

L'énergie éolienne en mer en France

Valoriser le potentiel de l'éolien
en mer en France pour atteindre
l'ambition de décarbonisation



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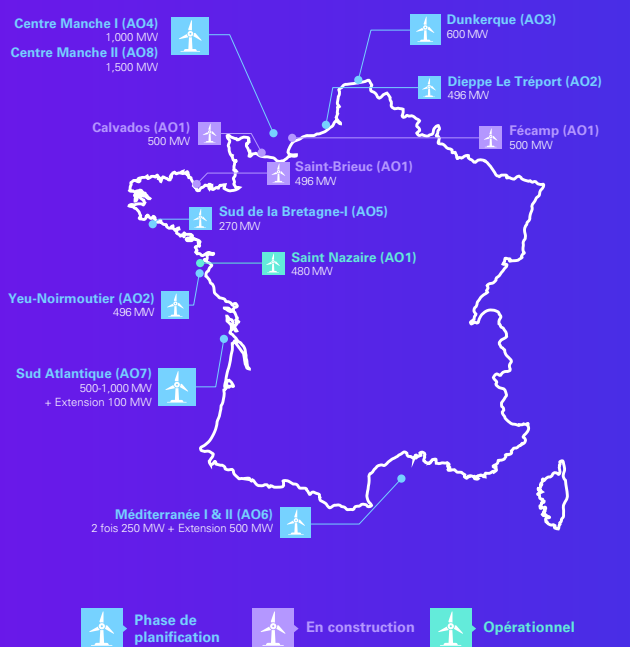
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Executive Summary

Avec un littoral de 5 853 km et des eaux territoriales de 371 000 km²,

la France possède la deuxième plus grande ressource éolienne en mer d'Europe. Cette technologie a connu des progrès importants, à partir de décembre 2020, avec la construction de trois grands parcs éoliens : Saint-Nazaire, Fécamp et Saint-Brieuc, de capacités respectives de 480 MW, 498 MW et 496 MW. Néanmoins le rythme de déploiement devrait être accéléré pour atteindre la trajectoire désignée par la France pour remplir ses objectifs climatiques : une capacité éolienne en mer installée de 40 GW d'ici 2050.



Note : La taille des légendes est proportionnelle à la capacité du parc éolien.

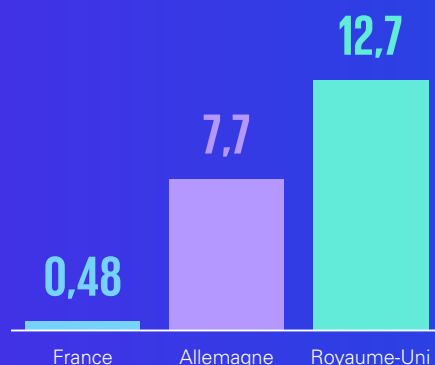
Principaux problèmes ralentissant le déploiement

01. Procédures réglementaire et de délivrance des permis allongées
02. Opposition des acteurs locaux
03. Insuffisance du réseau électrique
04. Accroissement des besoins d'investissement

La capacité installée mise en perspective (GW)

Malgré ses grandes ressources éoliennes en mer, la France est en retard vis-à-vis des états européens leaders dans l'éolien : à fin 2022, seul le projet de **Saint-Nazaire** est opérationnel.

Capacité opérationnelle d'énergie éolienne en mer en 2022 (GW)



Durée excessive d'achèvement des projets d'éoliennes en mer

À compter de sa date d'attribution, un projet français actuel nécessitera 7 ans pour son achèvement (autrefois entre 10 et 12 ans) : un délai excessif par rapport aux pays européens leaders.



La vision 2030 – 2050

Le gouvernement s'est fixé des objectifs ambitieux pour le développement de l'éolien en mer, avec une capacité installée prévue de 40 GW en 2050.



de l'électricité produite par des sources renouvelables d'ici 2030.



Capacité totale d'énergie éolienne terrestre et maritime d'ici 2050 (contre 20,1 GW en juin 2022).

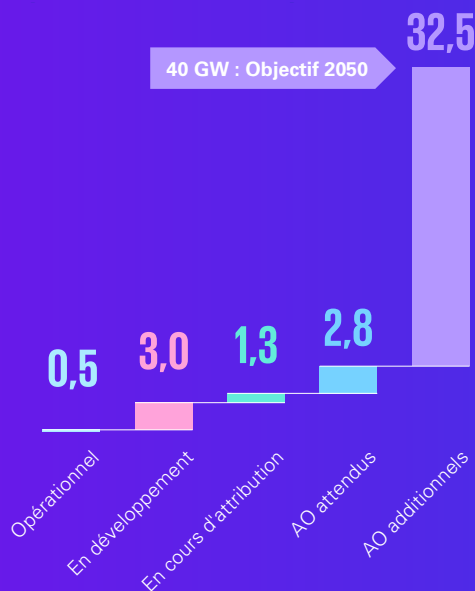
Capacité actuelle et projetée d'énergie éolienne en France, GW, 2015-2050

Capacité terrestre		Capacité en mer
10,3	2015	0,0
19,6	Junin 2022	0,5
37,0	2050	40,0

Pipeline de capacité installée d'énergie éolienne en mer en France

Pour atteindre les objectifs de capacité de l'énergie éolienne en mer, on constate une augmentation du nombre d'appels d'offres lancés pour des projets. Pour ce faire, la France réorganise sa structure réglementaire afin de la rendre plus favorable au secteur.

Évolution de la capacité éolienne en mer en France (GW)



Mesures prises en France à date

Compte tenu des objectifs ambitieux en matière d'énergie renouvelable, l'installation accélérée de l'énergie éolienne en mer est devenue une priorité pour le gouvernement français. Pour cela, des réglementations pertinentes visant à simplifier le cadre législatif ont été introduites.



