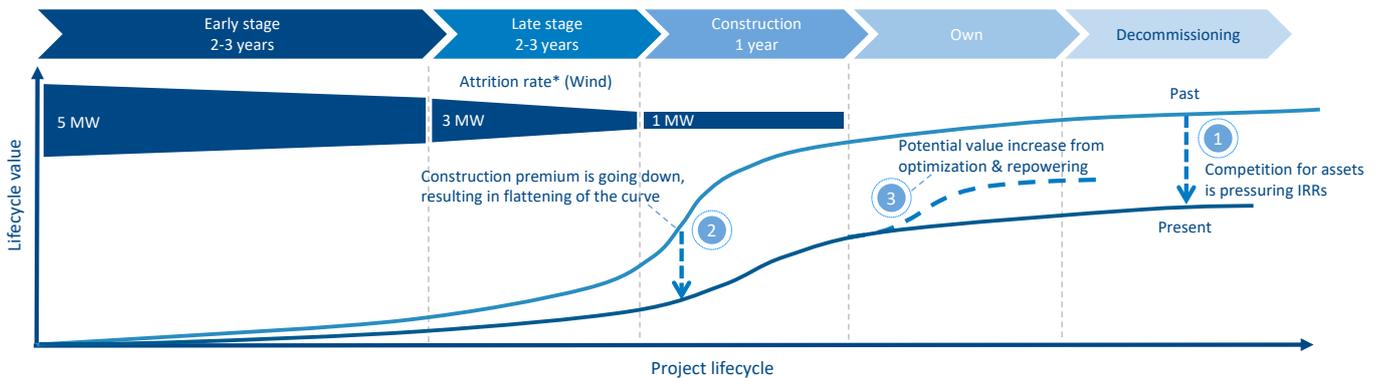
Development has historically been considered a relatively low capital-intensity business, certainly when compared to the full cost per MW of installing a wind turbine or PV panel. Typically, you would expect 5%-10% of sunk cost to install related to the all-important development piece. Of course, not every dollar spent will deliver as development comes with some natural attrition (see Figures 4 and 5).

Figure 4: The changing returns profile throughout a solar PV asset lifecycle



*Attrition rate refers to the fact that for a typical solar PV asset, for every 3 MW in the early planning stage, only 1 MW will make it to the construction phase. Source: Arthur D. Little analysis

Figure 5: The changing returns profile throughout a wind asset lifecycle



*Attrition rate refers to the fact that for a typical onshore wind asset, for every 5 MW in the early planning stage, only 1 MW will make it to the construction phase.
Source: Arthur D. Little analysis

However, partnerships and acquisitions are becoming highly competitive with a lot of investors (both infra/private equity) as well as O&G chasing origination/development platforms. Some recent deals in acquisition of developers and project pipeline include Mainstream Renewable Power (MRP) by Aker Horizons, Solarcentury by Statkraft, and the acquisition of a stake in CIP by leading wind OEM Vestas.

To glean some key understandings in renewable strategies, let's take a closer look at some of these recent developments.

The acquisition of MRP by Aker in January 2021 has demonstrated the value in pure development

Norwegian investment company Aker Horizons has bought a 75% stake in MRP at roughly the cost of \$818 million. Through this deal, Aker Horizons, an investment subsidiary of the Aker Group, will gain 1.4 GW of projects either under construction or in operation, a 10 GW project development project pipeline, and 10 GW of "identified project opportunities." According to MRP chairman and founder Eddie O'Connor:

"This partnership is the crucial next step in the vision set out for MRP in 2008. [It will] widen our scope for entry into new markets and further deepen and expand our leadership position in existing ones."

MRP accelerated its growth trajectory and Aker gets access to future renewable-generating assets

"This deal enables MRP to materially accelerate its growth plans to deliver a global portfolio of wind and solar assets. [MRP] plans to bring 5.5 GW of renewable assets to financial close by 2023, [setting

the company] firmly on track to becoming one of the world's first pure play renewable energy majors."

(Source: PowerTechnology)

According to the Financial Times, Aker's parent company saw its market capitalization increase by 25% after the deal, with the value uplift more than offsetting the cost of the acquisition.

