VIETNAM'S FUTURE TRANSITION TO OFFSHORE WIND AUCTIONS

INTERNATIONAL BEST PRACTICES AND LESSONS LEARNED

GWEC
GLOBAL WIND ENERGY COUNCIL

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The Renewables Consulting Group (RCG) is a specialized expert services firm supporting the global renewable energy sector. From strategy to implementation, the company serves businesses, governments, and non-profits around the world with technical and management consulting services for both mainstream and emerging renewable energy technologies. RCG works with the public sector, private equity and financial services firms, utilities and project developers, equipment manufacturers, and engineering and construction companies for on- and off-shore wind, solar, and emerging technologies including wave and tidal and energy-storage projects. RCG is headquartered in London, and has offices in New York, Tokyo and elsewhere.

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Liming Qiao
Head of Asia, Global Wind Energy Council

Foreword

Vietnam is facing a crucial crossroads: It must decide which energy sources to lock in now to meet its growing electricity demand and power its high economic growth. Last year's Resolution 55 confirmed the government's resolution to shift away from a fossil fuels-based energy mix, and now the draft version of the Power Development Plan 8 (PDP8) master strategy has defined the long-term targets to enact this transition. With no ''true'' offshore wind projects built in the country to date, but a large pipeline of interest, this is an opportune moment to shape the future trajectory of offshore wind in Vietnam

Offshore wind is one of the fastest-growing energy sectors in the world, and is set to be a transformative force for the global energy transition. Its success has been driven by its rapid deployment in Europe, incredible cost reduction and consistent record of technological innovation. The same success will surely be replicated in Asia, with Vietnam set to lead offshore wind development in South East Asia

Offshore wind is an optimal technology which can supply clean energy, alleviate air pollution and deliver the most decarbonisation firepower as a displacement technology for fossil fuels. Its high capacity factors, particularly in a country with abundant offshore wind resource like Vietnam, make it a secure and scalable source of power. As a domestic source, offshore wind can increase energy security and improve balance of trade by avoiding dependency on fuel market fluctuations. Moreover, the industry can be a source of massive inward capital investment, job creation and industrial development.

It is in this context that the Global Wind Energy Council publishes its report and recommendations for Vietnam's future offshore wind procurement, and specifically a transition to competitive auctions in this decade. With less than 10 years to meet PDP8 targets for 2030, the time is now to begin consultation for offshore wind procurement.

Auctions can be an effective mechanism for procurement, driving cost reduction while providing a long-term horizon for planning. The keyword for Vietnam will be the ''transition''. This report offers a thorough review of the transition period to auctions in six different markets, and makes it clear:

Successful offshore wind markets begin with a stable supportive scheme, such as a Feed-in Tariff, and then shift to auctions by providing long-term visibility of the pipeline and consultation on guidelines.

Sections 1 and 2 provide an overview of six market transitions to offshore wind auctions, while a summary of lessons learned is in Section 3. Section 4 offers stakeholder analysis on the challenges for Vietnam to accelerate offshore wind deployment, followed by concrete recommendations for how the government can undertake an effective transition period and successful auction scheme in Section 5.

We hope this report and its findings will be helpful for the Government of Vietnam in this critical period of making offshore wind a pillar of the future energy mix. More broadly, we hope this report can be used by all countries interested in developing their offshore wind potential and planning their support schemes and procurement mechanisms for the future.

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Exhibits

Acronyms

ACT	Advanced conversion technologies
BoE	Bureau of Energy (Taiwan)
BSH	Bundesamt für Seeschifffahrt und Hydrographie / Federal Maritime and Hydrographic Agency (Germany)
CfD	Contract for Difference (UK)
CHP	Combined heat and power
CPPA	Corporate Power Purchase Agreement
CRE	Commission de Régulation de l'Energie / Energy Regulation Commission (France)
DEA	Danish Energy Agency
EEG	Erneuerbare-Energien-Gesetz / Renewable Energy Sources Act (Germany)
EIA	Environmental Impact Assessment
EMR	Electricity Market Reform
EPA	Environmental Protection Agency (Taiwan)
EUR	Euro
EVN	Vietnam Electricity
FIDER	Final Investment Decision Enabling for Renewables Scheme
FiT	Feed-in-Tariff
GBP	Great British Pound
GW	Gigawatts
GWEC	Global Wind Energy Council
HRA	Habitats Regulations Assessment
MoEA	Ministry of Economic Affairs (Taiwan)
MOIT	Ministry of Industry and Trade (Vietnam)
MW	Megawatt
MWh	Megawatt-hour
NSIP	Nationally significant infrastructure project
NTD	New Taiwan Dollar
Ofgem	Office of Gas and Electricity Markets (UK)
PINS	Planning Inspectorate (UK)
PPA	Power Purchase Agreement
PV	Photovoltaic
RO	Renewables Obligation (UK)
ROC	Renewables Obligation Certificate (UK)
RVO	Rijksdienst voor Ondernemend Nederland / Netherlands Enterprise Agency
RPS	Renewable Portfolio Standard
SDE	Subsidieregeling duurzame energieproductie / Stimulation of sustainable energy production (Netherlands)
TCE	The Crown Estate (UK)
TGC	Tradable green certificate (Denmark)
TSMC	Taiwan Semiconductor Manufacturing Company
UK	United Kingdom
USD	US Dollar

EXECUTIVE SUMMARY

Executive summary

Vietnam is a nascent offshore wind market, with world-class wind resource and strong fundamentals for growth which can make it an offshore wind leader in South East Asia. Under the current development pipeline, the first true large-scale offshore wind projects are not likely to be connected to the grid until 2026 or later, and they lack a clear regulatory framework to support their development.

A recent study (World Bank, 2021) predicts offshore wind could meet between 5-12% of the country's electricity supply needs by 2035, with 11-25 GW installed capacity. This is a fraction of the 160 GW of total technical potential identified by the Ministry of Industry and Trade (MOIT) in Vietnam.

The infancy of the offshore wind sector in Vietnam means that policy is still being formulated. Therefore, it is incredibly important to ensure that current and future policy is designed for steady and sustainable growth, providing sufficient time for the offshore wind industry to mature.

In this study, six active offshore wind markets were selected for review: the UK, Germany, Denmark, France, Taiwan, and the Netherlands. They were selected to provide diversity in geography, in approach and in the maturity of their offshore wind industries.

- The **UK** transitioned from its Renewables Obligation credit-based scheme to its Contract for Difference auctions in 2014, allowing a grace period and an initial auction stage focused on technical and competency criteria to maintain an active pipeline of projects.
- **Germany** held its first offshore wind auctions in 2017, having introduced a feed-in-tariff mechanism in 2000 for a wide array of renewable energy technologies. A transition period allowed projects due to be commissioned by 2021 to access the Feed-in-Tariff (FiT) scheme to maintain a smooth handover between the two schemes.
- **Denmark** was an early adopter of offshore wind auctions, introducing auctions in 2004 when the offshore wind industry was still in its infancy. This led to some delays and an initial lack of interest in some of the auctions, which it has since resolved with a much clearer consultation process.
- **France** is still an immature market for offshore wind, and it utilised competitive auctions from the outset. It still does not have a commercial-scale project in the water, 10 years after its first 'Round 1' auction. There

Best practices for offshore wind auctions

Best Practice	Example Geography	Lesson Learned
Open dialogue between administrator and developers	Denmark	Consultation between the administrator and potential developers, and flexible auction design, increases participation levels in auctions.
Separation of technologies	UK	Separation of technologies in auctions ensures fair competition for subsidy support.
Transparency and certainty of capacity targets and timelines	Netherlands	Transparency through publication of offshore wind policy roadmaps, as well as consistent delivery of timelines set out in roadmaps increases investor and developer certainty.
Avoid strict local content requirements	France	Strict and inflexible local content requirements lead to high strike prices and delays in project realisation; therefore, it is key to provide appropriate flexibility in these requirements, especially in the early stage of sector development.
Sizeable volume and early phase FiT to support the build up of supply chain	Taiwan	Creating a pipeline of offshore wind projects which has sufficient volume to create market competition and meet market needs is important in the development of early-stage markets.
Single window permitting	Denmark and UK	Depending on the approach to auctions for offshore wind, "single window permitting" (where one government organisation is responsible for obtaining or deciding upon different permits) can take different shapes; however, certainty and simplified procedures for developers help to streamline offshore wind procurements.

are several contributing factors to the delays, but one factor is the lack of a stable support mechanism to build the industry prior to the auction mechanism being introduced.

- In **Taiwan**, over 3.8 GW of projects secured access to the FiT scheme, prior to the competitive auction rounds for offshore wind. The first round was completed in 2018 and further rounds are expected in 2022 and 2024.

- The **Netherlands** introduced auctions in 2011, following an initial feed-in-premium scheme for offshore wind. Auctions in the Netherlands have generally been a success in large part due to the country's long-term strategic roadmap and track record of meeting auction target dates.

Following this review, the study highlights some best practices from these markets. These represent the aspects of offshore wind policy design that have proven to be either successful or restrictive in developing a sustainable offshore wind sector.

Recommendations

The results of the desk-based analysis and the stakeholder outreach exercise resulted in clear recommendations for Vietnam to realise its full potential for offshore wind and prevent any major barriers to this critical early stage for growth:

Timing and transition from the FiT

The first true offshore wind projects in Vietnam will not reach COD until 2026 or later. A new FiT for offshore wind should therefore be applied from now to support the initial stage of 4-5 GW of true offshore wind projects connecting to the grid, prior to an auction mechanism being implemented.

- The FIT should be communicated as soon as possible to ensure stability in the industry, avoid undermining projects currently in development and support the initial batch of projects which will not be completed until at least 5 years from now.

- The current offshore wind FiT (0.098 USD/kWh), which is due to expire by November 2021, is based on nearshore wind, so a FiT for true offshore wind may require an updated calculation due to differences in costs and market maturity for these technologies.

- The FiT will give confidence to investors to push ahead with project development, which will help to support local businesses and encourage them to learn and partner with experienced developers and supply chain companies.

- An earlier transition to auction would apply excessive pressure on these companies to upskill and deliver at low cost, without the resources and time to do so. Excessive pressure could lead to a failure to deliver the desired volume or schedule of offshore wind, supply chain fallout due to cost overruns or even early auctions resulting in prices higher than expected.

- An earlier transition to auction will also require at least one year for the government to prepare the auction regime and guidelines, which will delay the first batch of offshore wind projects and risk projects missing the targeted COD year.

In the interim period leading up to the expiration of the new FiT covering the initial 4-5 GW of projects, a transition arrangement from this new FiT to auction should be made clear and publicly communicated.

- The publication of guidelines for the auction program should begin while the offshore wind FiT is still in place, to provide developers with sufficient visibility of the regulatory framework that will apply to their projects. This will allow developers to have full visibility on a project's expected return and make informed decision about project investment and development. Authorities can consider different milestones which can be met to qualify for the FiT, such as receipt of the IRC or COD date.

- Sufficient notice of the transition to auctions is also required for planning the required grid availability for GW-scale offshore wind projects, to avoid the risk of curtailment which has impacted the solar PV and onshore wind sectors.

- It is clear from stakeholder interviews that clear communication of when the transition will occur is critical, and key actors within the industry and government should be given enough time to prepare for this. The type of transition implemented is a secondary priority.

Ahead of auctions being introduced, bankability of the current PPA should be improved to attract foreign investment. Although not drawn from the case studies in this report, PPA bankability will be crucial for development of offshore wind projects due to the large scale of investment required.

- Whilst smaller-scale onshore wind projects can be financed using local banks and investors comfortable with

the current template PPA, the large scale of offshore wind will require international finance. However, foreign investors are not confident to proceed under the current terms.

- The current PPA does not follow international standards, particularly around: grid delay and the commissioning risks incurred; curtailment and compensation mechanism; currency conversion risks; protection from change in law; forums for international dispute; and others.

- Given the risks of the current PPA, it is even more important to have a strong FiT regime and transparent regulatory environment. These elements will help to manage development and investment risks, where lower costs for international finance could help to further reduce prices. Providing time for the industry to scale and mitigate these risks under a FiT regime is therefore important; if the transition to auction happens too early, foreign investors will be deterred and local companies will not have enough time to develop their capabilities.

- An earlier transition to auction would apply A study of other markets combined with consultation with foreign and local investors, including commercial banks with experience in project finance, is recommended as a next step to finding ways to improve PPA bankability. For example, developers in Taiwan sign "side letters" with the offtaker Taipower to address and manage deficiencies in the standard PPA. There is not sufficient liquidity in the Vietnamese banking sector to finance all offshore wind projects in the country, so involvement of foreign banks is crucial.

As part of open dialogue, developers should be kept informed about any changes to auction design or support schemes under consideration, and invited to submit commentary.

Policy support and process

Enough time should be given to prepare the auction policy: A minimum of two years' notice should be provided to industry and key stakeholders of any significant change in approach.[1]

- An auction with clear timing and implementation guidelines would also enable EVN sufficient time to prepare the grid for increased levels of connections and incentivise projects where they are most needed in the electricity system.
- It is also necessary to allow time to consult with other key actors, including to understand high-level social and environmental implications of the policy design.

The Government of Vietnam should incorporate a systematic and open consultation process whilst designing the future offshore wind policy.

- As part of open dialogue, developers should be kept informed about any changes to auction design or support schemes under consideration, and invited to submit commentary.
- A lack of open dialogue and consultation increases the risk premium for investors and developers, which will decrease participation in auctions and the offshore wind market.
- Wider stakeholder consultation should include EVN, local and foreign investors, project developers, actors in the international and local supply chain and local impacted industry groups such as the fishing community, shipping and offshore oil and gas.

There should be complete transparency throughout the offshore wind policy development process, such as publication of targets, and draft rules and procedures for commentary.

- Policy decisions by the government should be announced publicly and communicated clearly to interested parties.
- Important planning data, such as the locations of environmentally sensitive areas and other restricted areas of the sea, should be made available by the government and stakeholders for those wishing to develop offshore wind farms.
- Equally, planned projects should provide project information to key stakeholders during consultation to keep them informed.

Auction design

When announced, the auction should have enough scale, e.g. 2-3 GW per allocation round, to accommodate

1. This early notice and succession plan draws from the successful offshore wind case studies from the UK and Taiwan in this report.

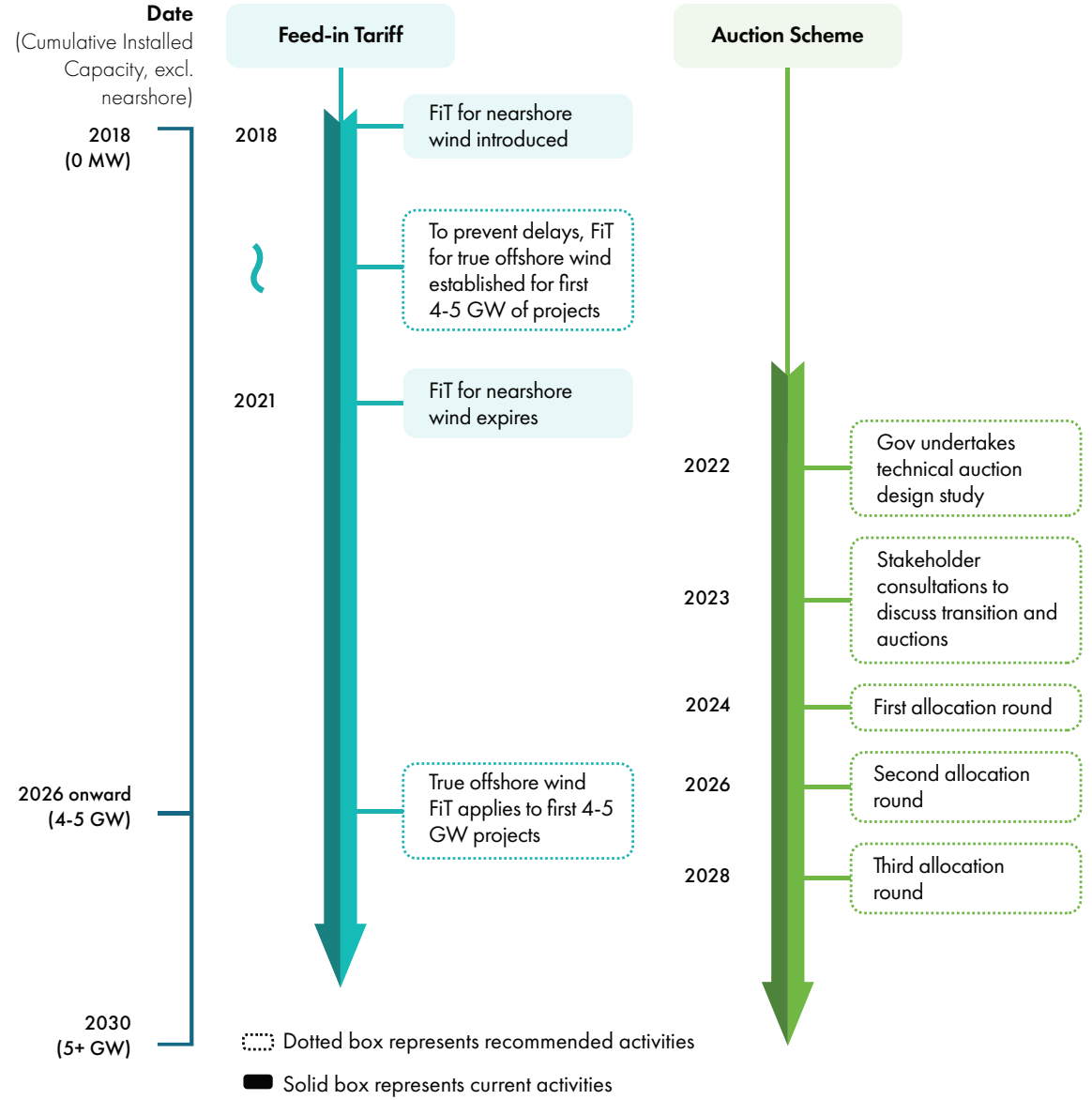
the strong interest in Vietnam's offshore wind sector.

- This will also promote competition if supply and demand can be balanced.
- Furthermore, a clear roadmap to future auction rounds (post-2030) should be published to demonstrate a longer-term ambition and the building of a sustainable industry, in line with PDP8 and Vietnam's goal to foster a ''green economy.''

Further study should be undertaken on one-stage versus two-stage auctions for Vietnam.

- Two-stage auctions are likely to provide more growth in a quicker period whilst leveraging the expertise of international developers to choose appropriate sites.
- The current process of awarding site survey licenses for offshore wind sites could be considered the first step in a two-stage auction process. However, the current practice of provinces awarding licenses for sites in close proximity can lead to unfeasible site areas. Wind blocking (or 'wake effects') should be considered before allocating offshore areas.
- One-stage auctions will require sufficient resources allocated within

Exhibit 1: Transition to auctions in Vietnam



the government to select appropriate sites. Education on the site selection process would also be required.

- Compensation arrangements or other suitable transitional arrangements for those projects that may be displaced by a one-stage system should be clearly laid out and consulted upon.

Auction design should differentiate between more and less mature types of technology.

- In particular, this should consider how offshore and nearshore auctions might interact and incorporate floating wind in the future.

- There will be varying levels of support required by different technologies of the same renewable energy source (wind), due to different stages of maturity in Vietnam.

An efficient and streamlined permitting process will be required for on-time delivery of projects. The government should prepare for offshore wind procurement with either a "single window" agency responsible for co-ordination permitting, or a clearer division of responsibilities for permitting among government bodies.

- While offshore wind projects are large in scale and require engagement with many government agencies and authorities, this coordination should be the responsibility of a high-level central office, such as one sitting under the Prime Minister's Office.

- This predictability is needed for the sector to deliver a pre-determined volume of power at the needed month/year, and support the country's energy security objectives.

INTRODUCTION

Introduction

Vietnam has enormous potential for developing offshore wind energy projects, due to its long coastline and favourable wind resources. A recent study (World Bank, 2021) predicts offshore wind could meet between 5-12% of the country's electricity supply needs by 2035, with 11-25 GW installed capacity.

By 2030, Vietnam could install 10 GW of offshore wind to meet its rapidly growing power demand (COWI for EREA and Danish Energy Agency, 2020), a fraction of the 160 GW of total technical potential identified by the Ministry of Industry and Trade (MOIT) in Vietnam.

Offshore wind policy in Vietnam is still being formulated, with most current development encompassing intertidal and nearshore projects.[2] In order to achieve the full potential of offshore wind deployment in Vietnam, stable and robust policies will be required.[3]

The current offshore wind support mechanism includes fixed feed-in tariffs (FiTs) which have kickstarted the industry and attracted initial investment. The current 20-year FiT for offshore wind (particularly nearshore wind), at 0.098 USD/kWh, was originally introduced in September 2018 and is due to expire for projects entering commercial operations after 31 October 2021.

Although no "true" offshore wind projects, i.e. projects in deeper waters which are not classed as nearshore, will be built for several years, the Government of Vietnam is assessing a possible transition of offshore wind energy procurement to an auction scheme following the end of the current FiT system.