2015 Loi de transition énergétique pour la croissance verte



2017 Loi sur la recherche et exploitation des hydrocarbures*



2017 Ordonnance sur l'autorisation environnementale unique



2018 Loi ESSOC (Un état au service d'une société de confiance)



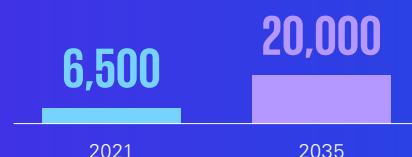
2020 Article 55 de la loi ASAP (Accélération et Simplification)

* RTE a été désigné comme l'entité responsable de la construction et du financement de la connexion des parcs éoliens en mer.

La route à suivre

Les 40 GW de capacité installée d'ici 2050 représentent une opportunité industrielle pour le pays, avec la production de composants industriels, le renforcement des infrastructures portuaires, la production d'activités d'amarrage et la modernisation du réseau électrique. Toutes ces opportunités permettront d'augmenter l'emploi dans le secteur.

Nombre de postes prévus dans le secteur de l'éolien en mer, 2021-35



Contactez-nous



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Réflexions d'experts du secteur

L'année 2022 représente une étape importante pour l'industrie de l'éolien en mer en France.

La France a enfin commencé à produire de l'électricité en mer depuis Juin 2022. Le parc éolien en mer de Saint-Nazaire, premier appel d'offre attribué en 2012 et porté par un consortium comprenant EDF Renouvelables, Enbridge et CPP Investments a eu toutes ses éoliennes mise en service et opérationnelles le 23 novembre 2022 (80 éoliennes avec une capacité installée de 480MW). Début 2023, l'attribution de l'AO5 (le mega projet d'une puissance de 1000 MW situé à 32km des côtes de Normandie (Centre Manche 1), a été faite à un tarif très compétitif de 44,9€ MWh, signe de l'attractivité de la France.

Bien que l'installation et la mise en service du parc de Saint Nazaire représentent une étape importante, le retard pris dans sa réalisation a suscité des inquiétudes. La France bénéficie du 2ème gisement d'éolien en mer en Europe après la Grande-Bretagne grâce à sa façade maritime mais reste aujourd'hui significativement en retard en termes de capacité installée comparée à ses voisins Européens, les projets mettant deux fois plus de temps pour leur instruction.

Comparé au 480MW en production, aux 4 GW déjà autorisés service d'ici 2027 le président de la république a annoncé en 2022, un objectif volontariste et ambitieux de 40 GW de capacité installée pour 2050 soit une attribution annuelle de plus d'1GW par an en moyenne. L'énergie éolienne offshore apparaît comme une technologie essentielle pour la France pour renforcer l'atteinte de ses engagements en matière de transition énergétique

La France ambitionne de développer une filière industrielle nationale solide pour le secteur. En développant des liens en amont et en aval, l'idée de créer une filière industrielle française de l'énergie éolienne offshore a déjà donné des résultats remarquables.

Par exemple, le projet de Saint-Nazaire et les autres appels d'offres ont permis la construction de plateformes logistiques près des ports, l'installation de centres d'assemblage et de maintenance, ainsi que la construction de trois usines de General Electric Renewable Energy (GERE - 750 employés) au Havre et l'usine de Siemens Gamesa à Cherbourg (750 employés). Un écosystème local est apparu, où les sous-traitants français de GERE ont créé 1 200 emplois et font affaire avec quelque 1 600 entreprises du secteur. Ces activités facilitent et accélèrent non seulement le déploiement de projets mais créent également une dynamique dans les économies locales.

La Loi du 10 mars 2023 relative à l'accélération de la production d'énergies renouvelables, ambitionne de mieux planifier les zones de développement de l'électricité en mer en simplifiant et accélérant les procédures d'approbation pour réduire les délais et permettre aux projets d'émerger plus rapidement et en plus grand nombre.

Espérons que 2023, soit le début de l'accélération et marque un vrai envol pour la filière de production décarbonée en mer pour lequel la France a un vrai Gisement et un potentiel industriel.



La crise énergétique actuelle accélère la transformation de l'industrie. Cela est essentiel pour garantir la souveraineté énergétique : non seulement l'énergie éolienne offshore représente une alternative pour produire une offre énergétique locale et compétitive, mais elle est également une opportunité de développer un écosystème industriel régional autour des parcs éoliens, comme l'illustre le projet de Saint-Nazaire récemment mis en service.