BayWa manages to raise nearly \$642 million in new equity and evolves the development business model

Several funds led by Energy Infrastructure Partners (EIP) have committed to investing \$641.7 million in a capital increase of BayWa renewable energy GmbH in order to get a 49% stake in the renewables business. (Source: Reuters)

BayWa can exploit new value-creation opportunities in merchant assets, corporate PPAs, and limited asset ownership

Institutional investors have a clear appetite for such a renewable development platform. Moreover, through this transaction, BayWa has essentially evolved its business model from a pure play developer to a partial IPP. BayWa AG (BayWa r.e.'s parent company) and EIP have agreed to strengthen BayWa's project, service, and solution business and develop the company into an IPP. According to BayWa, the company will operate selected solar and wind power plants itself, with a total volume of up to 3 GW in the medium term.

Arthur D. Little believes that adopting a progressive developer business model that allows limited ownership in certain jurisdictions in specific situations is critical for developers in the future. We believe that long-term value creation results from "cradle to grave" – that is, greenfield to full ownership, as long as balance sheet and funding constraints allow. However, in a world where regulation has shifted from feed-in-tariffs (FITs) to

merchant exposure or corporate offtakers, it will be critical for developers to prove merchant concept and revenue streams to maximize development asset value through limited ownership. Thus, successful developers of the future will need to have some access to balance sheet to do this.

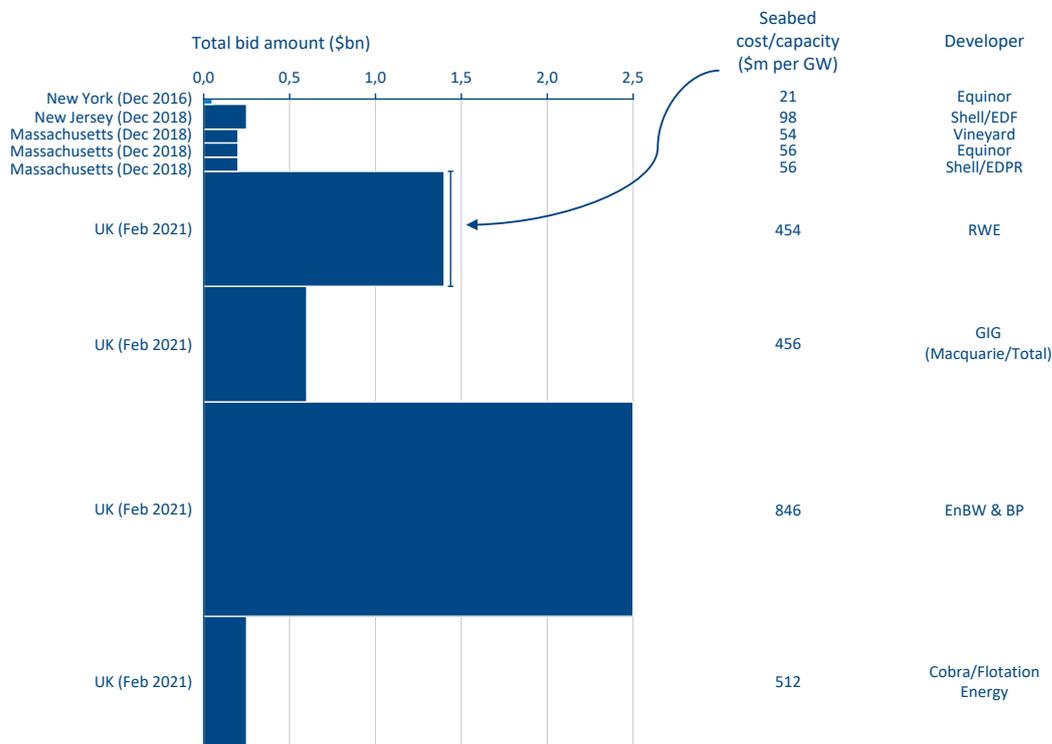
Even pure development requires greater capital now, especially in the offshore wind market

Equally, consider how the cost of development has changed dramatically in certain markets (e.g., offshore wind, where access to seabed real estate has become extremely expensive). In 2018, eyes were raised when US auctions in New York and

New Jersey produced prices of around \$54-\$98 million/GW for development rights (see Figure 6).