The first offshore projects will not enter commercial operations in Vietnam until 2026 or later. In the meantime, as of Q2 2021 it remains unclear whether an extension of the current FiT will be granted to projects commissioned beyond October 2021.

Lessons from the offshore wind sector to date

Still, with auctions growing as a popular procurement mechanism for clean energy around the world, this report looks ahead to the future transition process for offshore wind auctions in Vietnam. It undertakes a review of current offshore wind procurement models and their historical development in six geographies: the UK, Germany, Denmark, France, the Netherlands, and Taiwan. These represent mature and early-stage offshore wind markets with some of the most ambitious deployment targets for offshore wind globally. It is worth noting that this group represents developed economies, where resources, financing conditions and institutional capabilities may diverge from those available in Vietnam.

All six of these geographies have always used or have transitioned to auction mechanisms for offshore wind procurement. Despite having this in common, these markets have taken different approaches to the transition as well as the auction mechanisms themselves, with varying degrees of success.

Through review of international transitions to auctions, current auction processes, and the effectiveness of auction design across different markets in Europe and Asia, lessons can be learned which will aid the auction development process in Vietnam – as well as other geographies.

This report therefore presents the best practices in offshore wind policy design, drawn from international experience, which have helped to produce a successful market for offshore wind. The six case studies illuminate lessons learned on auction design, the use of auctions in achieving capacity targets, industrial development, supply chain and local content requirements, and the permitting process.

Finally, this report outlines recommendations for Vietnam's future transition to offshore wind auctions, based on the analysis of the experiences of other countries and Vietnam's current market conditions, as well as targeted outreach of stakeholders across government, industry, fishing (as an industry impacted by offshore wind growth), and investment communities. The recommendations aim to ensure long-term growth and sustainability of the sector beyond the current policy period.

2. According to the final draft of Power Development Plan (PDP8) sent to the Prime Minister's Office for approval in Q2 2021, intertidal and nearshore projects are defined as those located in less than 20m water depth. "True" offshore wind projects are located in water depth of at least 20m.
3. According to the PDP8 final draft, Vietnam plans to have at least 9,000 MW installed capacity by 2035.

REVIEW OF AUCTION DESIGN

Review of auction design

Introduction

This chapter presents qualitative analysis of offshore wind auction design in the UK, Germany, Denmark, France, the Netherlands, and Taiwan. For each geography, an overview of the transition from the previous procurement system to an auction is provided. The chapter outlines the current framework for offshore wind auction design and includes a discussion of the efficiency and success of the framework.

Types of auction

There is no one-size-fits-all auction scheme for renewable energy or offshore wind; the optimal tender design differs on a case-by-case basis, depending on the context and goals of the country. This has resulted in various examples of auction design, as governments have developed auctions believed to be most suitable to their market.

One of the most fundamental auction design decisions is whether **site selection** is centralised (one-stage auction) or de-centralised (two-stage auction), as shown in Exhibit 2.[4]

Determining **the price of offtake** is also a key element of auction design. The price-finding mechanism can be static or dynamic. In a static auction, bids are submitted simultaneously and remain undisclosed to other bidders during the process (but winning bids are typically published following the auction). In dynamic auctions, offtake price is determined through an iterative process, similar to an online auction. In either case, the payment received can be pay-as-bid, where each winning bidder receives the price offered, or uniform, where all bidders receive the price set by the highest accepted bid.

Other key auction design decisions include, but are not limited to, **pre-qualification criteria, penalties,** and whether the auction is **technology neutral or specific.**

All these aspects are described in more detail in the case studies on six geographies in the following sections. The focus in these sections is primarily on auctions with offtake included (either solely or when combined with concessions). Concession auctions on their own are not the focus of this study, since the key objective is to draw insights for Vietnam's future transition process from a FiT mechanism to auctions for offtake.

Exhibit 2: One-stage and two-stage auctions

One-stage auctions
The centralised or "one-stage" approach is where public authorities select wind farm sites and provide information to developers prior to the auction, at which both seabed lease ("concession") and offtake are awarded. **Denmark** is an example of a country that utilises one-stage auctions.

Site exclusivity and offtake secured in one auction process

Two-stage auctions
The decentralised approach or "two-stage" approach involves developers obtaining the rights to develop a site separately to the auction process for offtake agreements. **The UK** is an example of a country that utilises two-stage auctions with a concession auction, followed by an offtake auction. This approach involves higher developer risk: with site exclusivity secured, projects must undertake development activities in order to compete for an offtake, but have no guarantee of securing this.

Site exclusivity secured – through auction or other means

Offtake secured in an auction

4. Exhibit 2 in this report provides greater detail on the permitting and consenting process under the one-stage auction in Denmark and two-stage auction in the UK.

UK

Background
The UK is currently the global leader in installed offshore wind capacity, with over 10.2 GW in operational projects. The UK has been active in offshore wind since 2000, when Blyth, a 4 MW project and the country's first offshore wind farm, went into operation.

The UK favours a decentralised approach to leasing, permitting, bidding, and grid connection for offshore wind farms. Offshore wind developers have some flexibility regarding site selection but are required to obtain all permits themselves to obtain development consent from the government.[5] There remains a competitive bidding process, subject to pre-qualification, that provides winning bidders with government financial support to operate the offshore wind farm.

The bidding process for funding currently in place is the Contract for Difference (CfD) scheme, an auction process whereby qualifying electricity generation projects compete for a predetermined amount of funding with a capacity cap.

CfDs reduce price uncertainty by providing a fixed awarded price over a 15-year period, with generators being paid the difference between this awarded price and the wholesale price of electricity. Should the wholesale price fall above the awarded price, the generator must pay the difference to the UK government.[6] The Government does not act as the offtaker; the developer remains responsible to sell the power generated on the market or via bilateral/corporate PPA.

Transition to auction
The support mechanism for offshore wind in the UK has changed significantly over time. Initially capital grants were available for qualifying projects up to a value of £10 million, which helped to kick-start the offshore wind industry. The most fundamental change was in 2014 when the previous support mechanism, the Renewables Obligation (RO) scheme, began to be phased out in favour of the CfD scheme.

The RO was introduced in 2002 in England, Wales, and Scotland, and 2005 in Northern Ireland (Ofgem, 2021). The scheme placed an obligation on electricity suppliers to source a defined percentage of their supply from renewable sources. A large variety of technologies were supported under the RO scheme, including onshore wind, offshore wind, solar PV, hydropower, landfill gas, and

5. Exhibit 32 in this report provides greater detail on the permitting and consenting process under the two-stage auction in the UK.
6. Graphic illustrations of the CfD mechanism are provided in a UK Government white paper: Department of Energy & Climate Change, 2011. Planning our electric future: a White Paper for secure, affordable and low-carbon electricity, s.l.: s.n.

geothermal. Accredited renewable energy generators were awarded a number of Renewable Obligation Certificates (ROCs) for the electricity they generated, which could then be traded to electricity suppliers on an open market.

The RO closed for new generation in March 2017 (Ofgem, 2021) as the UK transitioned into the CfD framework, a competitive auction scheme. This transition happened as part of the UK's Electricity Market Reform (EMR), which was introduced to ensure the security, affordability and to reduce the carbon emissions of future electricity supply (Department of Energy & Climate Change, 2011).

An incremental transition to auctions

There was a transition period and overlap between the RO and the CfD schemes. The 2017 closure to new RO generation was announced six years prior in 2011 to enable a transition period, with the new CfD scheme coming into effect in 2014. A 12-month grace period was given to generators allowing them to obtain accreditation for the RO scheme after the 2017 closure date. A grace period of 18 months was given to Scottish floating and demo sites. Consultations were held with key stakeholders to ensure a smooth transition process between the two mechanisms.

Exhibit 3: UK cumulative capacity and awarded price

Source: GWEC Market Intelligence; RCG Analysis

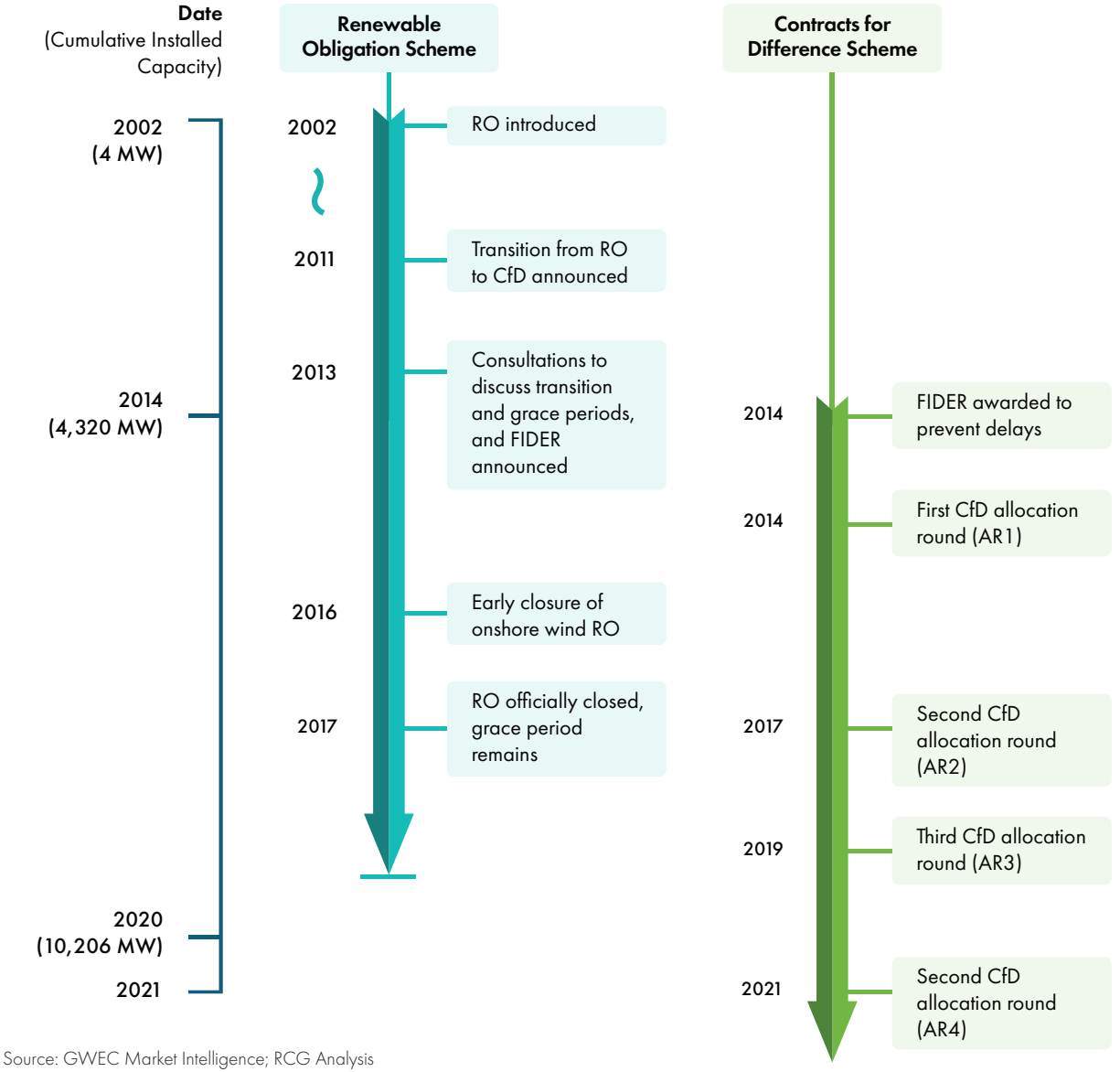
In 2013, as part of the transition, the government announced the Final Investment Decision Enabling for Renewables scheme (FIDER). FIDER awarded five offshore wind projects, totalling 3.2 GW of capacity, with contracts in place prior to the full launch of the CfD scheme. These contracts were awarded to prevent a delay in offshore wind investment.

Instead of bid price, projects that were awarded under the FIDER scheme were judged on their deliverability, benefit to local supply chain, and financial plans.

The administratively set prices for the FIDER scheme averaged 170 GBP/MWh (~235 USD/MWh[7]), while the winning awarded prices for offshore wind projects in the CfD Allocation Round 1 (AR1) in 2015 were 31% lower, averaging 117 GBP/MWh (~160 USD/MWh). In part this reduction was due to the competitive nature of AR1, meaning that companies bid aggressively to win contracts in contrast to the FIDER prices which were set by the government. Other contributing factors to this cost reduction, and that seen between later auction rounds, include maturing of the industry and supply chain in the UK, risk reduction due to establishment of a robust route to market, and technological advancements such as the use of larger turbines. Exhibit 3 shows how the awarded prices have rapidly declined as more installed capacity has been deployed in the UK.

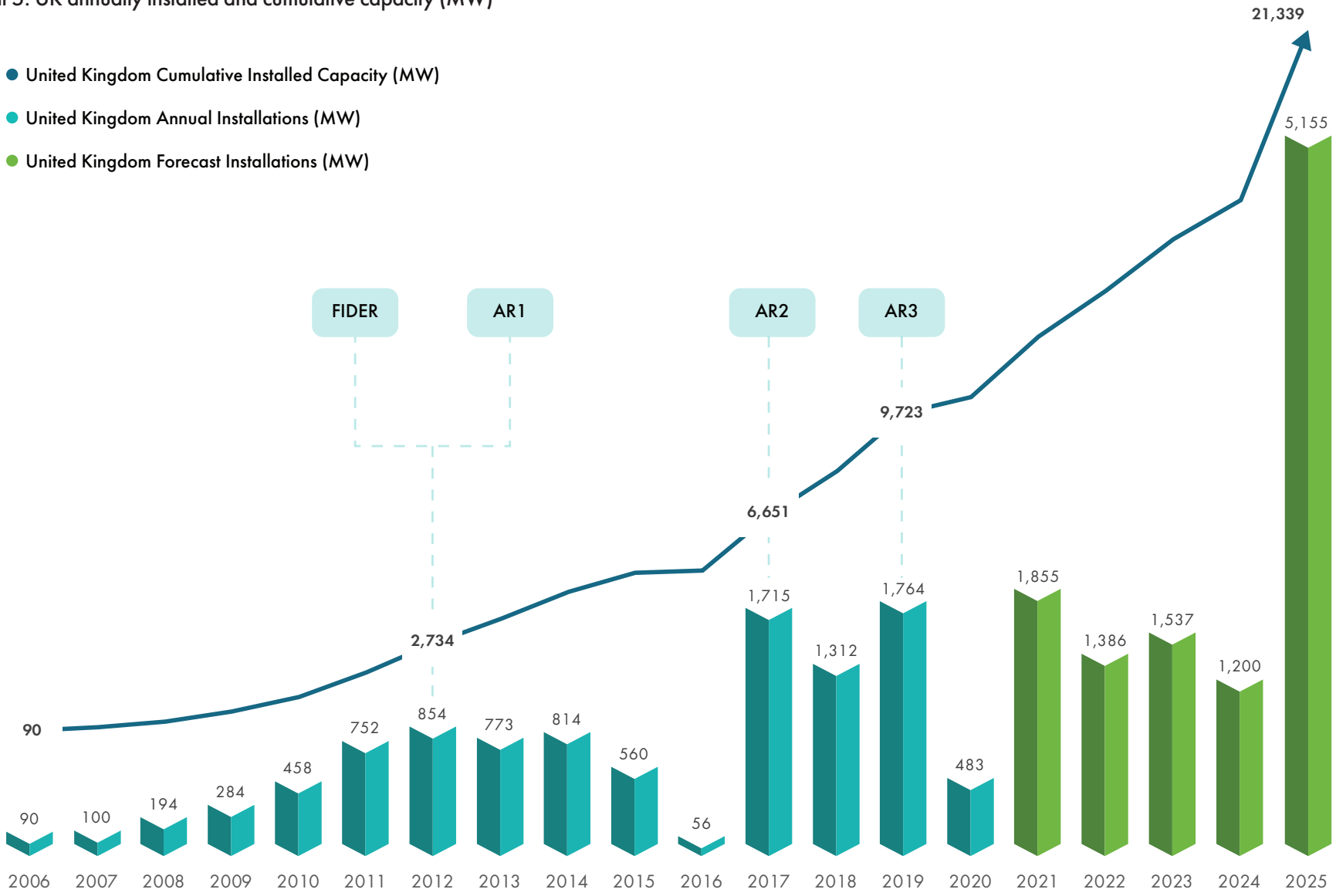
7. Figures for all UK auctions in this section are in 2012 prices as this is a requirement of the CfD scheme; USD conversions are based on 2021 exchange rates.

Exhibit 4: UK transition to auction timeline



Source: GWEC Market Intelligence; RCG Analysis

Exhibit 5: UK annually installed and cumulative capacity (MW)



Source: GWEC Market Intelligence; RCG Analysis

Current auction framework

The UK CfD scheme has now successfully run for three "allocation rounds". Each allocation round is a competitive process whereby qualifying electricity generation projects compete for an allocated pot of funding. A capacity cap is also in place which has become increasingly important for offshore wind in recent years, primarily due to cost reductions which have occurred since the introduction of the CfD scheme.

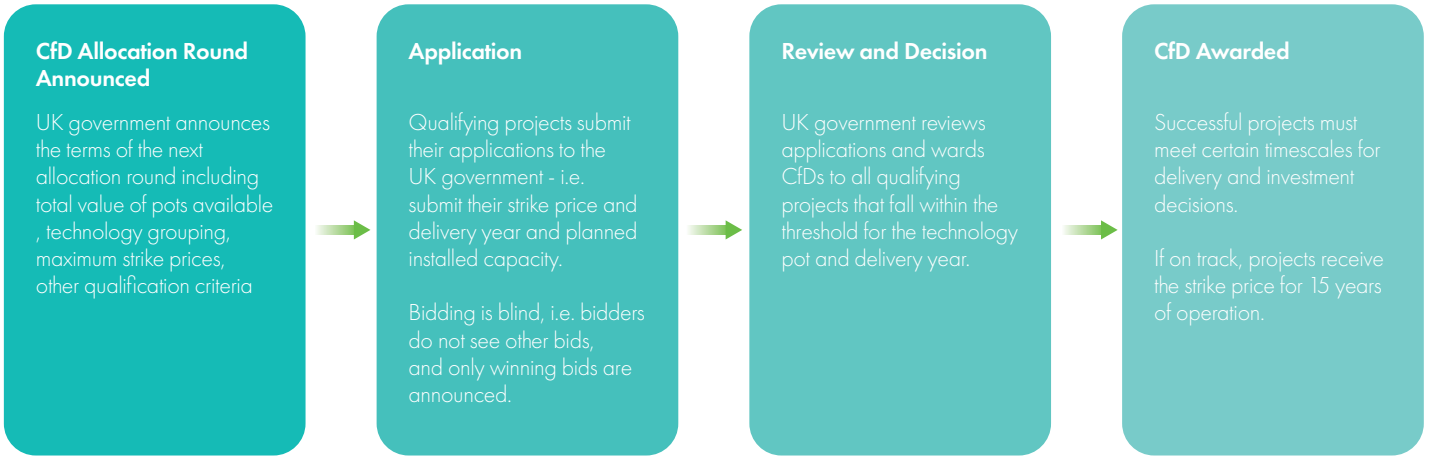
Alongside offshore wind, qualifying renewable generation for the CfD scheme has historically included onshore wind, solar PV, geothermal, wave, hydro, and tidal stream. Other renewable energy sources have also qualified, along with alternative forms of low-carbon generation such as landfill and sewage gas.

The UK Offshore Wind Sector Deal (Government of the United Kingdom, 2020), a landmark development agreement between government and industry in 2019, outlined that allocation rounds will be held every two years. Potential bidders have typically been given 6 months between formal notice of the upcoming auction to the conclusion of the auction. The funding is distributed to the successful projects through a CfD which provides the generator with a fixed awarded price for their electricity for 15 years. The process is run competitively on

Exhibit 6: UK auction overview

Auction / Tender	PPA / Offtake	Seabed rights	Construction permit	Grid connection	Multiple projects	Sequential tenders	Evaluation criteria	PPA type
FIDER	✓	✗	✗	✗	✓	✓	Project deliverability (timeline and feasibility) Benefit to local supply chain and workforce Financial plans	Sliding premium tariff[8]
AR1	✓	✗	✗	✗	✓	✓	Bid price	Sliding premium tariff
AR2	✓	✗	✗	✗	✓	✓	Bid price	Sliding premium tariff
AR3	✓	✗	✗	✗	✓	✓	Bid price	Sliding premium tariff

Exhibit 7: Flowchart depicting the bidding process and support mechanism in the UK



Source: RCG Analysis

8. In a sliding premium tariff model, the exact level of subsidy that the government is required to pay depends on the price of the wholesale market, i.e. the successful bidders receive a set price per unit and the government pays the difference between this price and the wholesale market price as a subsidy.

bid price, with the projects bidding the lowest price being awarded CfDs.[9]

Analysis

Delivering volume and cost reduction

The RO was a successful support mechanism in the UK which by the end of 2019 had enabled the delivery of 5.5 GW of offshore wind. However, as the offshore wind market in the UK matured, competitive auctions were seen as a better option to enable price reductions for consumers. Since the introduction of the CfD, 13 GW of offshore wind has been awarded funding across FIDER and three allocation rounds.