Valérie Besson

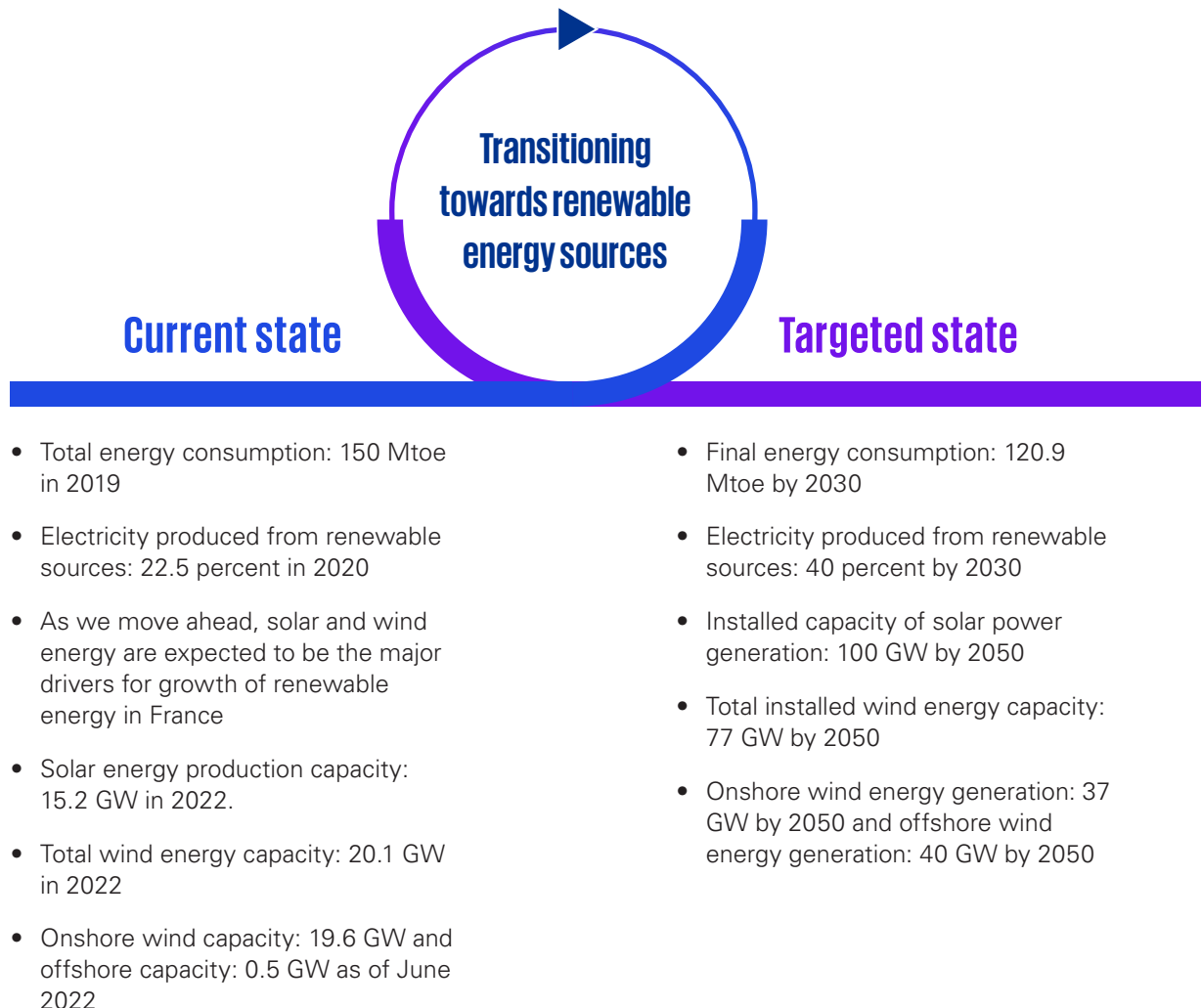
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02. France's climate ambitions



France's climate ambitions

Snapshot of the current and targeted state of renewable energy adoption in France¹



Key measures undertaken to achieve the targeted state

France is widely perceived as an early leader in energy transition by the international community. As a frontrunner in setting out ambitious targets for energy transition, it has established a net zero target for 2050 in its Energy and Climate Act 2019 and revised its nationally determined contributions accordingly. The country benefits from decarbonised electricity as it has a majority share of nuclear power (69 percent as of 2021) in the energy mix followed by hydraulic (hydropower) (12 percent as of 2021)². The decarbonisation foundation of France, anchored in the Energy Transition Law 2015, lays out a roadmap to mitigate climate change and diversify its energy mix. It includes ambitious targets to reduce greenhouse gas (GHG) emissions, overall energy consumption, share of fossil fuels and dependency on nuclear power.

¹ France Energy Policy Review 2021, IEA, Link, accessed on 13th January 2023

² Electricity Report 2021, RTE, Link, accessed on 5th January 2023

Broad objectives set by the law include :



Reduction of GHG emissions by 40 percent by 2030 compared with the 1990 levels and 75 percent by 2050



Reduce France's dependency on nuclear power from 75 percent to 50 percent by 2030



Increase the share of renewable energy in the energy mix to up to 32 percent by 2030

To ensure the accomplishment of the established targets, several measures were taken. For instance:

- In 2018, a governance mechanism known as the integrated National Energy and Climate Plans (NECPs) was established at the EU level and adopted by France. These NECPs are typically designed for a 10-year period and serve as climate roadmaps for each of the EU Member States.
 - This plan outlines the actions taken by the EU countries to address energy efficiency, increase the share of renewables, reduce GHG emissions and encourage research and innovation.
- In 2021, 'Climate and Resilience Law' was introduced in the country. As per which, the scale of existing penalties for non-compliance in environmental matters or involvement in illegal activities in protected areas was increased.

Apart from these measures, in 2021, 'European Climate Law' was adopted by the country. This law, in addition to the already existing targets, introduced new binding targets as follows:

- Reduce GHG emissions by 55 percent (as against the earlier target of 40 percent set under Energy Transition Law 2015) by 2030 over the 1990 levels³.
- Achieve climate neutrality by 2050.

To achieve the new targets, in 2021, the 'France 2030' investment plan was introduced. This plan aims to transform key sectors through innovation, research, and industrial investment by 2030. It has a total budget of EUR34 billion⁴, of which EUR1 billion⁵ is expected to be invested in renewable energy innovation projects. With increased investments in renewables, France seeks to accelerate electricity generation through solar and wind power. It targets to increase installed capacity of solar power generation by 10 times, up to 100 GW by 2050 and build 50 offshore wind farms, generating 40 GW collectively⁶.

To ensure meeting its climate targets and cope with energy crisis, France foresees wind power as one of the strategy pillars to achieve green and energetic transition. With the growing regulatory focus, investments and technological progress, wind energy showcases huge potential in France. It is in fact, emerging as one of the most crucial renewable energy sources to tap into, especially the offshore wind farms.

³ European climate Law, European Commission, Link, accessed on 9th November 2022

⁴ "European Green Deal, European Union, Link, as accessed on 4th November 2022

⁵ "France 2020" Investment Plan, IEA, Link, accessed on 9th November 2022

⁶ Statement of Mr. Emmanuel Macron on energy policy, Republic of France, Link, accessed on 11th November 2022

03. Wind energy market in France



Wind energy market in France

Wind sector highlights

20 GW

wind power capacity in France in 2022

36.8 TWH

total wind energy generated in 2021

31 GW

31 GW cumulative wind energy capacity by 2026

Wind Energy is the third preferred renewable electricity source in France, after hydropower and nuclear energy. With robust energy goals and growing investments, it is expected to be the fastest growing source of renewable energy during the period 2020–2025⁷.