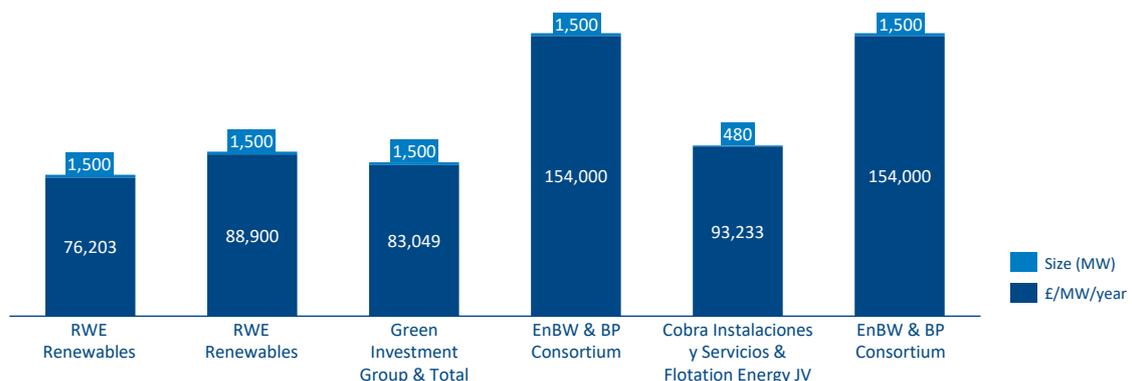
These rights do not confer access to a guaranteed development or grid connection; they merely confer the right to develop with no guaranteed outcome. The recent UK R4 seabed lease auctions (see Figure 7) took the industry into yet another stratosphere with prices equivalent achieved for development rights rising to around 8x-16x higher than the US auctions, with developers potentially being asked to pay up to £0.5 billion-1.0 billion/GW over 10 years before eventual CAPEX of £2 billion-4 billion/GW. This represents a significant amount of capital at risk with no guaranteed outcome or future revenue streams.

Figure 6: Seabed auction results in the US and UK



Source: The Financial Times

Figure 7: Clearing prices for The Crown Estate R4 seabed lease auctions 2021



*Following a three-stage tender process to evaluate bidders' capability and their proposed projects, six proposed new offshore wind projects to be built within four areas of seabed were selected during Offshore Wind Leasing Round 4. Source: The Crown Estate

It was highly instructive that the big winners in the UK R4 were those previously not present in the UK offshore market (e.g., BP/Total/RWE), but at what price for a seat at the UK offshore table? Notably, current active incumbents including major players Ørsted, Iberdrola/Scottish Power, Equinor, SSE, Vattenfall, Ocean Winds (EDPR/ENGIE), EDF, and others – all currently present lost out. At this point, it is difficult to say whether the winners will have overpaid, based on assessment of an asset that may run for 50 years with a view required on energy prices over that period. Certainly, however, there has been massive inflation, and up-front unguaranteed development costs will be well over £1 billion/GW.

All offshore developers and other governments will be looking very carefully at the UK offshore auction model as well as the rush to acquire development assets and a development capability.

In a world where balance sheets have become important, this has become a key question for offshore developers. Plus, there remain creative ways to finance growth with the establishment of novel development engines funded by higher risk capital (e.g., private equity) allied to assetco/yieldco-type structures funded by institutional capital (e.g., pension funds). Demand for development platforms remains high as evidenced by the deals discussed above as a route-to-market to generation assets.

Equally, even within the OEM space, business models remain fluid and are evolving; for example, Vestas is looking firstly to enter development but also in partnership with an infrastructure platform. Typically, OEMs have not been developers, but the need to find a route-to-market for equipment and high-margin services, along with the desire to capture some development value, has driven Vestas back into development and also toward an innovative deal with CIP.

4. Focus on Vestas – move into development and infra funding

Vestas has taken a 25% stake in renewable asset manager CIP. CIP runs seven funds (a total of \$16.6 billion); its portfolio represents 20 large-scale projects with 8 GWs of capacity. According to Vestas, the deal would “further expand its presence in renewable project development” and allow the company to invest within areas of the renewables value chain that lie beyond its existing activities. Pressure on the profitability of turbine sales has seen major manufacturers build up service contracts to find additional revenue. Thus, development and co-development offer another profit route, one that is insulated from any undulations in turbine orders, including development in technologies beyond wind.