The CfD and FIDER schemes have also helped drive a cost reduction in offshore wind in the UK: the average price awarded to OSW projects in the FIDER in 2014 was 170 GBP/MWh (~234 USD/MWh) compared to 41 GBP/MWh (~55 USD/MWh) in AR3 in 2019. This is a 76% reduction in cost reduction and reveals that the financial support level, set by the government, was high in the UK during early-stage market development before being subject to reduction through competitive auctions once the market was sufficiently established. As previously mentioned, competition alone did not drive cost reduction, establishment of the supply chain, a robust route to market, and technological advancements were also instrumental in this.

Creating a steady pipeline to support industrial development

The grace period and implementation of FIDER were successful in ensuring there were minimal gaps in installation of offshore wind projects in the proceeding years. Ensuring a steady pipeline of projects also supported the creation of a domestic supply chain. The FIDER secured a route to market for 3.2 GW of offshore wind capacity and created a path of stability for the industry during the transition from RO to CfD.

However, an independent evaluation (Grant Thornton; Poyry, 2015) found that actual execution of this transition could have been improved through greater transparency to the market regarding the evaluation of projects as part of the **FIDER process**.[10] Whilst it is also believed that the process delivered projects at greater value than the original RO, there are some differing opinions as to whether it delivered optimal value to the consumer. The administratively set bid price for FIDER was artificially high, evidenced by the 31% reduction in price in AR1 only a year later. While FIDER ensured the continuation of the industry in the UK during the regime transition, it may have had a short-term adverse effect on rate payers. The cost of supporting this transition is passed on to consumers through the Supplier Obligation (a levy on electricity suppliers).

The decentralised approach to offshore wind development in the UK has generally been successful, however inefficiencies have started to appear in the mechanism. Notably, The Crown Estate (TCE) Round 4 seabed leasing auctions which were held recently led to very high winning auction prices, which could expose developers to financial risk should the projects not be developed. These prices also bring into question whether the consumer will ultimately pay the price. The high auction prices for seabed were in large part due to excessive demand and limited supply of seabed areas in the Round 4 leasing round.

9. CfDs are awarded on a uniform basis, with projects bidding for offtake with the same delivery date awarded the same price, depending on the highest of the accepted bids. The highest accepted bid is calculated based on the total amount of funding available in that allocation round, and the capacity of projects competing in the same technology group or pot.
10. Applicants found that whilst the type of information required to satisfy the evaluation criteria was clear, there was uncertainty over the level of detail required. In hindsight, this could have been addressed by specifying defined parameters and evidence requirements to reduce the risk of subjectivity. These parameters should be communicated to participants and evaluators clearly.

Photo Credit: Orsted

Germany

Background

Germany currently has the second-most installed offshore wind capacity in Europe, behind only the UK. It has a total operational capacity of over 7.7 GW. The country has been active in offshore wind since 2010, when it commissioned its first offshore wind farm Alpha Ventus, a 30 MW North Sea project comprising six turbines.

Germany has adopted a hybrid approach to site leasing, permitting, and the bidding process, with a combination of aspects from centralised and decentralised models being used. The country has adapted its approach over time moving towards a more centralised approach as the offshore wind market has matured.

The current model sees the government identify project sites and carry out high-level site investigation work. This data is then provided to developers interested in participating in the competitive auction process. The winning developer is responsible for carrying out an environmental impact assessment (EIA) and obtaining permits for the site, such as exclusive seabed rights and a construction permit.

Transition to auction

Historically in Germany offshore wind has been supported by traditional FiT mechanisms as outlined in the Renewable Energy Sources Act, known as the EEG. Under the FiT, renewable electricity generators would receive a predetermined rate of return over a 20-year period, decreasing each year, most of the years.

As part of a reform to the EEG, a transition began in 2017 from the FiT system to a more centralised competitive auction system, which is due to come into full effect in 2021. The intention to transition to auction was first formalised in an amendment to the EEG in 2014, although no specific targets or dates were set until a further amendment to the EEG and the introduction of the Offshore Wind Energy Act (WindSeeG 2017) was passed by the parliament in Germany in 2016.

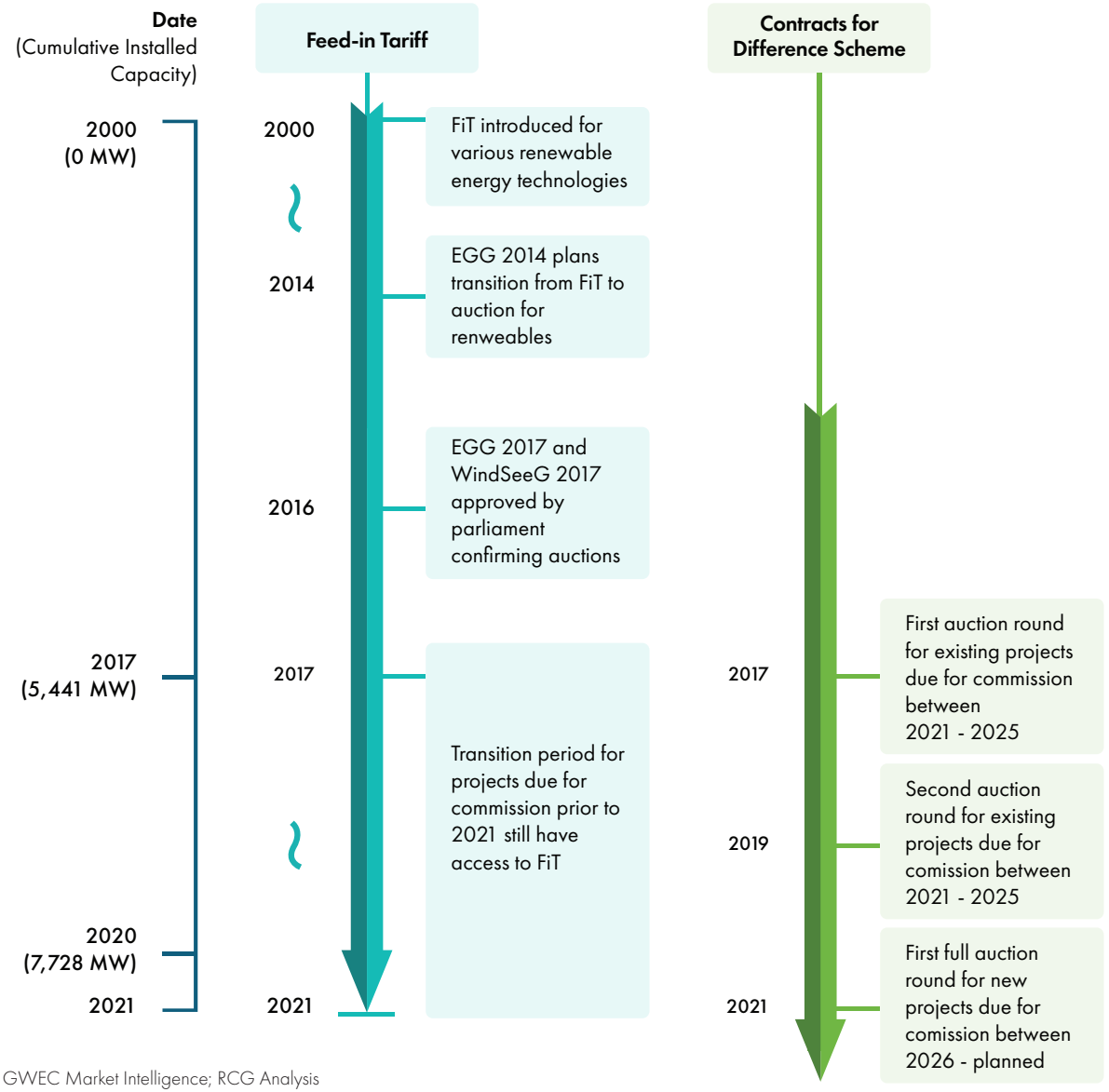
To help smooth the transition and give existing projects access to funding prior to the full auction scheme in 2021, projects due to be commissioned between 2017 and 2021 still had access to the FiT.

The FiT price varied over time and had different rules depending on the commercial operation date of the offshore wind farm, however the prices available were between 154 EUR/MWh to 194 EUR/MWh, generally decreasing after the first 8 years of operation and

including project-specific rules and indexes.[11]

In addition, transitional competitive auctions were held for existing projects that had secured certain permits or were advanced enough in the permitting process in 2017 and 2018; these auctions were specifically for projects due to be commissioned between 2021 and 2025. From 2021, annual auctions will be held for new government-defined projects which are due to be commissioned from 2026 onwards.

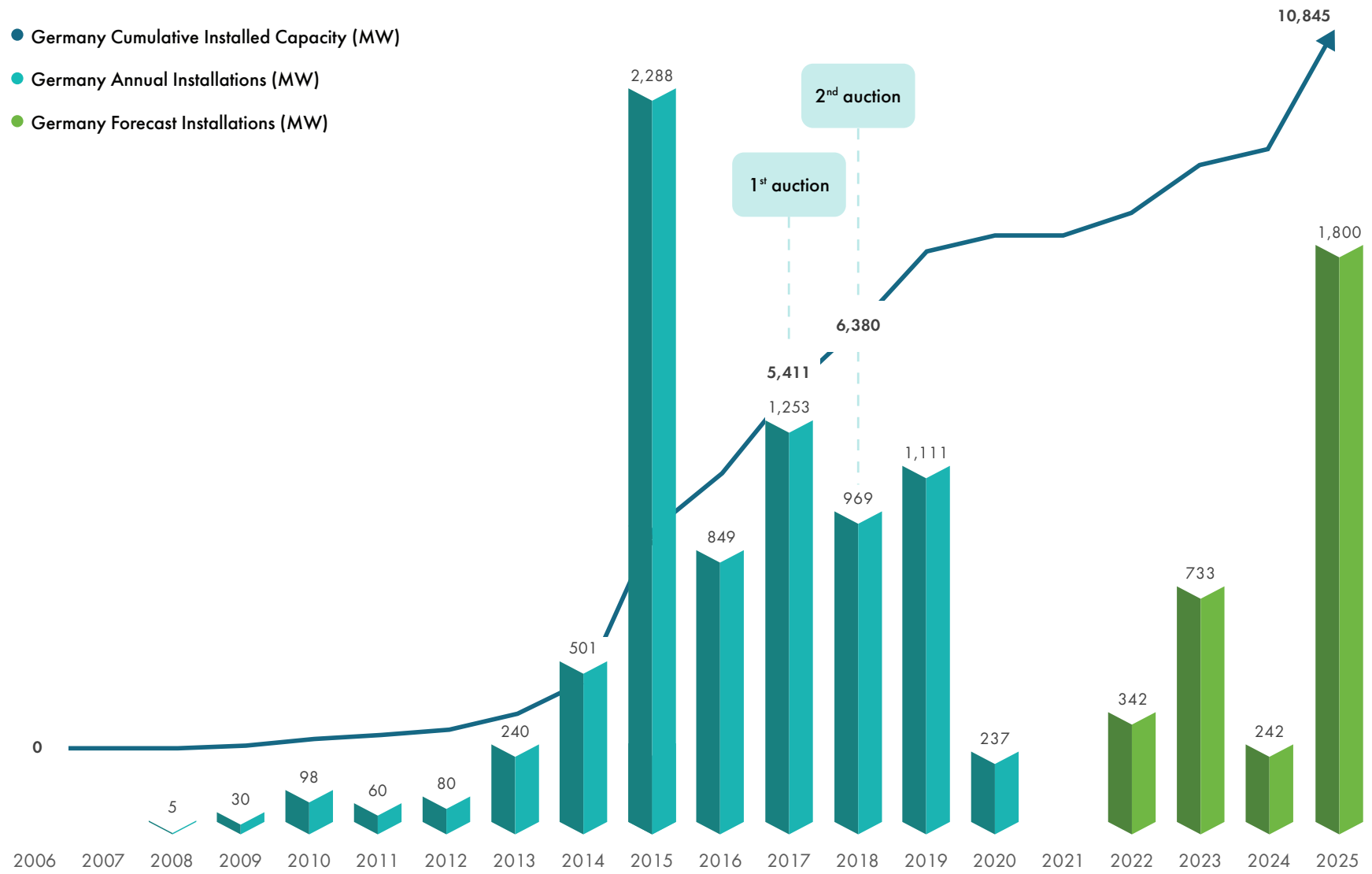
Exhibit 8: Germany transition to auction timeline



Source: GWEC Market Intelligence; RCG Analysis

11. Germany is the only country to modify the available tariff using calculations according to the distance from shore and water depth of the installed turbines, as well as incentivising early connection through a so-called 'Sprinter Bonus' which added a set amount to the tariff available if a project connected before a certain date.

Exhibit 9: Germany annually installed and cumulative capacity (MW)



Source: GWEC Market Intelligence; RCG Analysis

Current auction framework

In the current auction system, the *Bundesamt für Seeschifffahrt und Hydrographie* (Federal Maritime and Hydrographic Agency, known as BSH) nominates a specific site or sites that are to be the subject of the competitive auctions held from 2021 onwards and developers compete for the rights to develop that site.

The auction is on a cost basis with developers submitting their lowest price per MWh for the electricity generated by the offshore wind farm at the nominated site. The bidder with the lowest price for each site is awarded the rights. The subsidy is operated using a sliding market premium payable by the grid operator, representing the difference between wholesale electricity prices and the price submitted by the winning bidder as a subsidy. This is paid for a period of 20 years from the first generation of power by each wind turbine.

The price per MWh awarded under the subsidy regime does not operate as a ceiling price and therefore developers are able to capitalise on any instances where the wholesale electricity price exceeds the price they have been awarded through competitive auction (i.e. the subsidy regime is not based on a CfD model).

Exhibit 10: German auction design

Auction / Tender	PPA / Offtake	Seabed rights	Construction permit	Grid connection	Multiple projects	Sequential tenders	Evaluation criteria	PPA type
Hohe See/Albatros	✓	✗	✗	✓	✓	✗	Bid price	Fixed-price tariff
1st offshore auction	✓	✗	✗	✓	✓	✗	Bid price	Sliding premium tariff
2nd offshore auction	✓	✗	✗	✓	✓	✗	Bid price	Sliding premium tariff

Exhibit 11: Flowchart depicting the bidding process and support mechanism in Germany

Source: RCG Analysis

The 2017 and 2018 competitive auctions in Germany resulted in zero-subsidy bids (or 'zero-cent'), with developers winning the rights to develop projects without any government support.[12]

Analysis

The previous FiT model in Germany, in operation between 2000 and 2017, was successful in building out significant capacity of offshore wind. The transition to the competitive auction mechanism for offshore wind is still ongoing, with the first full auction for new projects scheduled for 2021.

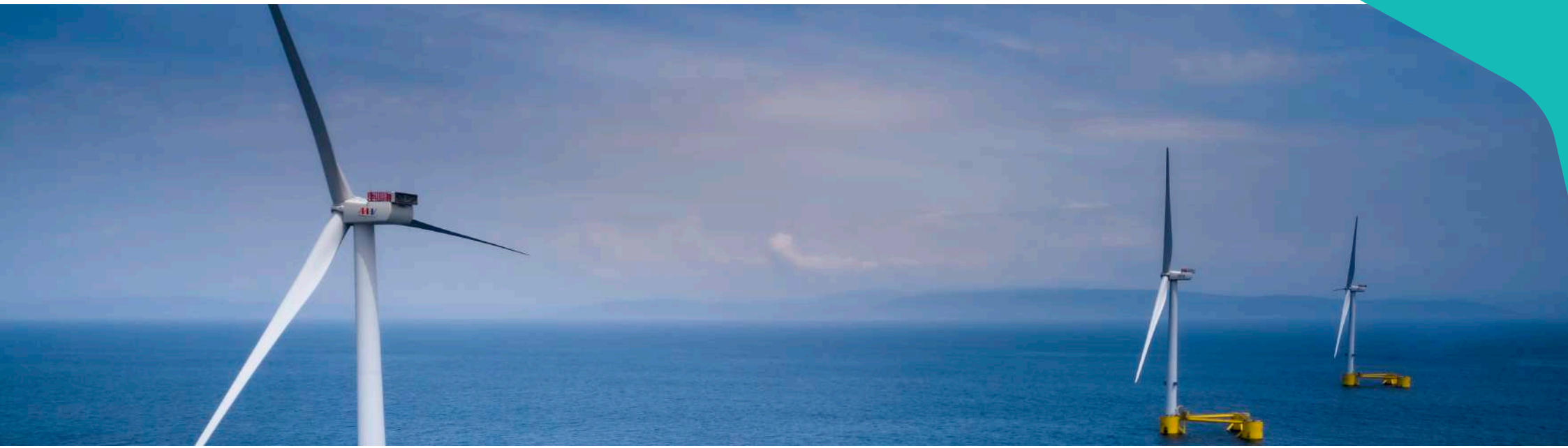
The primary change would see a second, dynamic bid procedure in the case of several zero-cent bids at one auction. During this procedure bidders may express their willingness to pay a so-called ''offshore grid expansion fee'' to cover part of the grid operators' offshore grid expansion costs.[13] This approach has been highly criticised by industry representatives who believe it creates additional risks for bidders and impedes cost efficiency. A CfD model, as seen in the UK, is therefore preferred by industry.

Another key part of the transition has been how to deal with existing development projects prior to implementing centralised auctions – a situation which Vietnam will also face, given the 36 GW of ''true'' offshore wind registered for investment as of December 2020.[14] In Germany's case, there has not been a single perfect solution, with those projects unsuccessful in the transitional auctions now evaluating whether to exercise a 'right of legal entry' in future auctions where government-selected projects overlap with their planned projects. Without an agreed compensation scheme, this may undermine trust in the auction process.

The transition to the competitive auction mechanism for offshore wind is still ongoing, with the first full auction for new projects scheduled for 2021.

The zero subsidy results of the auctions in 2017 and 2018 for pre-existing projects resulted in a large amount of industry discussion. The German government does not see zero-cent bids as appropriate for all future offshore wind projects and is therefore proposing changes in its pending version of the German Offshore Wind Act.

12. Developers winning with zero-subsidy bids sell electricity into the wholesale electricity market and request no form of support from the government. Zero-subsidy bids have been enabled by several risk-reducing factors including the TSO building transmission assets, the government undertaking initial development work, the potential to negotiate CPPAs and a stable and liberalised wholesale electricity market with prices high enough to support offshore wind projects. While Vietnam is moving towards a retail electricity market before the middle of the decade by Prime Minister's decree, the zero-bid concept may be less relevant for the country as development and investment risks are relatively higher.
13. The TSO in Germany is responsible for financing, constructing and operating offshore transmission infrastructure.
14. According to the MOIT reports attached to the February 2021 draft of PDP8.



Denmark

Background
Denmark is an established offshore wind market, with 1.7 GW of capacity in operation. Denmark has been active in offshore wind since 1991, when Vindeby, a 5 MW project and the world's first offshore wind farm, went into operation.

The Danish government predominantly uses a centralised process for offshore wind site leasing, permitting, and bidding. The government controls the entire process until handing over a 'packaged' offshore wind project to an offshore wind developer via a competitive auction. There is also the opportunity for offshore wind developers to use an 'open-door' approach, whereby offshore wind developers may select their own sites and apply for a licence to carry out preliminary investigations.

Transition to auction
Denmark became the world's first offshore wind market in 1991. The support mechanism for offshore wind has changed significantly in the years that have followed. The most fundamental changes occurred in 1999, when the FiT was replaced by a renewable portfolio standard (RPS), and in 2004, when Denmark pioneered an auction process for offshore wind.

In 1979, the Danish government enacted a renewable energy programme that included capital grants of up to 30% of the project installation cost. Whilst this scheme was available to all renewable energy technologies, onshore wind was the main beneficiary. This support was progressively reduced to 20%, then 10%, and finally withdrawn completely in 1989. Subsequently, utilities were required to interconnect and purchase power from wind projects at a ''fair price''.

Introduction and phaseout of the FiT
In 1993, a fixed FiT was introduced, requiring local utilities to purchase wind energy from independent generators at a rate of 85% of their production and distribution costs. In addition, wind projects received refunds from the Danish carbon tax and partial refund on the energy tax.