A glance at the key drivers and advancement in the wind sector

Technological advancements, energy transition policies, and public support are some key factors accelerating growth in the wind energy sector of the country. The energy transition policies and political demand to expedite the transition to energy autonomy has led the country to set ambitious targets for wind energy through the multiannual energy programme (PPE).

As per the PPE, the country has set the following targets⁸:

80 percent of people in France favour wind energy over other sources of energy to play an important role in energy transition.



Land-based wind

Increase the power capacity by 2 GW per year to reach the committed target of 24.1 GW by 2023 and install 33.2–34.7 GW capacity by 2028.



Offshore wind

Install 4 GW of fixed-bottom offshore wind by 2023 and 5.2–6.2 GW capacity of overall offshore wind power by 2028.

Acting upon its commitments, in the last two years, France has released three onshore wind tenders, with a total potential capacity of 1.4 GW. On the other hand, the offshore wind energy has seen major progress, starting December 2020, with the construction of three major wind parks namely Saint-Nazaire, Fécamp and Saint-Brieuc with a capacity of 480 MW, 498 MW and 496 MW, respectively.⁹ But the ongoing pace of the projects has shown a slight delay in the trajectory to reach its newly committed climate targets due to the pandemic, creating the need to further expand its offshore wind potential^{10,11}. The figure below mentions the total wind energy capacity for both onshore and offshore.

⁷ IEA wind TCP Annual Report 2020, Link, accessed on 7th November 2022

⁸ IEA wind TCP Annual Report 2020, Link, accessed on 7th November 2022

⁹ RTE Electricity Report 2020, Link, as accessed on 19th September 2022

¹⁰ "Energy Pathways to 2050", RTE, Link; as accessed on 19th September 2022

¹¹ "Renewable capacity statistics 2022", IRENA, Link; as accessed on 19th September 2022



20.1GW

Total wind energy production capacity in France, June 2022 (concentrated in the North and East of France)

Current and projected wind energy capacity in France, GW, 2015–2050

Onshore Capacity



Offshore Capacity

10.3

2015

0.0

19.6

**June
2022**

0.5

37.0

2050

40.0

France has many advantages to boast offshore wind power such as its extended maritime boundaries, port structure and industrial, energy and maritime expertise. The floating wind turbines and cutting-edge technologies are innovative, mature and promising. The new technologies are more productive than the onshore turbines, harnessing stronger and regular winds. The facilities for generation of offshore wind energy will help the country to achieve its national objectives. To further tap the potential of offshore wind farms, the French government has signed the deal with the wind industry, committing to build 40 GW offshore wind farms spreading over 50 farms by 2050¹².

¹² France commits to 40GW Offshore wind by 2050, Windeurope, Links, accessed 4 Nov 2022