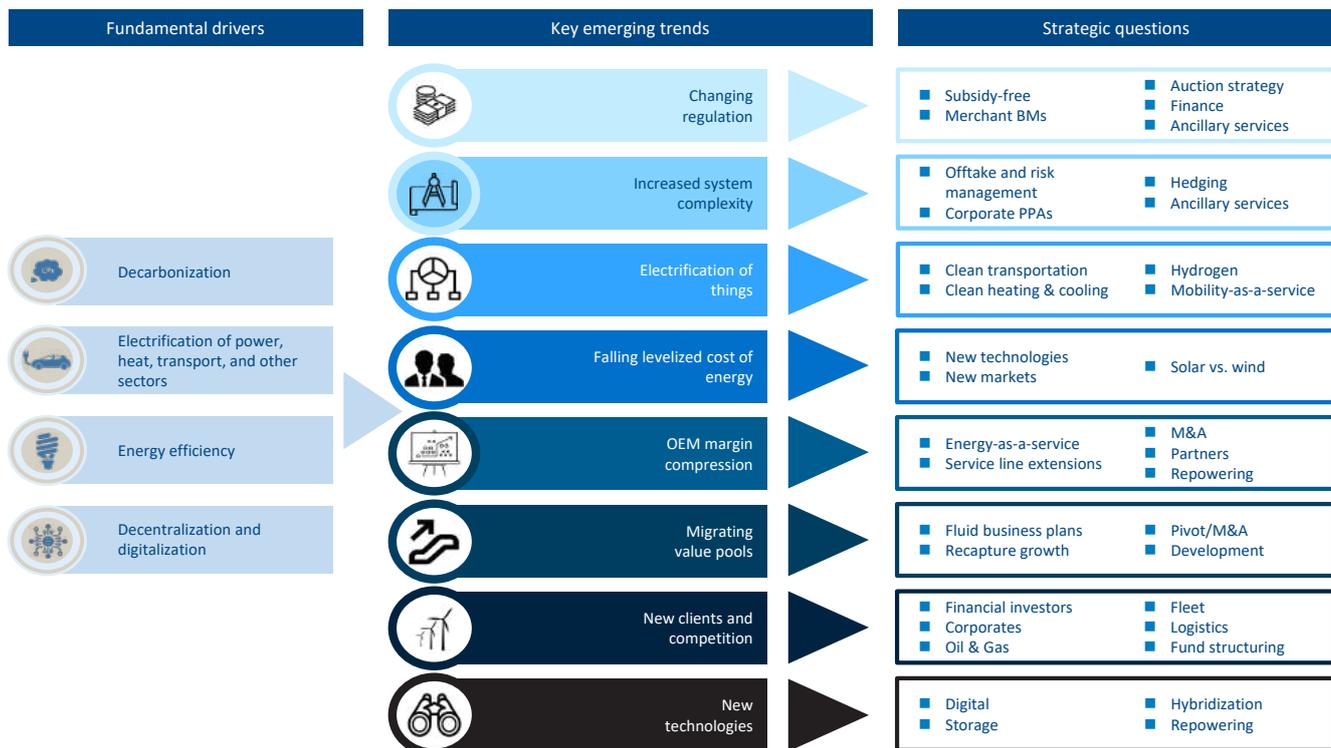
On the flipside, this transaction has strengthened CIP’s position as a market pioneer and global leader within renewable energy investments and complements its industrial know-how with an even stronger capacity to innovate, lead, and enhance the deployment of institutional capital into investments in the global energy transition toward a net zero carbon economy. CIP will use part of the transaction proceeds to create and co-invest into a new Energy Transition Fund, which will launch in the first half of 2021. The fund will invest in technologies such as power-to-X, which will be instrumental for the decarbonization of large-scale markets in fuel and feedstock. (Source: Energy Global)

5. So what will be your company’s answer to this strategic challenge?

We are witnessing seismic shifts in terms of market positioning from all O&G companies to traditional IPPs and utilities to even OEMs looking to gain a foothold in renewable project pipelines as a portal to owning assets. There are more buyers than sellers, and development platforms of all shapes and sizes are required. But at what cost?

Just saying “caveat emptor” is not that helpful for the buyers. There are ways to successfully enter the renewables business while creating significant value (see Figure 8). Arthur D. Little can help companies understand which markets, which technologies/combinations of technologies, and at what point in the value chain and with which partners to enter renewables markets. Arthur D. Little can also navigate innovative financing constructs and complex risk management tools that allow investors to get the very best out of their development, generation, transmission, or smart assets.

Figure 8: Key strategic drivers for the energy transition



Source: Arthur D. Little analysis

Notes



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Arthur D. Little

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