In 1999, it was announced that the FiT would be phased out in favour of an RPS mechanism with a system of tradable green certificates (TGCs). The TGC market required electricity customers to purchase 20% of their electricity from qualifying renewable resources. Accredited renewable energy generators were awarded certificates for the electricity they generated, which could then be traded to electricity suppliers on an open market. The market did not open until 2003 and a transitional programme,

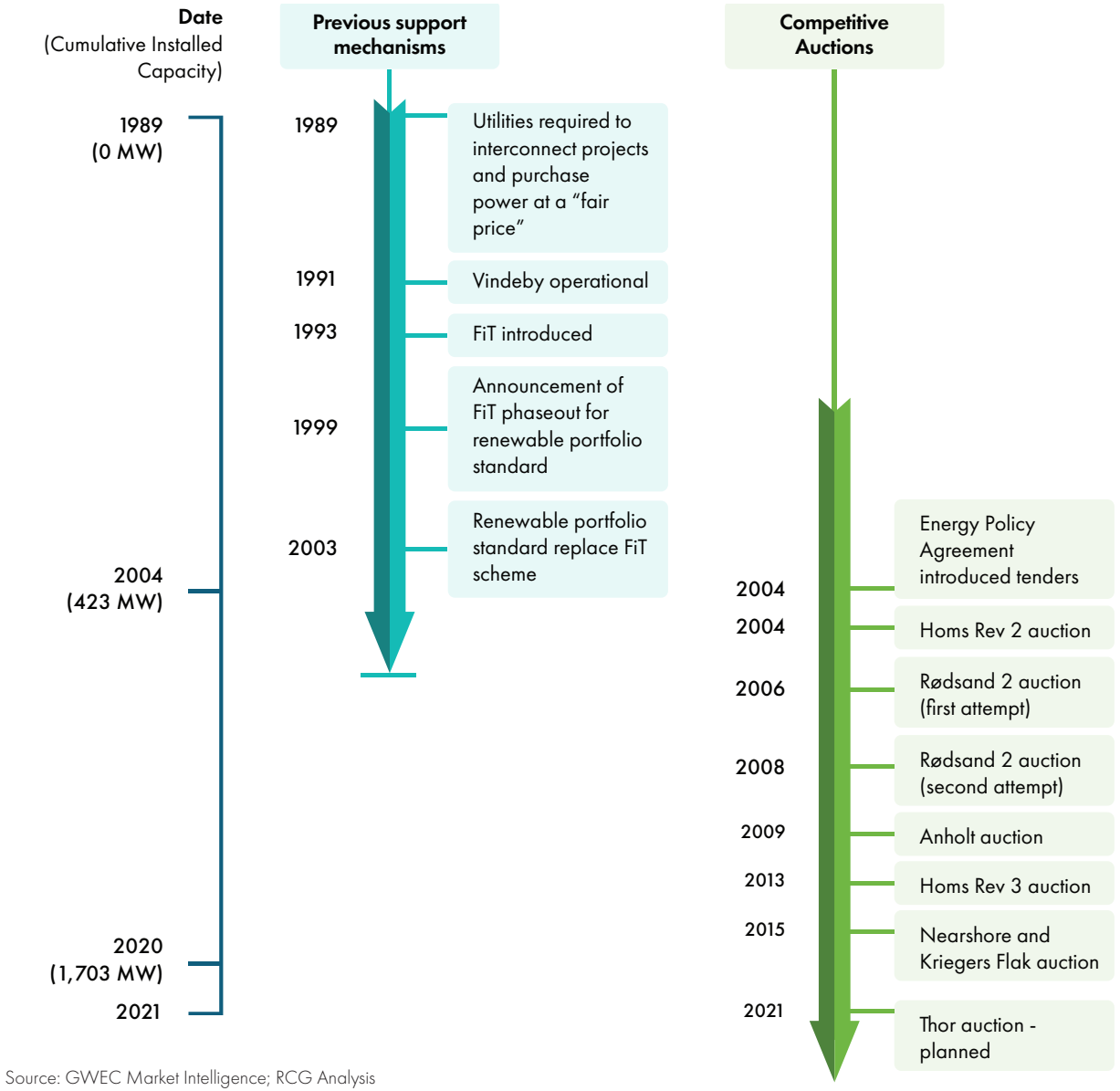
which gradually reduced FiT support, began in 2001.

Gaining experience ahead of auctions

Prior to the introduction of offshore wind auctions in 2004, two offshore wind farms of around 160 MW (Horns Rev I and Rødsand I) were already in operation while other, smaller wind farms (totalling less than 150 MW) had been built after being allocated non-competitively. Horns Rev I and Rødsand I were built by vertically integrated utilities Elsam and Energi E2 (both acquired by Ørsted in 2005) after a government order in 1997. The objective was to gain experience and knowledge in large-scale offshore wind power, financing projects and their impact on the natural environment.

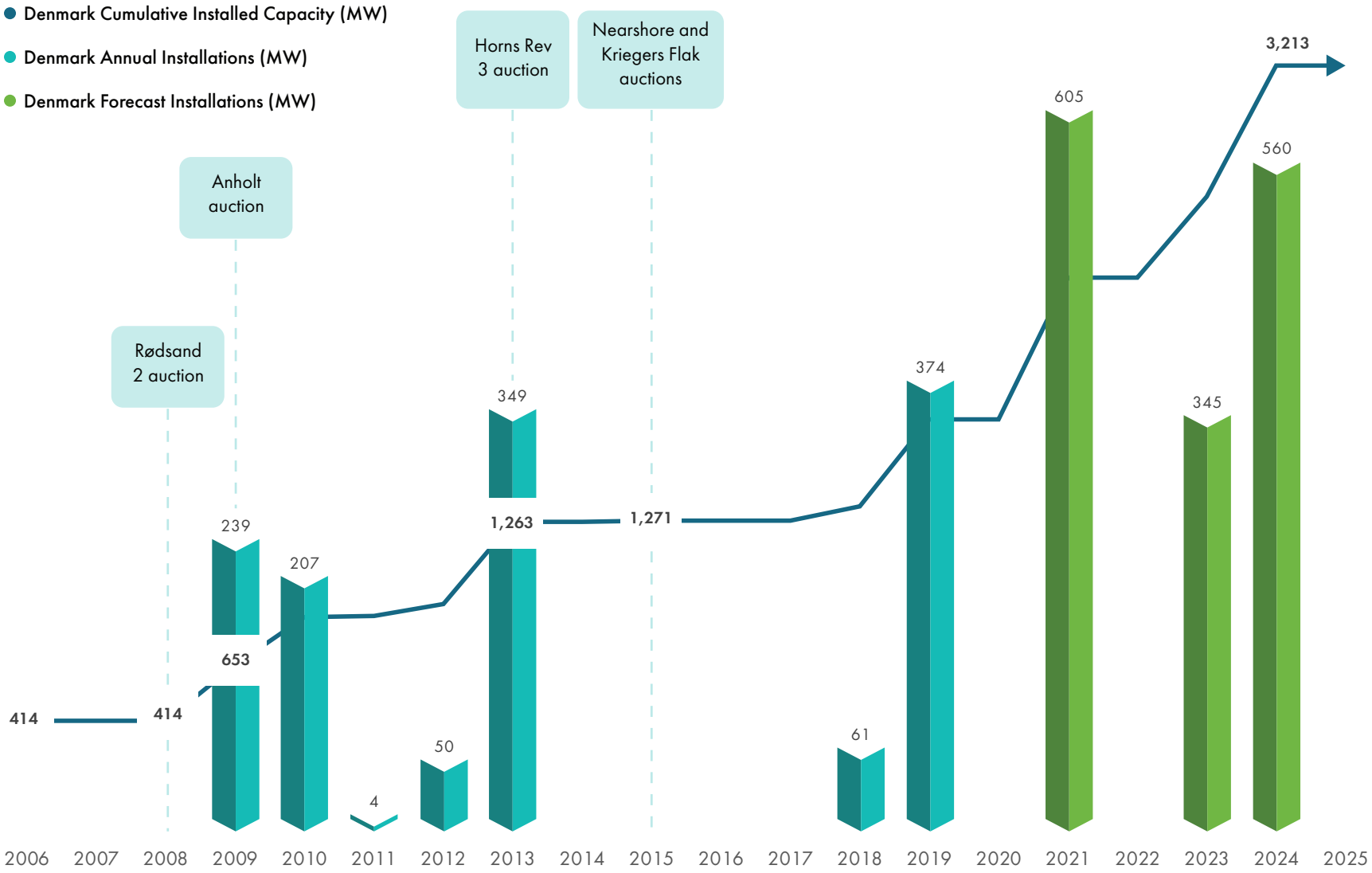
The transition to auctions occurred in 2004, with Horns Rev 2 being the first offshore wind farm allocated by a competitive process. The offshore wind farms Rødsand II, Horns Rev II, and Anholt were established by tenders, resulting from the Energy Policy Agreement of 2004 and 2008, respectively. Since 2004, auctions have been used to allocate projects to developers.

Exhibit 12: Denmark transition to auction timeline



Source: GWEC Market Intelligence; RCG Analysis

Exhibit 13: Denmark annually installed and cumulative capacity (MW)



Source: GWEC Market Intelligence; RCG Analysis

Current auction framework

The Danish Energy Agency (DEA) undertakes a screening process to determine areas of the seabed most preferred for offshore wind development. Following site selection by the DEA, it is then the responsibility of the Danish government to provide the necessary permits to develop an offshore wind farm in these areas. This includes early-stage development activities such as geophysical surveying and wind resource assessments.

The Danish transmission system operator, Energinet, also carries out a Strategic Environmental Assessment for the site. Developers are then provided access to the draft final permits (prior to auction) as well as the site categorisation information (''site data pack'') to take part in a competitive site-specific auction process. This allows all bidders to consider a comprehensive set of data on the site as well as reduce contingencies prior to making their final bid.

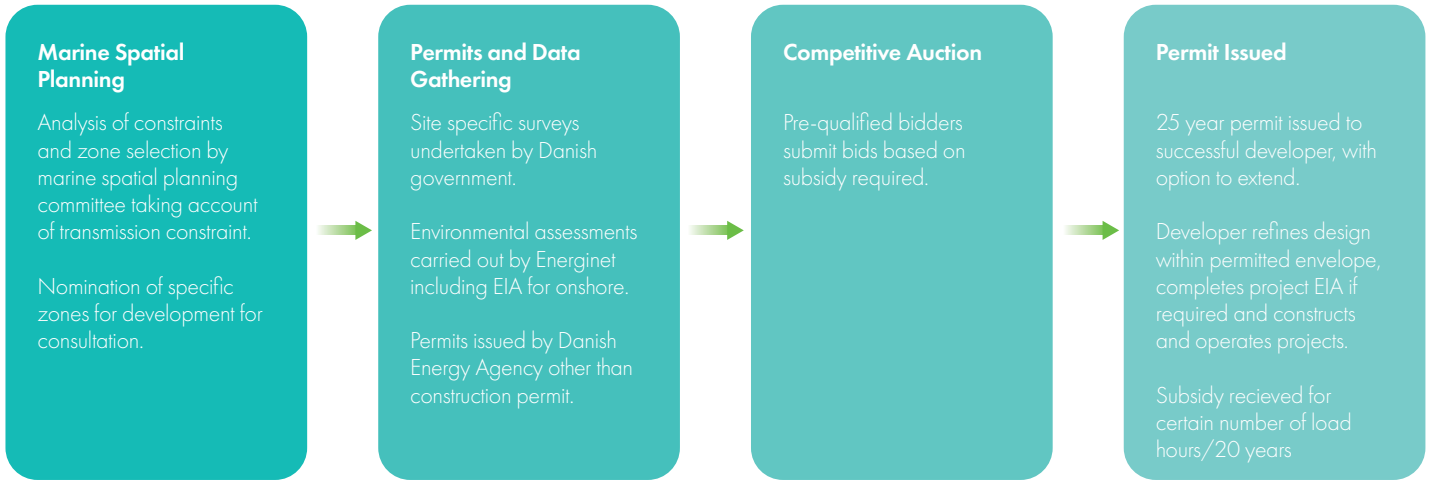
Pricing under auctions

Bidders in the competitive auction process provide their proposed price (per MWh) to deliver the offshore wind farm, with the lowest price winning the rights to develop the offshore wind farm in the selected area. Competitive auctions are announced by the Danish

Exhibit 14: Danish auction design

Auction / Tender	PPA / Offtake	Seabed rights	Construction permit	Grid connection	Multiple projects	Sequential tenders	Evaluation criteria	PPA type
Horns Rev 2	✓	✓	✓	✓	✗	✗	Bid price	Sliding premium tariff
Rødsand 2	✓	✓	✓	✓	✗	✗	Bid price	Sliding premium tariff
Anholt	✓	✓	✓	✓	✗	✗	Bid price	Sliding premium tariff
Horns Rev 3	✓	✓	✓	✓	✗	✗	Bid price	Sliding premium tariff
Near-shore tender	✓	✓	✓	✓	✓	✗	Bid price	Sliding premium tariff
Kriegers Flak	✓	✓	✓	✓	✗	✗	Bid price	Sliding premium tariff

Exhibit 15: Flowchart depicting the bidding process and support mechanism in Denmark



Source: RCG Analysis

government in advance, but there is no set frequency. Bidders are typically given 3 months of formal notice to pre-qualify for the auction, which is then run approximately 3 months after this period. This pre-qualification stage, which assesses financial strength and previous offshore construction experience, is important for ensuring competent and feasible bids are submitted.

A key take-away from the Danish market is the development of two utility-scale projects prior to the introduction of auctions.

The revenue support for electricity production from renewable energy is set out by the Promotion of Renewable Energy Act. Offshore wind projects are supported by a floating premium FiT, similar to the UK's CfD mechanism which is provided for a set number of units of electricity generated, for up to 20 years.

The DEA also allows for an 'open-door' process whereby offshore wind developers may promote their own areas outside of those designated, however in these cases the developer must then carry out its own site investigation and EIA whilst still partaking in the same bidding process as those other sites that have not harboured the same development risk or costs. The site cannot be part of an area already designated for offshore wind farms and applies primarily to nearshore projects. No commercial-scale offshore wind farms have yet been built utilising this procedure despite some developers having begun the process as early as 2012. Offshore wind developers that secure permits to build through the open-door procedure receive a fixed price premium at the same level as onshore wind turbines.

Analysis

Before the introduction of competitive auctions, two 160 MW projects had been developed. Since 2004, 6 competitive auctions have been conducted in Denmark securing a route to market for over 2.1 GW of capacity across 7 projects.

A key take-away from the Danish market is the development of two utility-scale projects prior to the introduction of auctions. These projects allowed the market to gain experience and ease the transition to competitive tenders. Denmark has also allowed an 'open-door' process alongside the auction process. Whilst this has not yet supported any active projects, it provides the industry with flexibility should developers choose not to participate in auctions.

Furthermore, key to the success of the Danish auction scheme has been its continual development based on learning from previous auctions. In particular, the introduction of an open dialogue between prospective developers and the DEA, has helped to ensure that the tender procedure matches evolving market conditions as well as supporting the de-risking of potential bidder's business cases where possible.

France

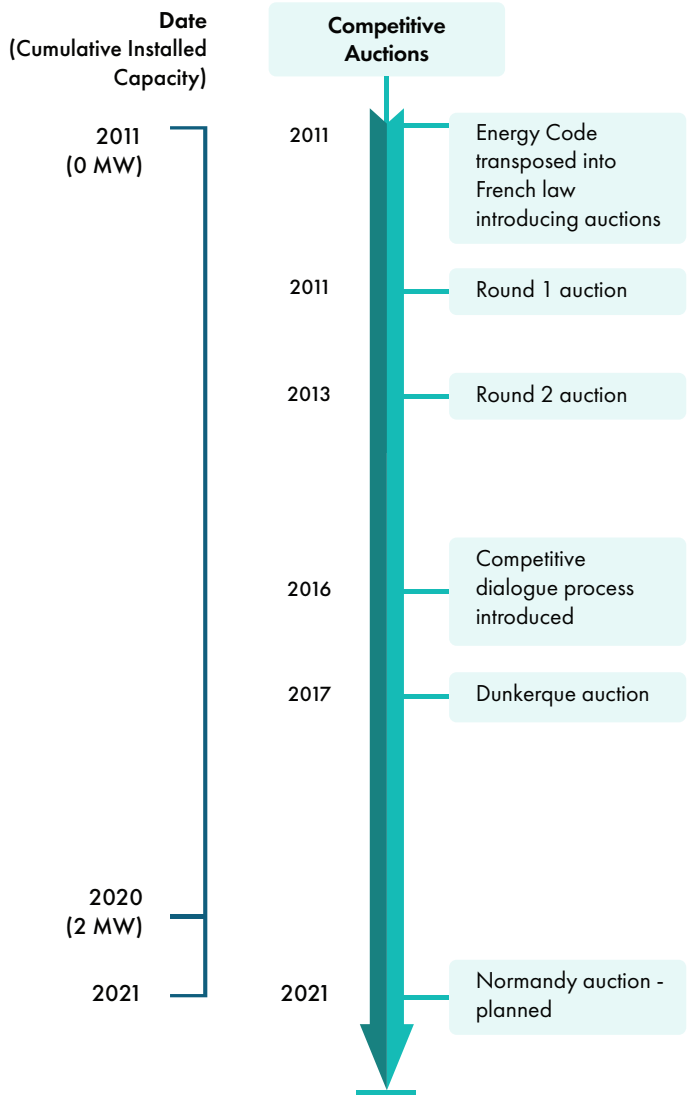
Background
While the French government has been pursuing offshore wind development for over a decade, the industry has experienced significant delays in getting underway. To date Floatgen, a 2 MW floating offshore demonstrator project which came online in 2018 (outside of an auction scheme), is the only operational offshore wind project. A further 3.5 GW of capacity has secured a route to market through tender procedures.

While the French government has been pursuing offshore wind development for over a decade, the industry has experienced significant delays.

France has adopted a one-stage auction model, although it differs slightly from conventional one-stage auction models. Site exclusivity and offtake are secured through a one-stage auction based on sites identified by the government. The government carries out high-level site investigation work on these sites. However, winners of the auctions must still secure necessary permits, finalise grid connection agreements, and receive final authorisation to operate the wind farm although this process is not competitive.

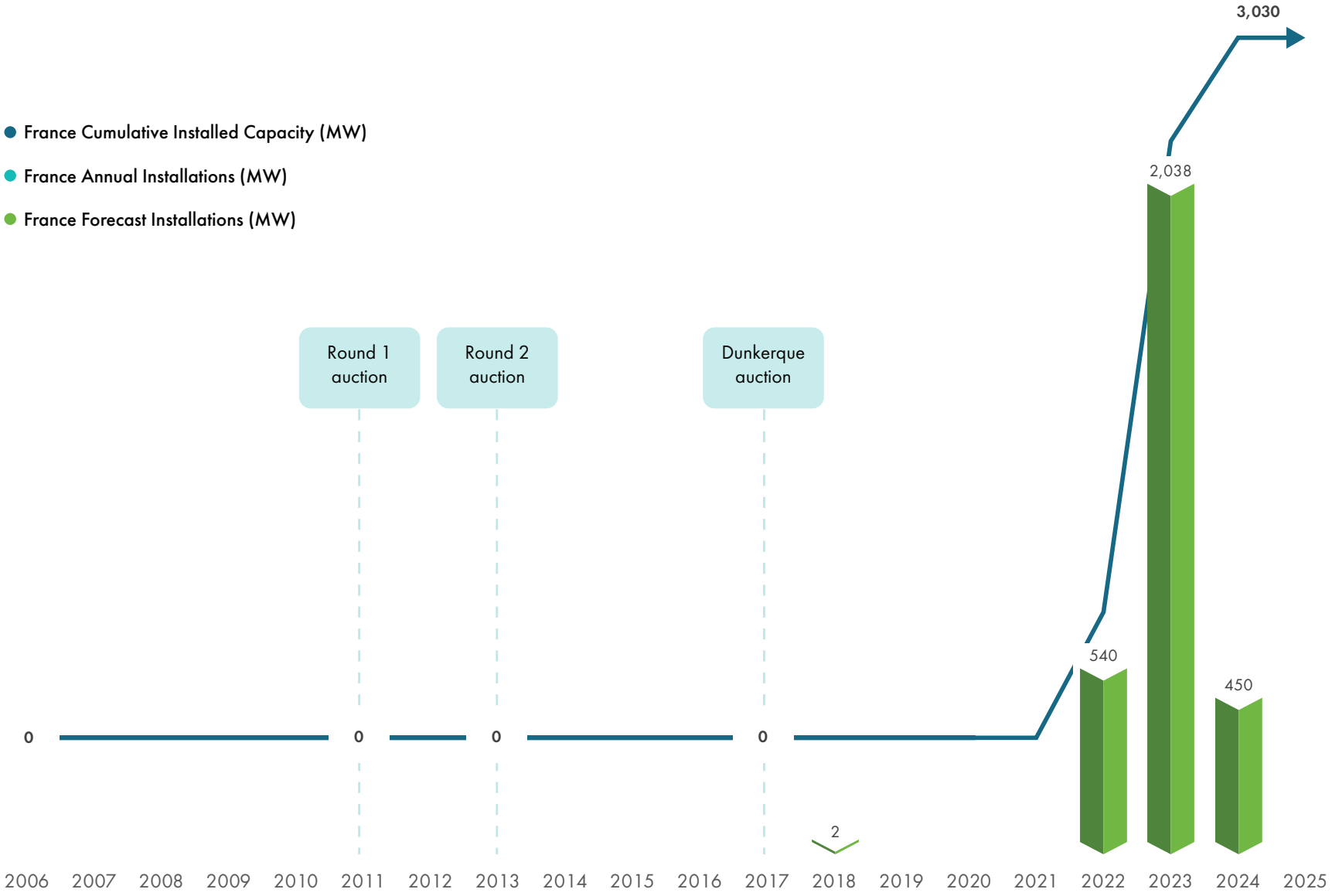
Transition to auction
France is unusual in that it did not transition to offshore wind auctions from a FiT system, and instead kicked off the industry by tendering projects competitively. While FiTs had been available to renewable energy projects prior to 2011, no offshore wind projects have been developed. The Energy Code of 2011 introduced offshore wind tenders. The first two auctions were launched in 2011 and 2013 respectively, through which 6 projects secured a route to market. Dunkerque was the most recent auction, launched in 2017, and used the newly approved competitive dialogue procedure.