04. Offshore wind energy in France

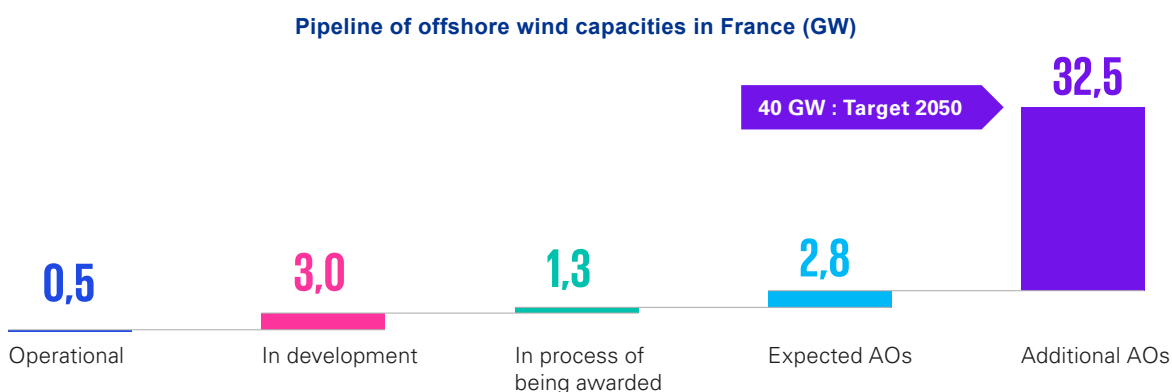


Overview of the offshore wind sector

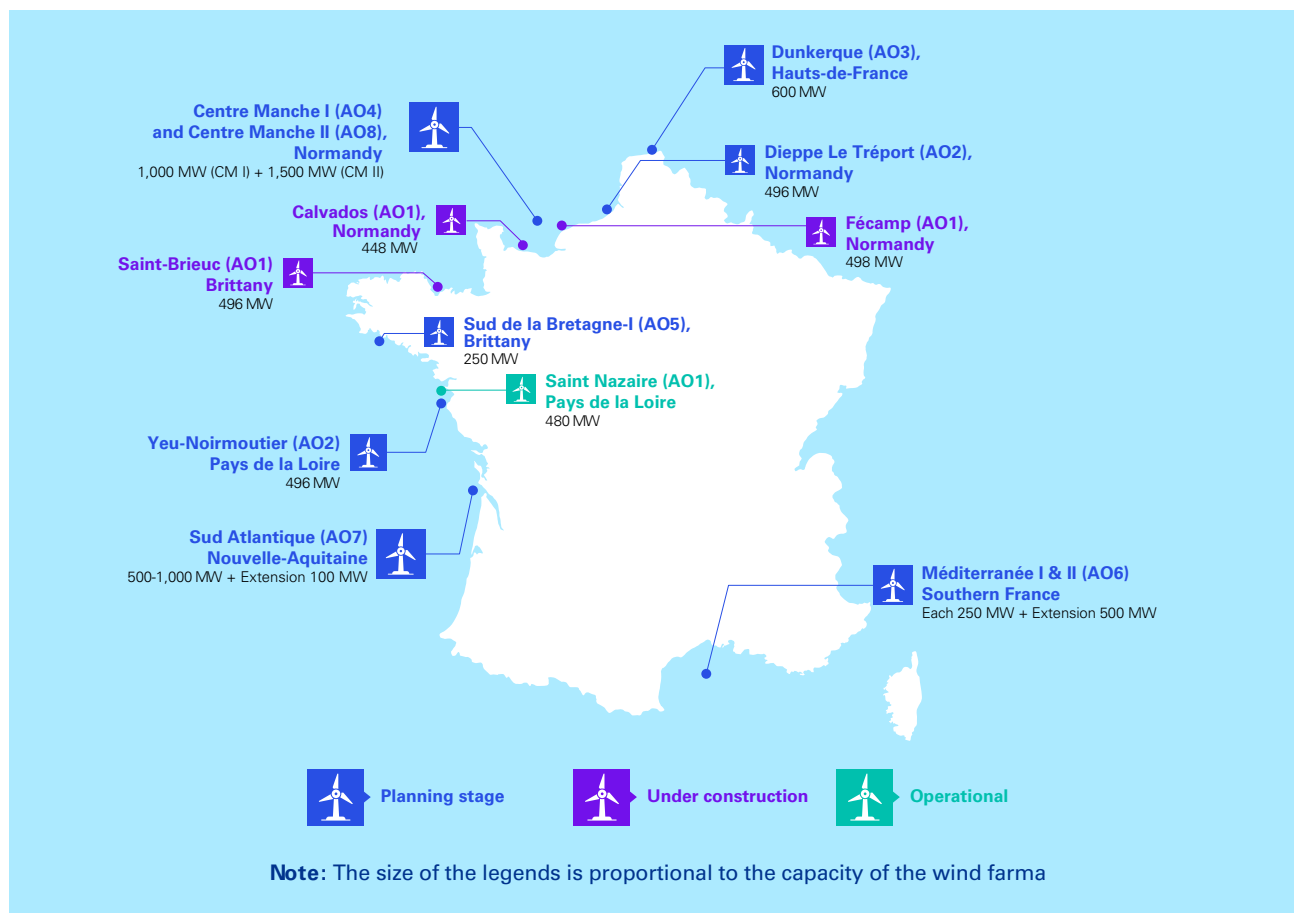
With an extensive coastline of 5,853 km and 371,000 km² of territorial waters, France has the second-largest wind resource for offshore wind energy in Europe. Despite this, it has struggled to deploy offshore wind energy when compared with its European counterparts. To put this into perspective, as of early 2022, the country had only one 2 MW demonstration offshore wind turbine project operational as against 2,542 wind turbines accounting for 12.7 GW in the UK and 1,501 turbines accounting for 7.7 GW in Germany¹³. But the future looks different as France is revamping its regulatory structure to make it more favourable for the sector. This, in turn, is leading to an increase in the number of tenders being launched for offshore wind energy projects.

Snapshot of key offshore wind projects (including tenders) in France

A peak into the pipeline of offshore wind capacity in the country and a project level overview of planned/ installed offshore wind energy is highlighted below.



Favourable winds surrounding the French offshore wind sector :



¹³ "Favourable winds for French offshore wind farms", Clifford Chance, Link; as accessed on 19th September 2022

Simplifying regulatory structure is paving the way for increased deployment of offshore wind farms

The country's offshore wind energy market is regulated by an independent public body, the Commission de régulation de l'énergie (The Energy Regulatory Commission, CRE). It is a key body responsible for establishing the regulatory framework for the sector and for preparing the competitive procedures for the offshore wind projects. The CRE is also responsible for overseeing the transmission and distribution services in the country. The key players related to it include:

- **RTE:** It is the only power transmission system operator in the country.
- **Enedis (a subsidiary of EDF):** It is the primary distribution network operator which has most of the RE installations connected to its network. The remaining RE installations are connected by local distribution companies.

Considering the ambitious renewable energy targets, rapid installation of offshore wind energy has become a priority for the French government. To achieve this, the government has introduced pertinent regulations to simplify its legislative framework^{14,15}.

Key measures taken to simplify the overall French legislative framework :



Energy Transition for Green Growth Act 2015 (LTECV)

It introduced a competitive dialogue procedure. Through it, the government invites developers to discuss the specifications of the project (location of the wind farm and the harbour, type of foundations, and connection to grid) before submitting their offer.



End to Hydrocarbon Research and Exploration Law 2017

RTE was appointed as the entity responsible for building and financing offshore farm connection.



Single Environmental Authorisation 2017

It eliminated the need to obtain multiple authorisations related to usage of water and public domain, receiving operating permit and others.



ESSOC Law 2018

It introduced an envelope permit, which allowed developers to change the characteristics of projects, without having to apply for new authorisations.



Article 55 of the ASAP Act 2020





It granted the power to the ministry in charge of energy (Ministry of Ecology, Sustainable Development and Energy) to ask the national commission of public debate to consult the public on several projects. The act also limited the duration of public debate to four months.