Exhibit 16: France transition to auction timeline



Source: GWEC Market Intelligence; RCG Analysis

Exhibit 17: France annually installed and cumulative capacity (MW)



Source: GWEC Market Intelligence; RCG Analysis

Current auction framework

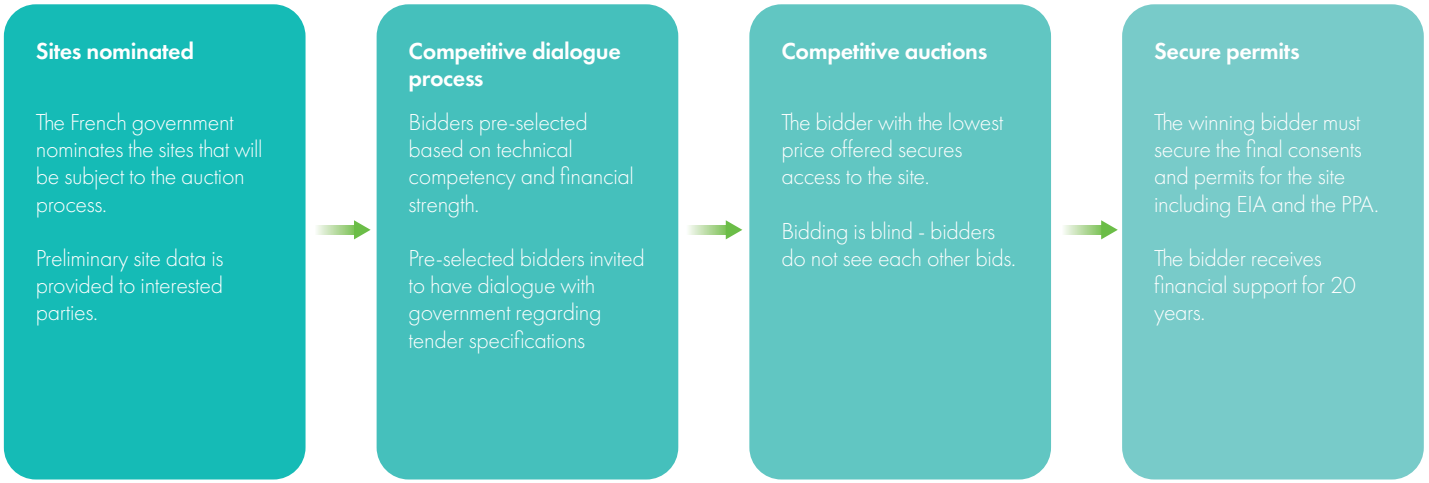
There are two different tender procedures which can be used in France. The classical tender procedure, which was the only available procedure prior to August 2016, and the competitive dialogue procedure. The competitive dialogue procedure includes discussion between authorities and the bidders and aims to increase flexibility. The competitive dialogue procedure was used for the most recent tender, Dunkerque which was launched in 2017, and will likely be used moving forward.

In the classical tender procedure, which was used for the first two French auction rounds in 2011 and 2013, initial high-level site investigation results are carried out by the Ministry for Energy and presented to bidders in the tender specifications. Bidders then submit tender applications to the national energy regulatory authority (Commission de Régulation de l'Energie, CRE), which provides a recommendation for the winning bidder to the Minister for Energy. The competitive dialogue procedure differs in that there is a pre-selection step based on technical and financial strength of companies. Pre-selected candidates participate in a competitive dialogue with the Minister of Energy on the tender specifications, after

Exhibit 18: French auction design

Auction / Tender	PPA / Offtake	Seabed rights	Construction permit	Grid connection	Multiple projects	Sequential tenders	Evaluation criteria	PPA type
Round 1	✓	✓	✗	✗	✓	✗	Bid price Benefit to local supply chain and workforce Environmental impact	Sliding premium tariff
Round 2	✓	✓	✗	✗	✓	✗	Bid price Benefit to local supply chain and workforce Environmental impact	Sliding premium tariff
Round 3 (Dunkerque)	✓	✓	✗	✗	✗	✗	Bid price Benefit to local supply chain and workforce Environmental impact	Sliding premium tariff

Exhibit 19: Flowchart depicting the bidding process and support mechanism in France



Source: RCG Analysis

which the procedure is the same as the classical tender procedure.

Evolving auction criteria

The auction evaluation criteria have evolved across tenders. For the Round 1 and Round 2 auctions the evaluation criteria were as follows: the bid price (40%), the industrial plan, including projects links to local companies (40%), and the environmental impact (20%). At the next French auction, Dunkerque, the evaluation criteria were as follows: electricity purchase price and strength of financial plan (80%) and inclusion of environmental stakes and optimisation of the area (20%).

The wind farms tendered in the 2011 and 2013 tenders will benefit from FiTs for a period of 20 years. However, in 2016 a new premium support scheme (complément de remuneration) was introduced in France, which will apply to all new projects. Under the new support scheme, a feed-in premium (similar to the UK's CfD) is awarded to successful bidders.

Analysis

Initial challenges and delays

France did not transition to offshore wind auctions from FiTs as many other countries have done, and instead started with auctions at the inception of the industry. While the auctions have secured a route to market for 3.5 GW of capacity, French offshore wind projects have experienced significant delays and serve as a warning to the dangers of overly stringent local content requirements and an inefficient permitting regime. In 2011, at the time of the first offshore wind auction, the French regulatory framework and offshore wind policy were immature and widely viewed as not fit for purpose.

It is reported that insufficient preliminary studies were performed by the public sector prior to the tender, and the framework required winning bidders to obtain several permits after the auction process (Hogan Lovells, 2021). Furthermore, the auctions in 2011 did not follow European Union procurement rules and resulted in a lack of transparency in determining the final outcome (CMS, 2017). This led to significant confusion and appeals from unsuccessful bidders which further served to damage the confidence in the French offshore wind market. Furthermore, these issues combined with stringent local content requirements led to a winning bid price of around 200 EUR/MWh (~240 USD/MWh), which was high compared to auctions in other countries at the time. The offtake prices were later renegotiated down to 135 -155 EUR/MWh (~165 -190 USD/MWh) in 2018.

Streamlining the permitting and application framework

In many ways the Dunkerque auction demonstrates the improvement of the French offshore wind framework. The number of authorisations needed has significantly decreased, with 'single environmental authorisations' having been introduced in 2017. Furthermore, the competitive dialogue process meant that candidates were able to adapt their applications and take into account project risk with a higher degree of accuracy. The result of this was a more effective auction process which yielded lower-priced bids, with the winning bid being 44 EUR/MWh.

Taiwan

Background

Taiwan is a leading offshore wind market in the Asia Pacific region. While Taiwan only has 128 MW of operational capacity, a further 5.5 GW of capacity has secured a route to market. Taiwan has been active in offshore wind since 2017, when the 8 MW Formosa 1 Phase 1 demonstrator project went into operation.

Taiwan currently favours a decentralised approach to leasing, permitting, bidding, and grid connection for offshore wind farms, although it is not strictly a two-stage approach. Developers have some freedom to select a site from several areas pre-determined by the government or most recently can select their own sites for development. There is a competitive bidding process that provides the winning bidder with financial support to operate the offshore wind farm, however developers are required to obtain all permits themselves.

Transition to auction

In the second phase of the National Energy Program (NEP-II, 2014-2018), the Taiwanese government set its first target for offshore wind. The target included construction of a demonstration wind farm of capacity greater than 10 MW and establishment of a local supply chain capable of manufacturing 5 MW turbines.

The Ministry of Economic Affairs (MoEA) started its long-term offshore wind planning under NEP-II and published a subsidy plan. The plan included both a capital grant subsidy and FiT mechanism. The subsidy available to demonstrator projects (two turbines at most) was limited to 50% of capital expenditure (Capex) while the subsidy available to utility-scale wind farms could reach 250 million NTD (~ 9 million USD). The capital grant needed to be paid back within 15 years by annual deduction from the FiT. In 2013, three local developers were awarded subsidies and capacity through this scheme.

In 2015, the Bureau of Energy (BoE) published 36 potential areas for offshore wind farms to be developed in the "Guidelines for Reservation of Offshore Wind Power Generation Sites". These areas were selected following work undertaken by BoE in collaboration with a local energy policy think tank. The zones were initially published as a reference for the industry, however during the development stage other government bureaus and departments engaged and these zones were further refined (including some that were eventually removed from consideration).

In 2017, after the presidential election, the new administration began to promote renewable energy even more

actively under its "Nuclear Free Homeland" policy. The policy aimed to phase out nuclear power and upscale renewable energy capacity, with a target of 4.2 GW offshore wind capacity by 2025. In 2018, the target was increased to 5.7 GW, and then in 2019 a target for an additional 10 GW by 2035 was set.

Moving from selection to competition

2018 was a critical year in the transition from a non-competitive selection process to a competitive auction process. In early 2018, the MoEA released the "Directions for Allocating Installed Capacity of Offshore Wind Potential Zones" which introduced a selection mechanism and a competitive bidding mechanism for allocation of capacity.

In April 2018, 3.8 GW of capacity was awarded through the first-round selection process. The selection process was a competitive process with projects competing against one another for a FiT provided and set by the government, as well as the ability to secure exclusive rights and negotiate a PPA with the grid operator, Taipower. The government set a relatively high FiT (NTD 5.8 or US Cent 19.6/kWh) to attract a high volume of competition to kickstart the market and encourage industrial investment; this was successful in attracting more than 10 GW of projects for selection. Projects were judged according to technical merit (60%) and financial capability (40%).

Local content requirements were not part of the selection process, however winning bidders were required to submit local content plans shortly after being selected. Pre-requirements for projects to enter the selection process included securing consent or pre-consent for an EIA – a total of 10.7 GW of projects in Taiwan were therefore eligible to participate at the time.

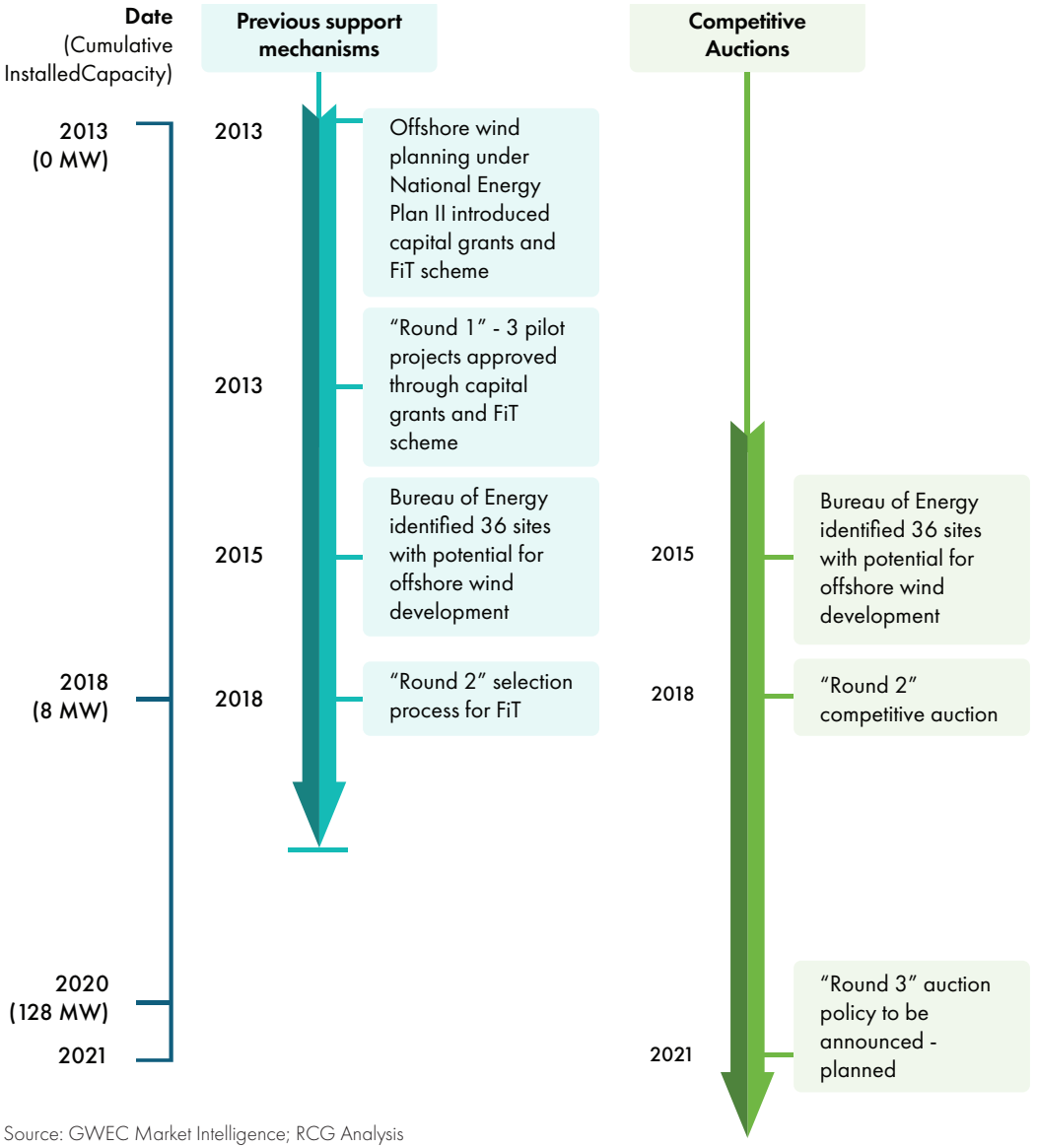
Encouraging cost reduction

In June 2018, a further 1.7 GW of capacity was awarded through the second-round competitive bidding process with projects that had been unsuccessful in the selection process competing against one another for government support. This was a more conventional auction with developers submitting bids based on the level of FiT required to build their project.

The evaluation of the bids was in two stages: first, projects were required to meet a threshold score based on the same technical and financial criteria as the selection process; all projects that passed the threshold score were then judged on the level of FiT submitted – the bids winning the same rights as the selection process. Winning bidders in this auction did not have any local content requirements due to the competitive nature of the procurement and to ensure the lowest cost projects.

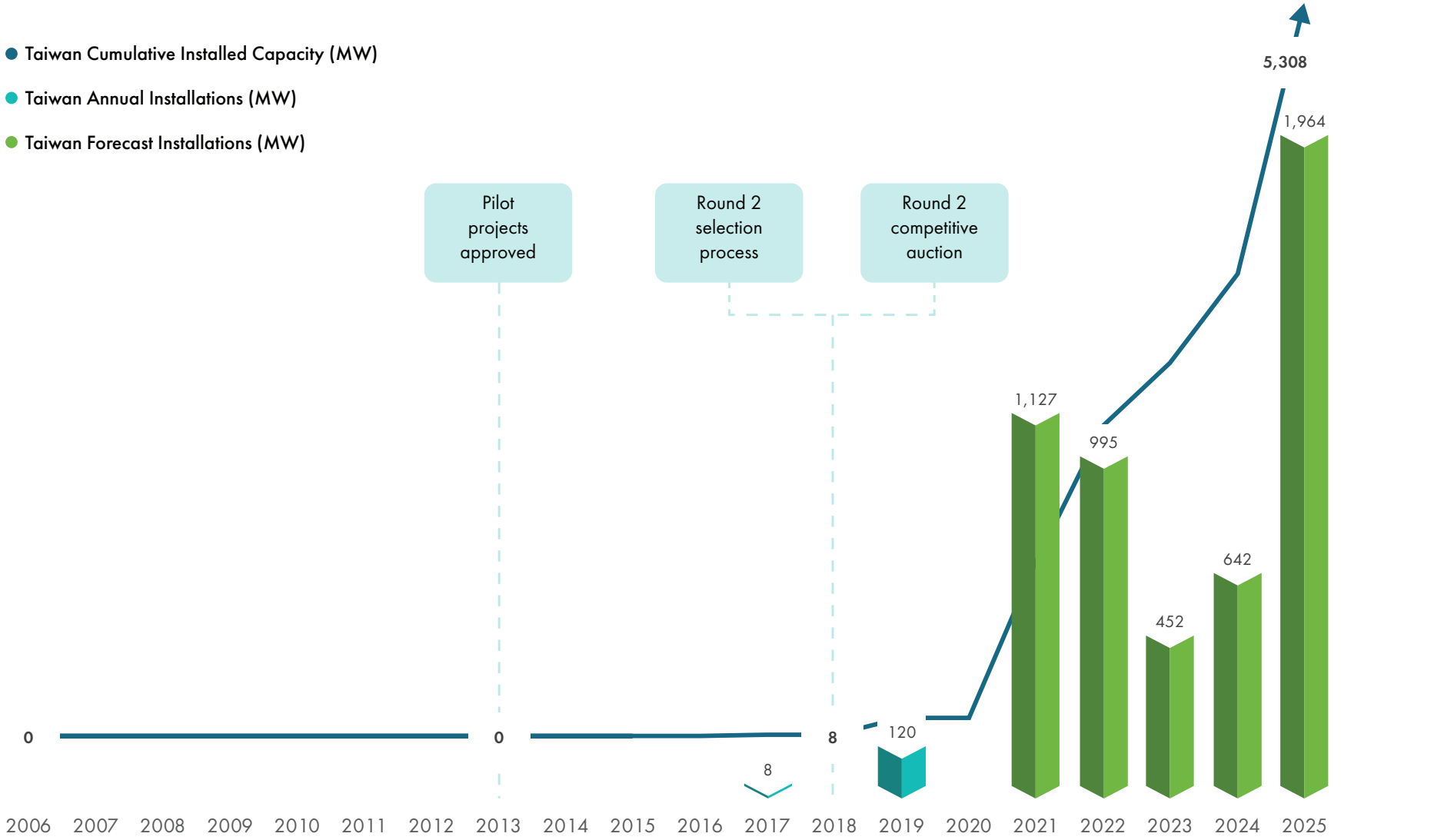
The final rules for the Zonal Development Phase I (also known as the third round) will be published in 2021. Even though the final policy has yet to be fully published at the time of writing, the industry has confidence that auction rounds will occur in 2022, 2023 and 2024 and allocate 3 GW of capacity in each auction.

Exhibit 20: Taiwan transition to auction timeline



Source: GWEC Market Intelligence; RCG Analysis

Exhibit 21: Taiwan annually installed and cumulative capacity (MW)



Source: GWEC Market Intelligence; RCG Analysis

Current auction framework

Project development and permitting

The Taiwanese leasing and capacity allocation process is unconventional compared to other established markets. Site selection and project development activities (including surveys and permit applications) are conducted by the subsequent auction bidders, as in the UK, but exclusive seabed rights are not guaranteed until after the offtake auction.[15] Upon winning an auction, developers sign an agreement with the Taiwan government that provides them with the exclusive rights to apply for the further permits required to construct and operate the offshore wind farm. This agreement places certain obligations on the developers including timeframes for achieving certain milestones and penalties in the event of failure.

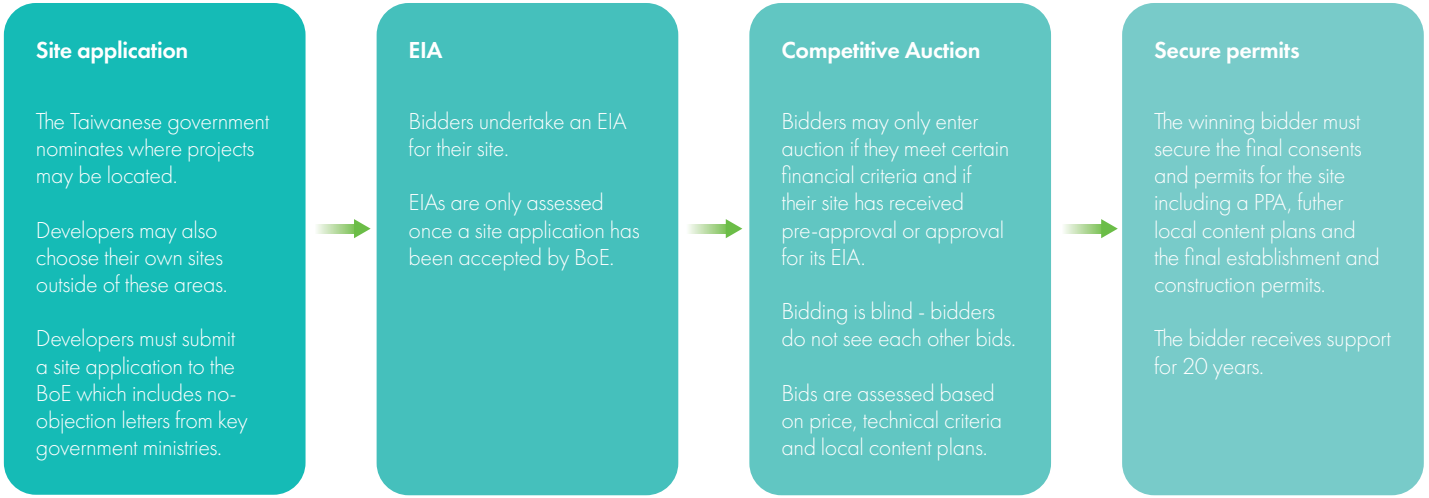
Permits that must be secured include an 'Establishment Permit', which can only be secured once certain additional consents have been granted, and execution plans have been approved by the BoE.