¹⁴ "Favourable winds for French offshore wind farms", Clifford Chance, Link; as accessed on 19th Sept 2022

¹⁵ "Offshore wind law and regulation in France", CMS, Link; as accessed on 19th Sept 2022

Impact of modified regulations on tendering, permitting processes and financing, and subsidy mechanisms of an offshore wind project

 <p>Tendering</p>	<ul style="list-style-type: none"> • Tenders for offshore wind projects can be floated in two ways — the classical tender procedure and the bidding procedure with competitive dialogue. <ul style="list-style-type: none"> – Classical tender procedure: Specifications such as geographical area concerned, descriptions related to installations and technical, economic, and financial conditions related to the tender are highlighted. Comprising these specifications, a tender is launched. In this process, these specifications are not subject to public consultation. – Competitive dialogue: Though most of the process remains similar to that in classical tender procedure, the key difference lies in the fact that here selected candidates are allowed to engage with the state in designing a final set of project specifications. 	<p>Competitive dialogue (introduced via LTECV Act) benefited both candidates and the government :</p> <ul style="list-style-type: none"> • Reduced technical risks associated with the site selected by the government. • Provided a list of potential issues (to the government) associated with a particular site.
 <p>Licensing</p>	<p>To build and operate offshore wind farms, primarily three authorisations are required:</p> <ul style="list-style-type: none"> • Offshore wind projects with an installed capacity of up to 1 GW are deemed to be authorised. However, for all others, an operating licence approved by the Ministry of Ecology, Sustainable Development and Energy is required. <ul style="list-style-type: none"> – The licence is provided on the basis of several criteria including the energy efficiency of the facility and technical, economic, and financial capabilities of the operator. 	<ul style="list-style-type: none"> • Single environmental authorisation law eliminates the need to obtain multiple authorisations which were previously required for land cleaning, operation permit and more.
 <p>Other approvals</p>	<ul style="list-style-type: none"> • For projects located in the public maritime domain, an authorisation to use the domain is required. This authorisation is issued by the préfet (regional public authority). <ul style="list-style-type: none"> – The key criterion for obtaining this approval includes the alignment of the project with the environmental objectives of the action plan for the marine environment. • For projects developed in an EEZ, the developers require a single authorisation by the préfet. 	<ul style="list-style-type: none"> • With the introduction of the ESSOC law, project operators can change the attributes of a project without requiring new approvals from the authorities.
 <p>Grid connection</p>	<ul style="list-style-type: none"> • The winning tenderer is required to pay an annual sum of EUR15,471 per MW11 of installed capacity and has to sign several agreements (grid access agreement, operating agreement, testing agreement and performance agreement) with RTE to receive a grid connection. <ul style="list-style-type: none"> – In case of any delay or damage, the RTE is responsible for providing compensation to the producer. According to Decree 2018–22, RTE is required to pay about 80 percent of the financial loss of electricity that was not generated in the previous month.^{12,13} 	<ul style="list-style-type: none"> • Prior to 2018, all connection costs were first paid by the producer and were later refunded by the electricity fund. • However, Decree 222 as of 2018 introduced a new compensation scale for the producer to limit the financial burden borne by the producers.



Remuneration and support schemes

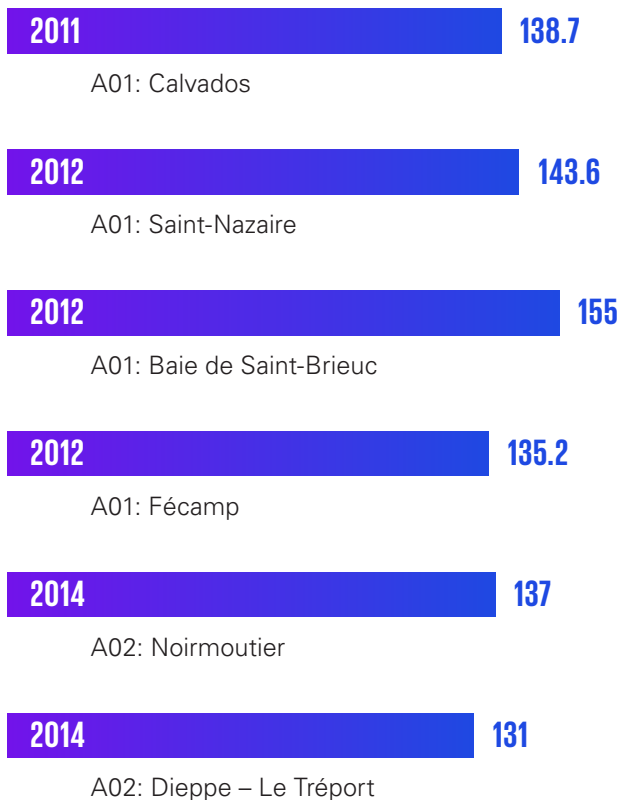
Two remuneration schemes namely PPA (feed-in tariff) and the CfD (feed-in premium) are currently available for the offshore wind projects. However, because of the benefits offered by the CfD scheme, it is expected to be widely used in future offshore projects.

- Under the FiT scheme, the operator selected via the tender process is required to sign a PPA with EDF. According to which, EDF is mandated to purchase all electricity generated from the operator at a fixed cost.
 - This scheme was used for the wind farms built pursuant to the 2011 and 2013 calls for tender wherein PPAs spanning over a period of 20 years were concluded.

- In 2015, a CfD scheme was introduced wherein the operator is required to enter into a contract called feed-in premium contract for 20 years with EDF. As per which, it (operator) sells the electricity generated by the wind farm at the market price. In return, the producer receives compensation on the basis of a reference tariff (instead of the price) quoted in the bid.
 - In a nutshell, in a CfD scheme, the producer's income is indicated by the difference between the market price and the reference tariff.
 - This scheme has been implemented in the Dunkirk project.

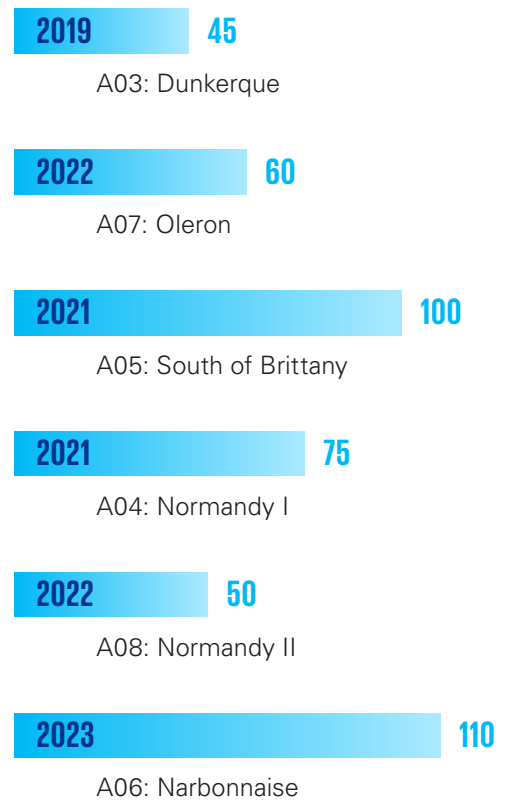
- The CfD support scheme introduced by the government provides a stable long-term revenue to developers. It also provides clear risk return outlook to investors

Reference rate as per the tender launched, EUR/MWh



2015: CfD scheme was introduced

Reference rate as per the tender launched, EUR/MWh

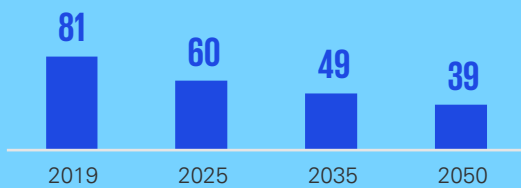


Notes: For tender A04 Normandy Offshore Wind Project: tariff should be equal or inferior to EUR75/MWh
For tender A05: South of Brittany Offshore Wind Farm: The award price is expected to be south of EUR100/MWh

A glance at the key technologies in offshore wind (technology drivers)

Broadly, bottom-fixed offshore wind (BFOW) and floating offshore wind (FOW) are two technologies that are being extensively deployed in offshore wind projects. BFOW refers to a technology where wind turbines are set up on fixed foundations in shallow waters particularly at depths less than 50 m. This technology has had a slow start in France as it was not fully authorised until 2019, even though the first tenders for commercial BFOW were launched in 2011¹⁶. However, technological advancements and innovations are leading to significant cost reductions in the technology¹⁷.

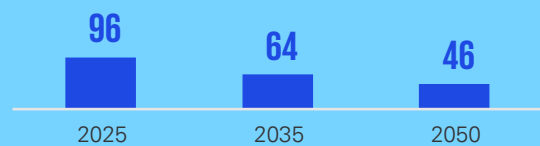
LCOE for BFOW, US\$/MWh, global, 2019–28F



On the other hand, FOW is gradually transitioning from a niche to fast-maturing technology. This technology has facilitated the deployment of offshore wind in deeper waters (at depths more than 50 m)¹⁸

where it is otherwise difficult to deploy bottom-fixed wind turbines. Additionally, FOW offers enhanced environmental benefits over BFOW, as it can be installed with relatively less invasive activity on the seabed.

LCOE for FOW, US\$/MWh, global, 2019–28F



With increasing technological advancements, cost efficiencies and investments provided by the government, the technology is heading towards large-scale commercialisation. In addition, as France offers a favourable environment for floating wind, the technology is garnering more attention than BFOW. The country has released tender for a subsidised 250 MW FOW project in South Brittany. The country has also announced to invest about EUR1 billion in the development of emerging technologies such as FOW¹⁹.



¹⁶ "Bottom-fixed offshore wind", France Energies Marines, Link; as accessed on 26th Sept 2022

¹⁷ "Europe to spearhead renewable energy cost reductions for offshore wind through 2028", Wood Mackenzie, Link; as accessed on 26th Sept 2022

¹⁸ "Big-scale floating wind is kicking off in France", Wind Europe, Link; as accessed on 19th Sept 2022

¹⁹ "Macron pledges 50 offshore wind farms for France by 2050", Institute of Energy for South-East Europe, Link; as accessed on 27th Sept 2022

Headwinds surrounding France's offshore wind energy industry

Though favourable government measures and technological progress are paving the way for the robust development of the offshore wind energy sector, the sector is still in its infancy and faces several impediments.



01.

Long permitting and regulatory process²⁰

As the country built its regulatory framework from scratch, the completion of initial projects takes 10–12 years. Even if there has been an improvement with recent projects taking seven years, it is still very long in comparison with the neighbouring countries. For instance, the UK has announced to shorten the approval process from four to one year.

02.

Opposition from local players²¹

France has about 3.5 GW of allocated offshore wind energy projects. Nevertheless, as the country has just opened the first active offshore wind farm in October 2022, the lack of a positive reference has led to scepticism amongst local actors.

Moreover, local activists, fishermen and residents have shown a strong resistance against the development of wind turbines, given their apprehensions over the adverse impact on the landscape and environment, which can diminish the value of their homes and harm their health.

03.

Grid inefficiency²²

To accommodate the power generated from wind energy, a more flexible transmission system with upgraded grid infrastructure is required. To this end, by 2035, the RTE aims to install smart grids equipped to accommodate about five times more renewable power than today.

04.

Increased investment requirements²³

Large investments will be required for the connection of offshore wind energy projects. It is estimated that the digitisation of grids will require an investment of about EUR2 billion per year between 2021 and 2025, including about EUR500 million for the connection of new offshore wind power installations.

²⁰ "Offshore and floating wind Europe", Reuters Events, Link; as accessed on 27th Sept 2022

²¹ "Why has wind become such a hot political topic in France?", The Local, Link; as accessed on 27th Sept 2022

²² "Wind Observatory 2021", France Energie Eolienne, Link; as accessed on 27th Sept 2022

²³ "Integrated national energy and climate plan for France", European Commission, Link; as accessed on 27th Sept 2022

Competitive pressure in the French offshore wind market



Rising consolidation increasing barriers for new players

Having developed more than 80 wind farms and currently developing three offshore wind energy projects with a total capacity of 1.5 GW, EDF Renewables is a dominating player in the wind energy market. Furthermore, considering the capital- and skill-intensive nature of the industry, the moderately consolidated market is moving towards further consolidation, thereby making it more difficult for new players to enter.