At the time of writing the specific policy for the Round 3 auctions has not yet been confirmed, however based on previous auction rounds, public consultations, and drafts published to date, there is a high level of certainty

Exhibit 22: Taiwanese auction design

Auction / Tender	PPA / Offtake	Seabed rights	Construction permit	Grid connection	Multiple projects	Sequential tenders	Evaluation criteria	PPA type
Round 2 – Selection	✓	✗	✗	✗	✓	✗	Project deliverability (timeline and feasibility) Knowledge and experience of bidder Financial plans and background Local content plans required after selection	Fixed-price tariff
Round 2 - Bidding	✓	✗	✗	✗	✓	✗	Compliant submission for Round 2 - Competitive Bid price	Fixed-price tariff

Exhibit 23: Flowchart depicting the bidding process and support mechanism in Taiwan



Source: RCG Analysis

15. The TSO in Germany is responsible for financing, constructing and operating offshore transmission infrastructure.

regarding the fundamental aspects of the policy.

Qualification and evaluation

Developers planning to compete in auctions must file a site application to BoE and must obtain EIA approval (or conditional approval) from the Environmental Protection Agency (EPA). The site application process requires sites to obtain 'no-objection' letters from key ministries within the Taiwanese government and ensures they are not sited within specific 'no-go' areas. For developers to qualify to participate in bidding rounds, all of these approvals must be obtained.

Winning bidders are awarded offtake in the form of FiTs based on the price they have submitted as part of the auction. Developers may also sell power directly to private end-users through corporate power purchase agreements (CPPAs).[16]

The main evaluation criteria for the initial auction rounds were project deliverability, technical capabilities, and financial capabilities. The leasing authority recognised the first tranche of projects to be installed could not rely on the local supply chain, as it was yet to be established. Offtake for projects therefore did not include local content requirements, however the phased development plan of the Ministry of Economic Affairs mandates increased local content requirements for later auction rounds.

Analysis

A rapid growth story with reduction of prices

The main success story in Taiwan has been the introduction of competitive auctions after a sizeable volume of capacity supported by the FiT. Just over 4 GW of offshore wind capacity will be supported by Taiwan's FiT mechanism, prior to their switch to an auction-based mechanism.

This allowed developers to build up a pipeline of projects, to understand the market in more detail and for the FiT to support supply chain development prior to a shift to a competitive environment. This success is evidenced by the level of competition in the first auction and the cost reduction seen in the bid prices of the winning projects.[17] In addition to the competitive mechanism, bid prices in the first auction were also lower due to lack of local content requirements and sites being adjacent to projects already under development, allowing developers to access project synergies.

Establishing the industry before introducing local content requirements

Another key takeaway from the evolution of Taiwan's offshore wind industry is the importance of an appropriate level of local content requirements. Local content requirements were not imposed for the early price bidding auction rounds, as the government recognised that the local supply chain could not be relied upon to kickstart the industry. Strict local content requirements too early in the industry's development could have stalled progress, due to the extra cost and time that developers need to invest in the local supply chain.

However, where a higher FiT was awarded for projects (e.g. in the selection process for Round 2), this was used to leverage investment in the supply chain through local content requirements.

The government is still focusing on local content requirements, with this expected to continue in Round 3. It remains to be seen whether this will be a success as the local supply chain is still relatively immature and untested. There have been early signs that the localisation requirements that have been introduced previously were too onerous, with delays to the approval of localisation executions plans (e.g. Hai Long Offshore Wind Farm), and media reporting that developers are concerned with how steep the learning curve is for local suppliers. Getting the balance right in future auctions will be critical to achieving installed capacity targets going forward.

Taiwan's first Round 3 auction is expected to take place in 2022 and allocate at least 3 GW of capacity. The current drafting of the auction requirements also introduces more flexibility into the localisation requirements which may be an indication that the government is applying lessons learned and responding to industry consultation. More than 30 GW of projects have declared their intention of competing in future auctions in Taiwan. Overall, this demonstrates the strength, stability, and positive competition that the government has been able to foster in the market in the short time period since its inception.

Round 3, the initial policy documentation indicates that this will not be the case which has led to several developers looking to bid on the same areas of seabed.

16. CPPAs in Taiwan were enabled by legislation set out in 2017 and therefore the CPPA market is relatively immature. Despite this, Ørsted signed the largest renewable energy CPPA to date with the Taiwan Semiconductor Manufacturing Company (TSMC) for their 920 MW Greater Changhua South West B and North West offshore wind projects. These projects were winners of the last competitive auction round in Taiwan, however Ørsted managed to secure a higher price through CPPA than they bid in the auction. This shows how auctions can serve as a baseline or safety net for developers, who may try to secure a better return in the corporate market. In Taiwan, signing a CPPA for the full project capacity means turning down a PPA with TPC, and therefore a long-term deal is paramount to success as the lack of a wholesale electricity market means there are no other alternatives to sell power. CPPAs are much more common in mature markets where the cost of offshore wind has already been driven down by government support.

17. Ørsted's winning bid price in the first auction was reported to be TWD 2,548 / MWh, compared to a FiT for offshore wind projects signing PPAs in 2021 of TWD 4,657 / MWh. Whilst the two are not directly comparable due to Ørsted's projects being connected later than 2021, this shows the downward cost trajectory of offshore wind in Taiwan.

Netherlands

Background

The Netherlands has the third-most offshore wind capacity in Europe, behind the UK and Germany. It has a total operational capacity of 2.6 GW. The country has been active in offshore wind since 2007, when it commissioned its first large-scale offshore wind farm Egmond aan Zee, a 108 MW project comprising 36 3 MW turbines.

The current leasing, permitting, and bidding processes in the Netherlands are all integrated into one process for developers and has been in place since 2013 following the Energy Agreement for Sustainable Growth. The Netherlands is a proponent of a centralised one-stage model whereby the Dutch government controls the entire process until the handing over of a 'packaged' offshore wind project to an offshore wind developer via a competitive auction.[18] Auctions are typically held annually providing a consistent pipeline of projects.

Transition to auction

The Netherlands has historically used tender mechanisms to support offshore wind with varying levels of success. Prior to 2011, the key subsidy mechanisms for supporting offshore wind in The Netherlands were the Environmental Quality of Electricity Production scheme (MEP), a feed-in-tariff program, and the Subsidieregeling duurzame energieproductie (SDE) scheme, a feed-in premium mechanism allocated via tender but not competitive auction.[19]

The SDE was replaced in 2011 with the SDE+ scheme, a sliding premium awarded through competitive auctions. The sliding feed-in premium compensates the difference between the production cost and market price of electricity. A lack of government support, funding, and a less centralised model meant that prior to 2013 the SDE and SDE+ schemes had not supported a large quantity of offshore wind development, with approximately 1 GW of offshore wind capacity constructed and under development as of 2013.

Providing visibility with a long-term roadmap

The turning point was in 2013, when the current bidding processes were introduced under the Energy Agreement for Sustainable Growth. Under the agreement, a roadmap was established for offshore wind which set a target of 4,450 MW of capacity by 2023, funded by the SDE+ mechanism. The roadmap detailed five competitive tenders between 2015 and 2019 for the

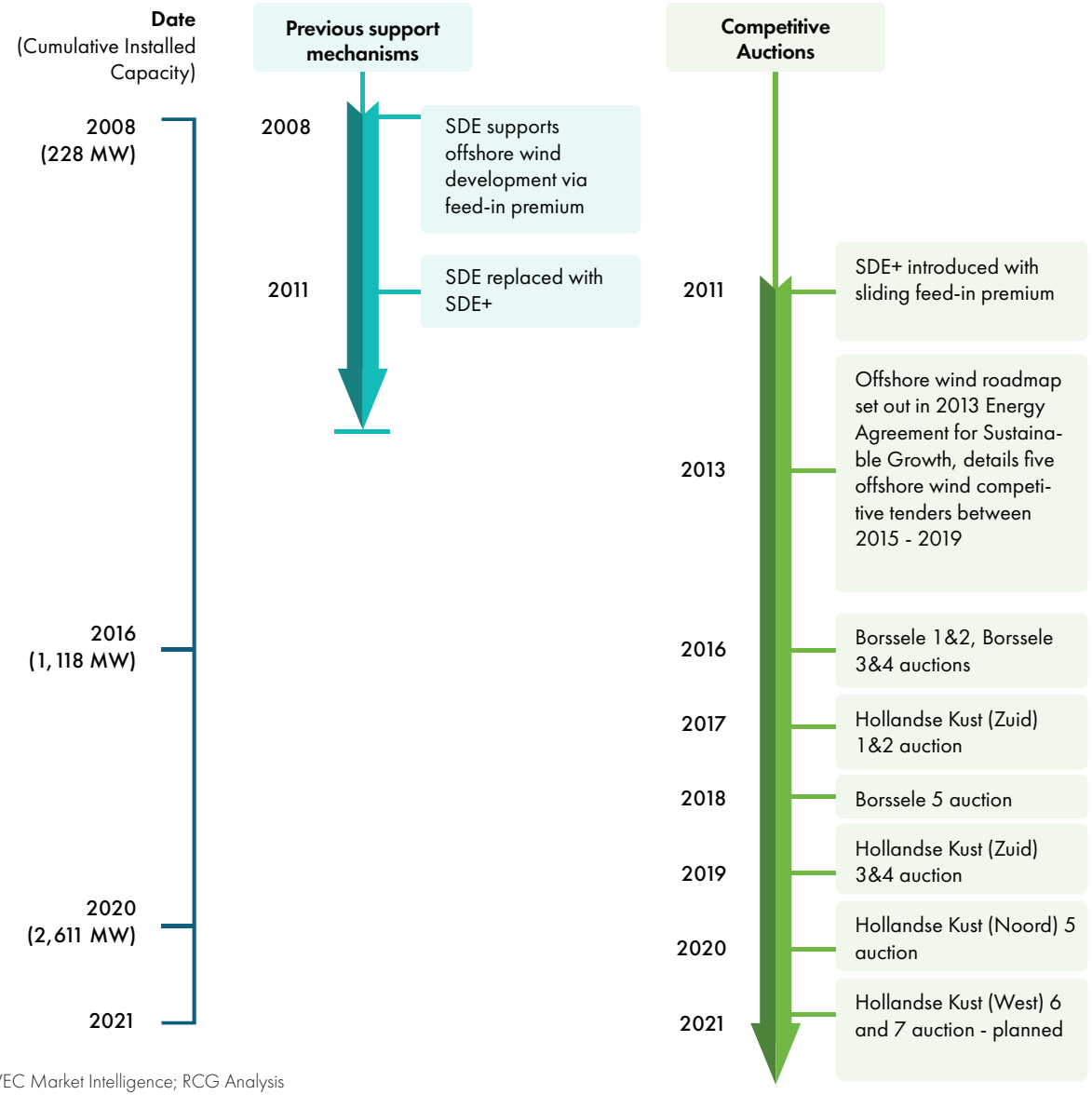
18. On average, there is a period of 1-2 years between the publication of the draft site decision with all wind farm requirements and the opening of the auction process.
19. The MEP scheme was successful in delivering the first 228 MW of offshore wind capacity in the Netherlands, whilst the SDE actually failed to support any new capacity prior to SDE+ being introduced.

auction of government-defined projects. This roadmap helped provide clear visibility for the sector up to 2023, giving developers confidence and allowing them time to plan accordingly.

There was no specific transition period between SDE and SDE+ other than announcing the change in approach in advance and providing sufficient time for interested parties to prepare for the auction from the announcement of the shift to SDE+ in 2011, to the first auctions in 2015. At that time, offshore wind farms with existing construction licences had their licences revoked, requiring them to participate in the newly planned SDE+ auction mechanism.

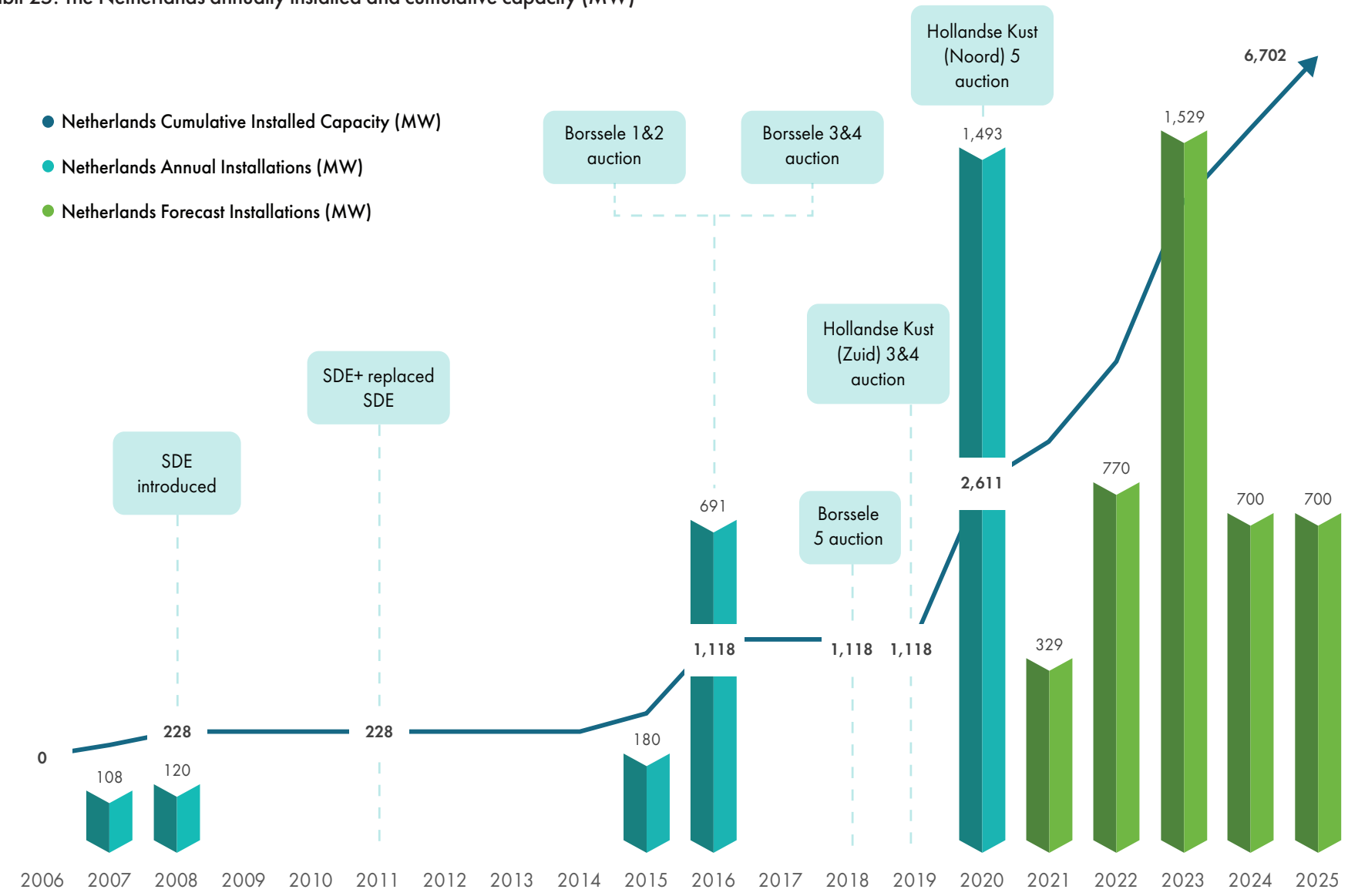
A compensation package for the relevant licence holders was agreed and this was funded and accounted for through the SDE+ budget (Loyens Loeff, 2015). Nine developers were eligible for this compensation, having previously been granted construction licences (and therefore site exclusivity) for wind farms. Negotiations were held to reach an agreement over the level of compensation, which totalled EUR 7.35 million. This provides an instructive example for Vietnam, which already has a sizeable pipeline of offshore wind projects registered for interest, although site exclusivity is seen as key indicator of site value.

Exhibit 24: The Netherlands transition to auction timeline



Source: GWEC Market Intelligence; RCG Analysis

Exhibit 25: The Netherlands annually installed and cumulative capacity (MW)



Source: GWEC Market Intelligence; RCG Analysis

Current auction framework

The current bidding process in the Netherlands allows offshore wind developers to compete for the rights to develop an offshore wind farm in one of the designated zones, nominated by the Dutch government in a competitive auction. Whilst there is no pre-determined frequency for these competitive auctions, due to the ambitious offshore wind deployment targets of the Netherlands, the Dutch government has been auctioning the rights to 700 MW per year, with auctions of between 700 MW and 2,000 MW scheduled every year, except 2024, until 2025

Remuneration under a feed-in premium

Bidders are asked to submit the price per MWh at which they can deliver the offshore wind farm. The Dutch government then provides a subsidy to the winning developer under the SDE+ mechanism for a period of 15 years or a certain number of full-load hours depending on which comes sooner. The subsidy is paid as a sliding feed-in premium.

The subsidy regime in the Netherlands also contains a floor price which limits the level of this subsidy if wholesale prices fall below a certain level. This provides the government with extra securities regarding the total amount it would pay to a developer. There is no ceiling on the subsidy and therefore if

Exhibit 26: The Netherlands auction design

Auction / Tender	PPA / Offtake	Seabed rights	Construction permit	Grid connection	Multiple projects	Sequential tenders	Evaluation criteria	PPA type
Borssele 1&2	✓	✓	✓	✓	✓	✗	Knowledge and experience of bidder Project deliverability (timeline and feasibility) Wind farm capacity Social costs Assessment of risks Measures to assure cost efficiency	Sliding premium tariff
Borssele 3&4	✓	✓	✓	✓	✓	✗	Knowledge and experience of bidder Project deliverability (timeline and feasibility) Wind farm capacity Social costs Assessment of risks Measures to assure cost efficiency	Sliding premium tariff
Hollandse Kust (Zuid) 1&2	✓	✓	✓	✓	✓	✗	Knowledge and experience of bidder Project deliverability (timeline and feasibility) Wind farm capacity Social costs Assessment of risks Measures to assure cost efficiency	Sliding premium tariff
Borssele 5	✓	✓	✓	✓	✗	✗	Demonstration of advanced technology Contribution to wind energy cost reduction Contribution to Dutch economy Engagement with small and medium sized enterprises	Sliding premium tariff
Hollandse Kust (Zuid) 3&4	✓	✓	✓	✓	✓	✗	Knowledge and experience of bidder Project deliverability (timeline and feasibility) Wind farm capacity Social costs Assessment of risks Measures to assure cost efficiency	Sliding premium tariff
Hollandse Kust (Noord)	✓	✓	✓	✓	✗	✗	Knowledge and experience of bidder Project deliverability (timeline and feasibility) Wind farm capacity Social costs Assessment of risks Measures to assure cost efficiency	Sliding premium tariff

the wholesale electricity price exceeds the agreed price set by the successful offshore wind developer, the offshore wind developer may profit from this excess.

Typically, the developer which submits the lowest value price bid into the auction wins the rights to develop an offshore wind farm in the designated zone. However, due to the continued reduction of costs in the offshore wind industry, as well as the low-risk investment environment and centralised approach through which the Dutch government absorbs project risks including construction of transmission assets, recent auctions that the Netherlands Enterprise Agency (RVO) administered resulted in a 'zero-subsidy' auction.[20]

Analysis

Creating stability through long-term visibility

The Netherlands is an example of a country where installation rates stalled and there was a pause in activity of offshore wind construction. Between the construction of the first offshore wind farms in The Netherlands, Egmond aan Zee in 2007 and Princess Amalia in 2008 there was a stall in offshore wind development, with the next offshore wind farm Luchterduinen coming into operation in 2015. A key reason for this stall was a lack of funding for offshore wind.

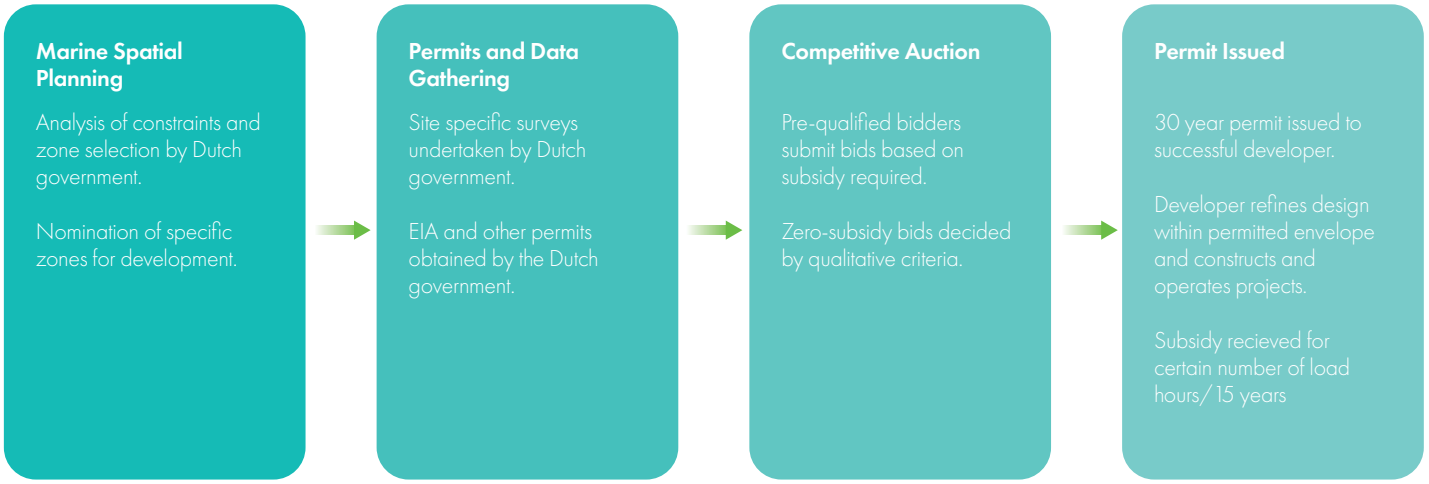
However, the time taken in this period of inactivity was used to ensure the future policy was transparent, long-term, and stable. Since 2015, development has increased primarily due to the Energy Agreement for Sustainable Growth, which included the publishing of a clear roadmap between 2015 and 2019 for offshore wind development, which gave developers preparation time and confidence in the sector moving forward. This has led to a resounding success in the subsequent auctions and efficient delivery of those projects awarded.

Centralising responsibility for power infrastructure and site development

In addition, a more centralised approach to offshore wind development shifted the risk from developers onto the government, primarily through construction of transmission assets and ownership of early development work. The reduction of development risk enabled price reductions at auction, however the government was required to deliver reliable information for project development and infrastructure for transmission.

Like Taiwan, the Netherlands is another country where offshore wind CPPAs have been successful and are viewed as critical to the future success of the market due to the expected pattern of zero subsidy bids. In March 2021, Vattenfall announced it had signed a CPPA with Air Liquide to offtake power from its Hollandse Kust Zuid wind farm, for a period of 15 years. Again, this shows the potential for auction mechanisms to serve as ways to secure sites whilst more attractive commercial arrangements are negotiated.

Exhibit 27: Flowchart depicting the bidding process and support mechanism in the Netherlands



Source: RCG Analysis

20. RVO is now running specific zero-subsidy actions where bids are all submitted without bid price and on the basis of a zero-subsidy award. These bids are evaluated on criteria including knowledge and experience, quality of design of the wind farm, capacity of the wind farm, social costs, quality of the inventory and analysis of risks, and quality of measures to assure cost efficiency. Analysis of risks and measures to assure cost efficiency are the highest weighted criteria and can be subdivided into risk on the electricity prices and the value of the Guarantees of Origin, risk during construction and risk during operation. There is a pre-qualification step prior to the auction which ensures that developers have the required technical and financial capability (RVO, 2020).

BEST PRACTICE CASE STUDIES

Photo Credit: Orsted

Introduction

Following this review, this study highlights best practices in offshore wind policy design from these six geographies. These represent the aspects of policy design that have proven to be either successful or obstructive in developing a sustainable offshore wind sector, with some related to auction mechanisms in particular. The sections below provide further detail on each lesson learned.

For simplicity, one or two geographies were selected to demonstrate the best practice and lesson learned; however, many of the geographies in this table reflect multiple best practices. The authors further note that this table is not an exhaustive overview of best practices in transitions to auctions or offshore wind auction design.

Exhibit 28: Best practices in offshore wind policy

Best Practice	Geography	Lesson Learned
Open dialogue between administrator and developers	Denmark	Consultation between the administrator and potential developers, and flexible auction design, increases participation levels in auctions.
Separation of technologies	UK	Separation of technologies in auctions ensures fair competition for subsidy support.
Transparency and certainty of capacity targets and timelines	Netherlands	Transparency through publication of offshore wind policy roadmaps, as well as consistent delivery of timelines set out in roadmaps increases investor and developer certainty.
Avoid strict local content requirements	France	Strict and inflexible local content requirements lead to high strike prices and delays in project realisation; therefore, it is key to provide appropriate flexibility in these requirements, especially in the early stage of sector development.
Sizeable volume and early phase FiT to support the build up of supply chain	Taiwan	Creating a pipeline of offshore wind projects which has sufficient volume to create market competition and meet market needs is important in the development of early-stage markets.
Single window permitting	Denmark and UK	Depending on the approach to auctions for offshore wind, "single window permitting" (where one government organisation is responsible for obtaining or deciding upon different permits) can take different shapes; however, certainty and simplified procedures for developers help to streamline offshore wind procurements.

Open dialogue between administrator and developers

Case study: Denmark

Denmark was one of the first countries to introduce technology-specific auctions to award financial support to offshore wind projects. Over multiple auctions, the process has been refined and improved, taking into account developer feedback. An open dialogue between the DEA and prospective developers has been key to increased competitiveness and improvement of the process.

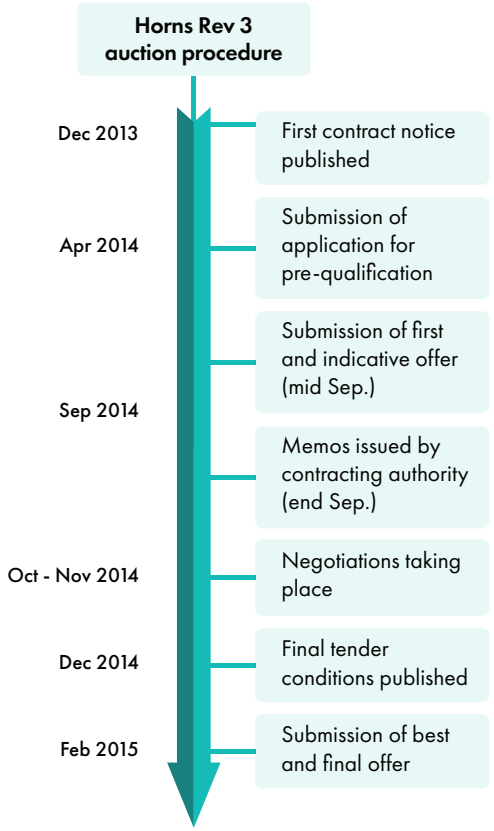
The early Danish auctions suffered from low participation rates: There was only one final bid for the Anholt tender in 2010 and only two for the second Rødsand 2 tender in 2008. Inflexible auction design and setting a timeline without the possibility of consultation or negotiations made participation unattractive. In response, the Horns Rev 3 auction process placed a strong focus on developer consultation. As shown in Exhibit 29 (Kitzing, et al., 2015), a consultation meeting and negotiation between each pre-qualified bidderand the DEA took place after the submission of the first and indicative offer.

Using any information gained to adapt the tender process is key to reaping the benefits of consultation. **This ensures that the tender procedure reflects current market conditions, increases attractiveness of participation, and allows the most effective risk allocation between the state and the developer to be achieved.**

With only one bidder participating in the Anholt tender, it has been questioned whether the auction identified the least-cost supplier as was the aim in the auction. However, for the Horns Rev 3 tender, consultation between the DEA and developers and flexibility of auction design helped to ensure strong participation with four consortiums submitting final bids.

Furthermore, the DEA has taken this policy forward into other auctions, pre-qualifying bidders and providing comprehensive data packs to final bidders to support strong bids at lower costs. The Thor tender was announced in February 2019, and in September 2019 the DEA invited interested parties to a market dialogue on the tendering process. In January 2021 six bidders were pre-qualified to participate in the upcoming tender.

Exhibit 29: Horns Rev 3 auction procedure timeline



Source: Adapted from https://orbit.dtu.dk/files/124056860/pdf_denmark.pdf

Separation of technologies

Case study: United Kingdom

In the UK, the CfD scheme has successfully secured a route to market for around 16 GW of renewable energy capacity since its inception in 2014. The auction scheme has supported multiple low-carbon technologies: advanced conversion technologies (ACT), energy from waste technologies, onshore wind, offshore wind, solar PV, dedicated biomass with CHP, and remote island wind.

The separation of technologies into groups or ''pots'' (segregated budget and capacity allocations for specific technology groups) and the adaptation of the pots as technologies have developed has been key to **ensuring support is allocated to a range of technologies whilst competing under the same auction mechanism, as well as maximising potential for innovation in commercial-scale projects.**

The importance of separation of technologies is revealed by the bid prices seen in AR1. Bid prices for established technologies in Pot 1 were 50-82.5 GBP/MWh (~70-115 USD/MWh), dependant on technology and year of delivery, while bid prices for the less established technologies were 114.39-119.89 GBP/MWh (~ 60-165 USD/MWh). The stark difference in price shows that without separation of technologies all the contracts would have been won by established technologies. Fixed-bottom offshore wind serves as a prime example of a technology which was able to mature due to separation from established technologies and has now been moved from the less-established technology pot.

The UK demonstrates the need not only to separate different renewable energy technologies but also the need to understand and clearly define fundamental differences in technologies for a specific renewable source. For example, the separation of onshore wind into conventional onshore wind and remote island onshore wind, and the separation of offshore wind into floating and fixed-bottom represents an **understanding of the varying levels of support required by different technologies of the same renewable source.**

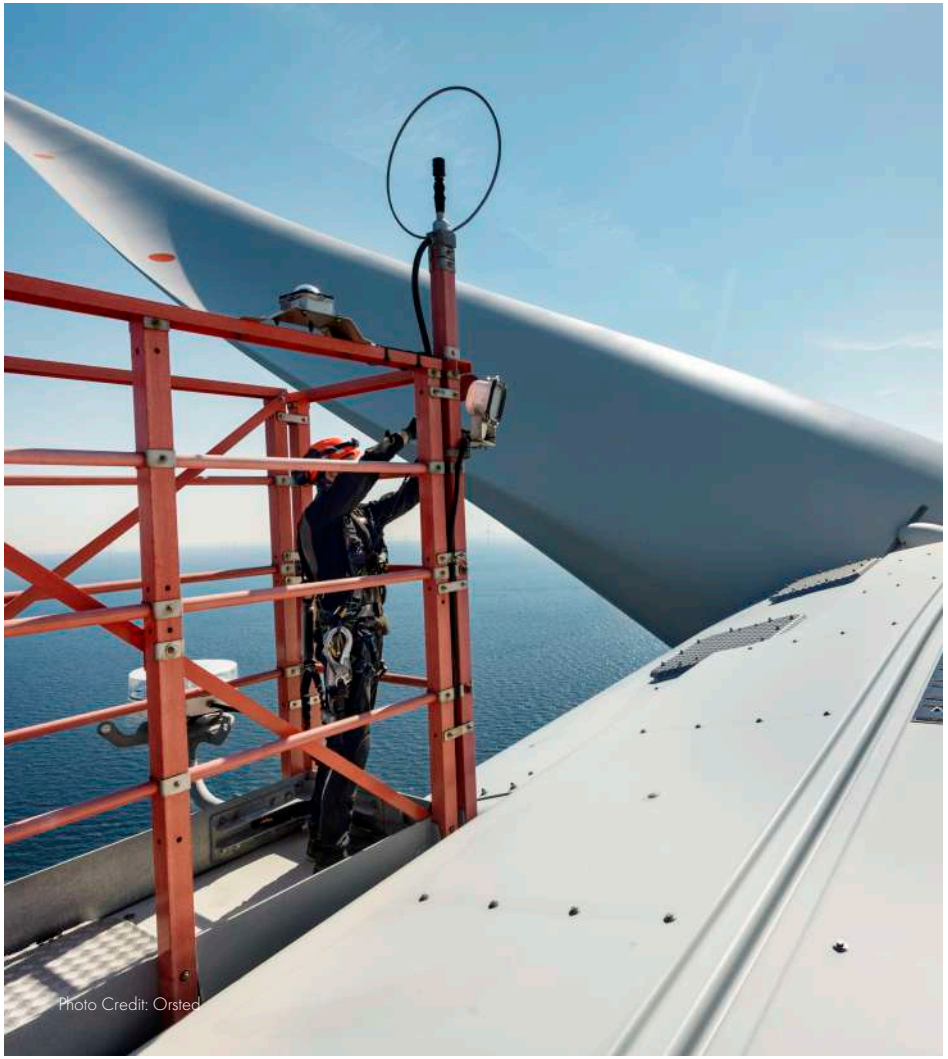


Photo Credit: Orsted


Photo Credit: Orsted

Exhibit 30: Development of UK CfD allocation rounds

Allocation Round (year)	Pot 1: Established Technologies	Pot 2: Less-established Technologies	Pot 3: Offshore Wind
AR1 (2014 -2015)	Onshore wind (>5 MW) Solar photovoltaic (>5 MW) Energy from waste with Combined Heat and Power (CHP) Hydro (>5 MW and <50 MW) Landfill gas Sewage gas	Offshore wind (fixed-bottom and floating) Biomass with Combined Heat and Power (CHP) Wave Tidal stream Advanced Conversion Technologies (ACT) Anaerobic digestion (>5 MW) Geothermal	Not yet established
AR2 (2017)	Closed	Offshore wind (fixed-bottom and floating) Biomass with Combined Heat and Power (CHP) Wave Tidal stream Advanced Conversion Technologies (ACT) Anaerobic digestion (>5 MW) Geothermal	Not yet established
AR3 (2019)	Closed	Offshore wind (fixed-bottom and floating) Biomass with Combined Heat and Power (CHP) Wave Tidal stream Advanced Conversion Technologies (ACT) Anaerobic digestion (>5 MW) Geothermal Remote island wind (>5 MW)	Not yet established
AR4 (2021)	Onshore wind (>5 MW) Solar photovoltaic (>5 MW) Energy from waste with Combined Heat and Power (CHP) Hydro (>5 MW and <50 MW) Landfill gas Sewage gas	Floating offshore wind Biomass with Combined Heat and Power (CHP) Wave Tidal stream Advanced Conversion Technologies (ACT) Anaerobic digestion (>5 MW) Geothermal Remote island wind (>5 MW)	Fixed-bottom offshore wind

Transparency and certainty of capacity targets and timelines

Case study: Netherlands

The Dutch government has set out clear directives for its offshore wind industry through its policies and supporting roadmaps. The legislature presents information on where and when new offshore wind farms will be tendered and commissioned, amongst other items. This provides clarity to all stakeholders and ensures certainty for wind farm developers.
In 2013 more than 40 organisations laid the basis for a robust, future-proof energy and climate policy for the Netherlands in the Energy Agreement for Sustainable Growth.

The Energy Agreement included scaling up offshore wind, and a roadmap to do so to 2023 was presented to parliament in 2014. This enabled the expansion to be achieved in accordance with the previously agreed timeframe. The 2023 roadmap laid provisions for the development of 3,500 MW of offshore wind, expanding the country's total capacity to 4,500 MW by 2023. The Offshore Wind Energy Law, adopted in 2015, became the legal basis of this roadmap.

In 2017 the Coalition Agreement, entitled ''Confidence in the Future'', was published calling for the designation of more sites for offshore wind farms. As such, following extensive consultation with stakeholders, the government presented an offshore wind energy roadmap to 2030. The 2030 roadmap laid provisions for the development of 7,000 MW, expanding the country's total capacity to 11,000 MW by 2030.

These two roadmaps have been used successfully by the Dutch government to provide certainty in achieving the capacity targets that have been set out. The roadmaps clearly identify which sites are being tendered and when. To date, the government has continued to deliver and meet its timetable. As well as allowing the government to achieve its capacity targets, the importance of this practice is that **the market knows in advance when tenders will take place, and this provides stability for investors.**

Exhibit 31: Projects in Netherlands 2030 offshore wind roadmap (2016-2020)

Capacity (MW)	Wind Farm	Planned Tender Date	Actual Tender Date	Anticipated Commissioning Date
700	Borssele 1 and 2	2016	Q2 2016	2020 (commissioned Q4 2020)
700	Borssele 3 and 4	2016	Q3 2016	2021 (commissioned Q1 2021)
19	Borssele 5	2018	Q1 2018	2021
700	Hollandse Kust (zuid) 1 and 2	2017	Q4 2017	2022
700	Hollandse Kust (zuid) 3 and 4	2018	Q1 2019	2023
700	Hollandse Kust (noord) 5	2019	Q2 2020	2024

Exhibit 32: Projects in Netherlands 2030 offshore wind roadmap (2021-2025)

Capacity (MW)	Wind Farm	Anticipated Tender Date	Anticipated Commissioning Date
700	Hollandse Kust (west) 6	Q3 2021	2025 to 2026
700	Hollandse Kust (west) 7	Q3 2021	2025 to 2026
700	Ten noorden van de Waddeneilanden 1	Q4 2022	2027
1000	IJmuiden Ver 1	Q4 2023	2028
1000	IJmuiden Ver 2	Q4 2023	2028
1000	IJmuiden Ver 3	Q4 2025	2029

Avoid strict local content requirements

Case study: France

Despite France's coastline offering significant potential for offshore wind, the country's operational capacity is negligible and lags significantly behind that of its European neighbours. In part, this can be attributed to the French government's determination to foster the development of a local industrial capacity from the outset. High local content requirements in the Round 1 and 2 auctions led to delays and high bid prices relative to auctions in other countries at the time.[21]

1 offshore wind auction were announced in April 2012. The exact bid prices submitted were kept confidential but it was later revealed that all projects were awarded the same price of around 200 EUR/MWh (~ 240 USD/MWh). The Round 2 auction had the same evaluation criteria and winning bid price.

While local content requirements can support supply chain development, they can also cause delays and increase the cost of realisation of a project. In less mature markets, significant investment is typically required to upgrade existing facilities or build new facilities to deliver the project. This has come to fruition in France with the six projects awarded in the Round 1 and 2 auctions having faced difficulty in development and suffering significant delays. Furthermore, the 200 EUR/MWh bid price was very high compared to support awarded in other countries at the time, and in 2018 had to be renegotiated down to between 135 - 155 EUR/MWh (~165 -190 USD/MWh). In part, delays can be attributed to stringent local content requirements, however, public opposition has also been a driving force.

France is an example of the importance of finding a balance between gradually increasing local content requirements to support development of domestic industry and ensuring value for money for consumers.

For the Round 1 auction the evaluation criteria used to determine the winning bidder were as follows: the bid price (40%), the industrial plan (including projects links to local companies) (40%), and the environmental impact (20%). The results of the French Round

At the next French auction, Dunkirk, in 2019 the evaluation criteria were as follows: electricity purchase price and strength of financial plan (80%) and inclusion of environmental stakes and optimisation of the area (20%). The auction had a focus on encouraging competitive bidding and less stringent local content requirements resulting in a bid price of 44 EUR/MWh (~ 50 USD/MWh), a significant improvement on the prior auctions. France is an example of the importance of **finding a balance between gradually increasing local content requirements to support development of domestic industry and ensuring value for money for consumers.**

21. Local content requirements were involved providing a plan regarding how to procure major components of the offshore wind farm locally, with the quality of this plan making up 40% of the overall scoring criteria for a bid.

Sizeable volume and initial stage of high FiT support

Case study: Taiwan

Taiwan is a rapidly growing offshore wind market with strong government policy and an ambitious capacity target of 10 GW by 2030. **Ensuring that there is sufficient volume of sites available for development is an important stage in nurturing developing markets** and Taiwan is a successful example of this. Furthermore, Taiwan has also initially supported a significant pipeline of projects through a relatively high FiT scheme, providing a stable base of projects off which to launch a more competitive auction scheme.

In July 2015, the BoE published the Guidelines for Reservation of Offshore Wind Power Generation Sites. The Guidelines govern offshore wind site planning and identified 36 potential zones suitable for project development along the west coast of Taiwan. Of these sites, 10 have been awarded subsidy support, totalling 5.5 GW of capacity expected to be operational by 2025. Of the 5.5 GW, nearly 4 GW of capacity was awarded through the original FiT scheme, and 1.6 GW has been awarded through competitive auction. Further sites, totalling 5 GW, are expected to be awarded financial support in further auction rounds with much of this capacity expected to come from zones within the initial 36 zones.

Sizeable volume is critical as it creates a healthy level of competition in the market and enables investment in developing a local supply chain. This is important for attracting investment from foreign companies who can bring their learnings from other markets to help promote the industry locally. Sizeable volume is crucial not only in the number of available sites, but in the initial stages of offshore wind development. Taiwan has been able to create a healthy, competitive environment by having sufficient number of offshore wind sites for developers, as well as supporting a significant capacity through an initially high FiT regime to establish a robust pipeline. In addition, sizeable volume is important to maintaining continuity and momentum in the market to meet policy goals. This includes accounting for development risks, so that if any sites experience delays or are found to be unsuitable for development they can be replaced.

Photo Credit: Orsted

Single window permitting

Case study: Denmark (one-stage) / UK (two-stage)

A clear and streamlined permitting process is key to a successful offshore wind industry. Governments can best deliver their energy strategy if developers are confident that their projects will be built within a set timeframe. **An efficient permitting process allows projects to close financially in a timely fashion, which in turn expedites projects moving to the construction phase and overall, this boosts the attractiveness of investing in the market.** Furthermore, a clear process ensures that government, developer, and stakeholder concerns are addressed as early as possible. While the regimes differ, both are examples of best practice, incorporating a well enforced timeline and transparency with the market.

Exhibit 33: Denmark and UK single window permitting

Denmark - One-Stage Auctions	UK - Two-Stage Auctions
Denmark is an example of country that utilises one-stage auctions.[22] The DEA serves as the single window, responsible for auctions, concessions, and relevant licences and procedures. This is effective in ensuring a smooth and administratively lean process. Tenders held have been site specific and the sites have been pre-developed and pre-approved by the DEA; in winning the tender the developer receives all the necessary licences and consents it needs to proceed to construction. There is complete transparency and co-ordination within the market, and it is clear to the industry and developers who is responsible. The responsibility of the single window includes undertaking an EIA and habitats regulations assessment (HRA) and finalising this prior to any auctions, removing this risk and uncertainty for developers bidding into any tenders. This de-risking can also create significant value in itself and lead to increased competition and reduced strike prices as a result of the auctions. The success of the single window approach is evidenced by the timescales achieved. For example, the DEA undertook an EIA for Horns Rev 3 with results announced in May 2014, only six months after the formal contract notice had been published. The auction was concluded in early 2015 and the wind farm was operational by 2019.	The UK is an example of a country that utilises two-stage auctions. Despite this, all permitting for the onshore and offshore infrastructure is considered together at a national level (with the exception of Scotland). Any offshore wind farm over 100 MW is categorised as a nationally significant infrastructure project (NSIP). The permitting process for NSIPs is managed by a branch of the central government: the Planning Inspectorate (PINS). PINS is responsible for awarding a development consent order (DCO), marine licence, and reviewing the EIA and HRA. Authority for final approval sits with the energy minister i.e., the Secretary of State for Business, Energy, and Industrial Strategy in the current UK government. The regime imposes strict timescales on key stages of the process, and it has typically taken 18 months from the day an application is submitted to a decision being made. The advantage of this system for developers is that permitting is overseen by a single organisation and that they have confidence that a timely decision will be made. It should be noted that in the past year a number of projects have experienced delays in receiving consent decision for their permits. This shows the need for permitting processes to evolve to meet the maturation of the industry. In the case of the UK, this is likely to mean modifications to the way PINS manages this single-window process, rather than abandonment of the single-window process itself.

22. This is changing for the upcoming Thor tender, where the DEA will undertake a Strategic Environmental Assessment for the site and the offshore EIA will be the responsibility of the winning bidder.

STAKEHOLDER FEEDBACK

Introduction and methodology

To understand how these best practices might apply to the Vietnamese market, this study also undertook interviews with nine stakeholders during H1 2021. These stakeholders represented local (Vietnamese) and foreign interested parties across four key groups – government, industry, fishing, and investment, as shown in Exhibit 34.

These stakeholders were all interviewed by an independent consultant, and their identities were anonymised prior to conclusions being issued to the authors to ensure independence of views and to allow stakeholders to speak freely. Each interview was undertaken in Vietnamese or English by phone using a set of pre-selected questions pertinent to that stakeholder's group. The questionnaires used are available in Appendix A-D provided in a separate document. Verbal responses were summarised in written reports which were issued to the authors of this report.

The interviewed stakeholders are described as follows:

- Deputy Director of a Vietnam-based offshore wind developer;
- Head of Government Relations of the Vietnam office for a foreign offshore wind developer;
- Renewable energy lead of a Vietnamese engineering company active in offshore wind;
- Member of a Vietnam-based aquaculture trade association;
- Senior leader of a fishing trade union in a province with offshore wind development;
- Adviser to the MOIT on renewable energy issues;
- A senior leader within EVN who is familiar with offshore wind;
- The lead underwriter of an export credit agency active in offshore wind financing in Asia;
- A Vice Director of a state-owned commercial bank in Vietnam with significant energy investments.

Exhibit 34: Stakeholder groups interviewed

Results

The stakeholder interviews were generally aligned in their recommendations and their views of the current offshore wind market in Vietnam, despite their different backgrounds and disciplines. The following sections summarise these themes; where there was any significant difference in opinion by any of the stakeholders, this is discussed. The summary is broken down into three sections, according to the sections of the questionnaire used in the interviews.

Awareness of global offshore wind policy and particularities of Vietnam

Most stakeholders showed a general awareness of global offshore wind policy and highlighted of the need to increase offshore wind experience and expertise within the Vietnamese government. Some local stakeholders with less experience of offshore wind outside Vietnam were less aware of global policies and best practices. It was noted that offshore wind education would be critical and come from a committee or team of both international and local experts.

The stakeholders primarily cited Taiwan, Denmark, and the UK as leaders in offshore wind development, highlighting the potential to learn from these markets where appropriate. As a key development difference between Vietnam and the leaders in offshore wind, the stakeholders mentioned how Vietnam's transmission system is different in ownership and strength to other markets, pointing out that grid and transmission upgrades would be required to support a large scale of offshore wind development.

Priorities in auction design

Stakeholders highlighted how in comparison to other countries, the nearshore project pipeline in Vietnam is more significant and environmental standards in Vietnam tend to be lower than in other countries with offshore wind. To receive international debt, projects are generally required to meet international environmental and social performance standards. These are areas that will need consideration in any policy design for offshore wind, which will require large volumes of finance including international debt.

They noted Vietnam is currently establishing itself as an industrialised nation and energy demand is still increasing. If rapid growth in offshore wind is to be achieved, then learning will have to occur whilst the wider energy sector is still developing. Government intervention may be required to ensure foreign companies invest and upskill the local supply chain, however strict localisation requirements were viewed as potentially harmful and unnecessary at this stage.

In comparison to other countries, the nearshore project pipeline in Vietnam is more significant and environmental standards in Vietnam tend to be lower than in other countries with offshore wind.

It was evident amongst stakeholders that both lowering the cost of energy for offshore wind and creating scale will be critical for the success of offshore wind in the country. There was a general view that if policy is designed well and with transparency, and scale is achieved, then local jobs and growth of the industry will follow.

With regards to support mechanisms for offshore wind, the current FiT level was seen as appropriate. Still, concerns were raised over the duration of validity, with stakeholders keen to extend the FiT to "true" offshore wind prior to a transition to auctions.

Foreign investors expressed concerns regarding the bankability of the existing PPA and believed the PPA terms would need to change before they would invest in large-scale offshore wind projects in Vietnam. Domestic investors were less concerned about the PPA, having become accustomed to the terms and working with Vietnam Electricity (EVN) on other smaller-scale energy projects, although it was acknowledged that domestic investors were currently unable to finance GW-scale offshore wind projects on their own.

Regarding auction design, there were some concerns raised that a one-stage approach may drain internal government resources and require upskilling in offshore wind that would not be possible in a short timeframe. However, the general consensus was no strong preference towards one-stage versus two-stage auctions. There was a view that regardless of which system is used, the policies should cover all aspects of offshore wind development with responsibilities clearly defined.

Best practices for offshore wind growth in Vietnam

Stakeholders indicated that consultation is a key aspect of offshore wind policy design and believe success is contingent upon it. The local supply chain and fishing communities were identified as groups likely to be affected by nearshore and offshore wind. The desire to establish a way for the fishing communities to benefit and be minimally impacted from offshore wind development was raised.

The stakeholders mentioned how offshore wind policies should be clear, transparent, and have a long-term vision. The pace of the transition from a FiT mechanism to auctions was a key concern, and stakeholders believed a transition period between the schemes should be implemented. During this period of overlap, stakeholders would like a robust analysis to take place and for the auction to be designed appropriately. Alternatively, if there is no period of overlap, then stakeholders believed this should be made clear with early notice and a succession plan in place with long-term and stable goals.

RECOMMENDATIONS

Photo Credit: Orsted

Vietnam is a nascent offshore wind market, with world-class wind resource and strong fundamentals for growth which can make it an offshore wind leader in South East Asia. Under the current development pipeline, the first true large-scale offshore wind projects are not likely to be connected to the grid until 2026 or later, and they lack a clear regulatory framework to support their development.

Until then, the market needs sufficient time to develop investor confidence, the first few flagship projects, and experience in the local supply chain. These factors should be in place for the first projects to be realised, and only then a transition to a competitive bidding scheme can feasibly evolve. This has been the process in the UK and Taiwan, which successfully transitioned to offshore wind after 5.5 GW and 4 GW respectively of projects secured access to previous offtake mechanisms.

The infancy of the offshore wind sector in Vietnam means that policy is still being formulated. Therefore, it is incredibly important to ensure that current and future policy is designed for steady and sustainable growth, providing sufficient time for the offshore wind industry to mature. Specifically, the following recommendations should be considered as Vietnam undertakes a transition to an offshore wind auction scheme in the years ahead:

Timing and transition from the FiT

The first true offshore wind projects in Vietnam will not reach COD until 2026 or later. A new FiT for offshore wind should therefore be applied from now to support the initial stage of 4-5 GW of true offshore wind projects connecting to the grid, prior to an auction mechanism being implemented.

- The FIT should be communicated as soon as possible to ensure stability in the industry, avoid undermining projects currently in development and support the initial batch of projects which will not be completed until at least 5 years from now.
- The current offshore wind FiT (0.098 USD/kWh), which is due to expire by November 2021, is based on nearshore wind, so a FiT for true offshore wind may require an updated calculation due to differences in costs and market maturity for these technologies.
- The FiT will give confidence to investors to push ahead with project development, which will help to support local businesses and encourage them to learn and partner with experienced developers and supply chain companies.
- An earlier transition to auction would apply excessive pressure on these companies to upskill and deliver at low cost, without the resources and time to do so. Excessive pressure could lead to a failure to deliver the desired volume or schedule of offshore wind, supply chain fallout due to cost overruns or even early auctions resulting in prices higher than expected.

- An earlier transition to auction will also require at least one year for the government to prepare the auction regime and guidelines, which will delay the first batch of offshore wind projects and risk projects missing the targeted COD year.

In the interim period leading up to the expiration of the new FiT covering the initial 4-5 GW of projects, a transition arrangement from this new FiT to auction should be made clear and publicly communicated.

- The publication of guidelines for the auction program should begin while the offshore wind FiT is still in place, to provide developers with sufficient visibility of the regulatory framework that will apply to their projects. This will allow developers to have full visibility on a project's expected return and make informed decision about project investment and development. Authorities can consider different milestones which can be met to qualify for the FiT, such as receipt of the IRC or COD date.

- Sufficient notice of the transition to auctions is also required for planning the required grid availability for GW-scale offshore wind projects, to avoid the risk of curtailment which has impacted the solar PV and onshore wind sectors.

- It is clear from stakeholder interviews that clear communication of when the transition will occur is critical, and key actors within the industry and government should be given enough time to prepare for this. The type of transition implemented is a secondary priority.

Ahead of auctions being introduced, bankability of the current PPA should be improved to attract foreign investment. Although not drawn from the case studies in this report, PPA bankability will be crucial for development of offshore wind projects due to the large scale of investment required.

- Whilst smaller-scale onshore wind projects can be financed using local banks and investors comfortable with the current template PPA, the large scale of offshore wind will require international finance. However, foreign investors are not confident to proceed under the current terms.

- The current PPA does not follow international standards, particularly around: grid delay and the commissioning risks incurred; curtailment and compensation mechanism; currency conversion risks; protection from change in law; forums for international dispute; and others.

- Given the risks of the current PPA, it is even more important to have a strong FiT regime and transparent regulatory environment. These elements will help to manage development and investment risks, where lower costs for international finance could help to further reduce prices. Providing time for the industry to scale and mitigate these risks under a FiT regime is therefore important; if the transition to auction happens too early, foreign investors will be deterred and local companies will not have enough time to develop their capabilities.

- A study of other markets combined with consultation with foreign and local investors, including commercial banks with experience in project finance, is recommended as a next step to finding ways to improve PPA bankability. For example, developers in Taiwan sign "side letters" with the offtaker Taipower to address and manage deficiencies in the standard PPA. There is not sufficient liquidity in the Vietnamese banking sector to finance all offshore wind projects in the country, so involvement of foreign banks is crucial.

Policy support and process

Enough time should be given to prepare the auction policy: A minimum of two years' notice should be provided to industry and key stakeholders of any significant change in approach.[23]

- An auction with clear timing and implementation guidelines would also enable EVN sufficient time to prepare the grid for increased levelsof connections and incentivise projects where they are most needed in the electricity system.

- It is also necessary to allow time to consult with other key actors, including to understand high-level social and environmental implications of the policy design.

The Government of Vietnam should incorporate a systematic and open consultation process whilst designing the future offshore wind policy.

- As part of open dialogue, developers should be kept informed about any changes to auction design or support schemes under consideration, and invited to submit commentary.

- A lack of open dialogue and consultation increases the risk premium for investors and developers, which will decrease participation in auctions and the offshore wind market.

23.This early notice and succession plan draws from the successful offshore wind case studies from the UK and Taiwan in this report.

- Wider stakeholder consultation should include EVN, local and foreign investors, project developers, actors in the international and local supply chain and local impacted industry groups such as the fishing community, shipping and offshore oil and gas.

There should be complete transparency throughout the offshore wind policy development process, such as publication of targets, and draft rules and procedures for commentary.

- Policy decisions by the government should be announced publicly and communicated clearly to interested parties.
- Important planning data, such as the locations of environmentally sensitive areas and other restricted areas of the sea, should be made available by the government and stakeholders for those wishing to develop offshore wind farms.
- Equally, planned projects should provide project information to key stakeholders during consultation to keep them informed.

Auction design

When announced, the auction should have enough scale, e.g. 2-3 GW per allocation round, to accommodate the strong interest in Vietnam's offshore wind sector.

- This will also promote competition if supply and demand can be balanced.
- Furthermore, a clear roadmap to future auction rounds (post-2030) should be published to demonstrate a longer-term ambition and the building of a sustainable industry, in line with PDP8 and Vietnam's goal to foster a ''blue economy.''

Further study should be undertaken on one-stage versus two-stage auctions for Vietnam.

- Two-stage auctions are likely to provide more growth in a quicker period whilst leveraging the expertise of international developers to choose appropriate sites.
- The current process of awarding site survey licenses for offshore wind sites could be considered the first step in a two-stage auction process. However, the current practice of provinces awarding licenses for sites in close proximity can lead to unfeasible site areas. Wind blocking (or 'wake effects') should be considered before allocating offshore areas.
- One-stage auctions will require sufficient resources allocated within the government to select appropriate sites. Education on the site selection process would also be required.
- Compensation arrangements or other suitable transitional arrangements for those projects that may be displaced by a one-stage system should be clearly laid out and consulted upon.

Auction design should differentiate between more and less mature types of technology.

- In particular, this should consider how offshore and nearshore auctions might interact and incorporate floating wind in the future.
- There will be varying levels of support required by different technologies of the same renewable energy source (wind), due to different stages of maturity in Vietnam.

An efficient and streamlined permitting process will be required for on-time delivery of projects. The government should prepare for offshore wind procurement with either a ''single window'' agency responsible for co-ordination permitting, or a clearer division of responsibilities for permitting among government bodies.

- While offshore wind projects are large in scale and require engagement with many government agencies and authorities, this coordination should be the responsibility of a high-level central office, such as one sitting under the Prime Minister's Office.
- This predictability is needed for the sector to deliver a pre-determined volume of power at the needed month/year, and support the country's energy security objectives.

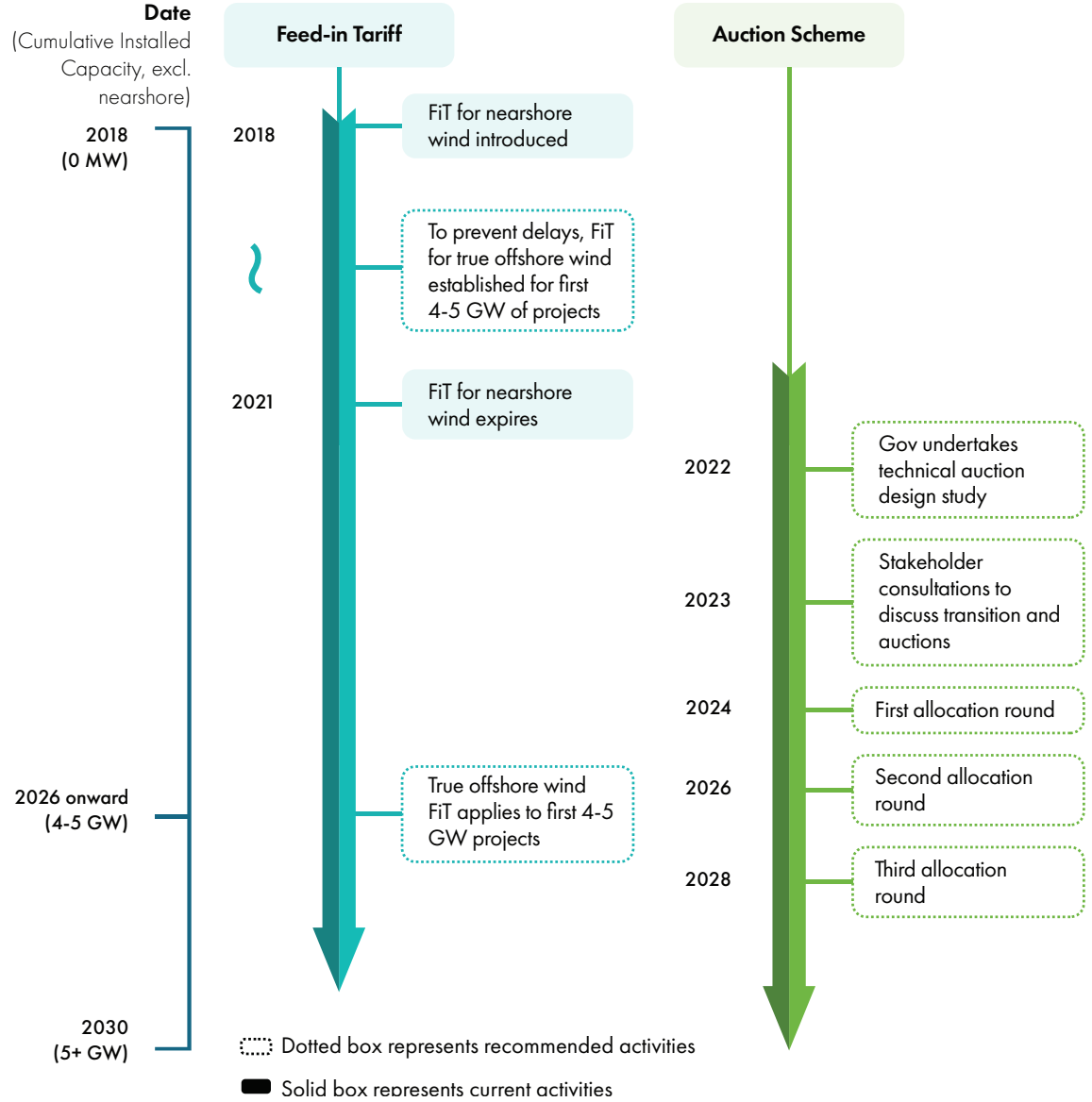
Recommendations for further study

In the course of conducting research and drafting this report, the following areas emerged as meriting further study for successful offshore wind development in Vietnam:

- Best practices in grid connections and offtake arrangements, including priority access, timely grid connections, responsibility for substation and transmission infrastructure, payments for curtailments and nearshore/offshore cost allocation.
- Best practices in permitting and consenting frameworks, as well as lessons learned in stakeholder consultation with other ocean users and communities impacted by offshore wind.

- A study on marine spatial planning and site selection in Vietnam, allowing for identification and ranking of potential sites for bottom-fixed as well as floating offshore.
- A technical study on offshore wind auction design, including pre-qualification criteria and evaluation criteria which allows for transparency, stability and fair competition.

Exhibit 1: Transition to auctions in Vietnam



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