Few suppliers dominating the market lead to moderate bargaining power

The market is primarily dominated by a few multinational suppliers such as Vestas, Siemens Gamesa Renewable Energy, and Navantia Seanergies. To increase market share and combat supply chain pressures, the larger players are acquiring tier two and upstream component suppliers. Therefore, only a few suppliers hold a significant share of the market which, in turn, translates into a moderate bargaining power²⁴ of suppliers.



One player is the sole purchaser of electricity

In France, all renewable electricity injected is purchased by EDF. Therefore, being the sole buyer of electricity, it has high bargaining power²⁵.



Growing market attractiveness intensifying the competition

Since there is limited scope for product differentiation, the offshore wind industry faces intense competitive pressure. Most players are banking upon technological advancements to increase efficiencies and reduce operational costs. As the industry is moving towards vertical integration, the larger players are aiming to solidify their position in the market by gaining economies of scale.



Growing opportunities in other renewables

With intensifying focus of the French government on achieving its renewable energy targets, the offshore wind energy faces stiff competition from other renewable sources. With the high rate of adoption (as of 2021, France had 56 operational nuclear reactors producing more than 70 percent²⁶ of its electricity — the second highest in the world), nuclear energy remains a strong alternative for offshore wind energy.

- In addition, accounting for nearly 12 percent (as of 2021) of the country's total electricity generation²⁷, hydropower is emerging as the predominant source of renewable electricity in the country.
 - Therefore, with substitute technologies becoming more mature than offshore wind, they are offering higher cost efficiencies. Additionally, the already developed infrastructure for these technologies offers limited deployment challenges.

²⁴ "Scenario Planning for Offshore Wind Supply Chains 2030", MIT, Link; as accessed on 27th Sept 2022

²⁵ "Electricity regulation in France: overview", Thomson Reuters Practical law, Link; as accessed on 27th Sept 2022

²⁶ "Nuclear Power in France", World Nuclear, Link; as accessed on 27th Sept 2022

²⁷ "Renewable Energy In France: What You Should Know", Hive Power, Link; as accessed on 27th Sept 2022



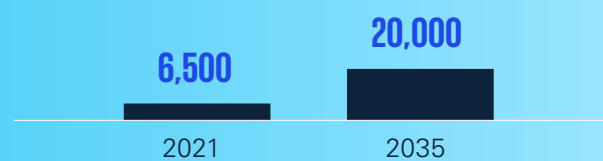
Way forward: Emerging opportunities in the offshore wind industry

- France’s commitment to build 40 GW of offshore wind energy by 2050, indicates that offshore wind holds a huge industrial opportunity for the country. Some of which include:

- **Production of industrial components for floating wind farms:** As France aims to expedite the installation of floating wind farms, it has targeted to encourage domestic manufacturing of industrial components used in FOW technology. To ensure this, each new offshore wind project is required to use at least 50 percent of locally produced components by 2035^{28,29}.
- **Upscaling port infrastructure³⁰:** As the wind industry is growing, volume of projects and size of wind farms and turbines are also increasing. Thus, there is a need for advanced ports which offer facilities such as heavy lifting of large wind turbines and efficient assembling techniques.
- **Production and installation of mooring facilities:** The deployment of FOW technology requires modified mooring and electrical cabling systems. Considering FOW technology is relatively new, development of advanced mooring systems can lead to significant cost efficiencies in the installation process.

- **Upgrades in grid:** To accommodate for intermittent nature of offshore wind, new-generation smart substations with in-built optical fibres and sensors that can take in 30 percent more electricity from renewable sources are required. Thus, immense opportunities exist in building new substations.
- Owing to these opportunities, the sector is expected to witness a rise in jobs.

Jobs expected to be created by offshore wind sector, 2021-35F



- However, to efficiently achieve its targeted potential, the French government should focus on limiting the regulatory delays in offshore wind projects, work towards boosting investor confidence and attract increased private investments.³¹

²⁸ “France commits to 40 GW offshore wind power by 2050”, EV wind, Link; as accessed on 27th Sept 2022

²⁹ “France aims to become an industrial leader in floating wind power”, La French Fab, Link; as accessed on 27th Sept 2022

³⁰ “Ports: a key enabler for the floating offshore wind sector”, Wind Europe, Link; as accessed on 27th Sept 2022

³¹ “France 2021: Energy policy review”, IEA, Link; as accessed on 27th Sept 2022

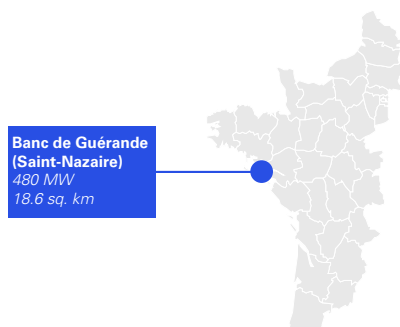
05. Annexure



Overview of the current offshore wind energy projects in France

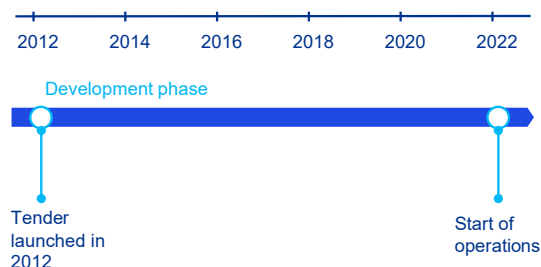
A01 tender: Banc de Guérande – Saint-Nazaire

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The wind farm is expected to be equipped with GE's 80 Haliade 150 6 MW wind turbines.
- The electricity generated by the wind farm is planned to be transmitted through a 33 km submarine link and a 27 km underground link to Saint-Nazaire Trignac, Montoir-de-Bretagne, Donges and Prinquiau.
- The total value (CAPEX) of the farm is EUR2.2 billion.

Technology

- Fixed-bottom wind turbines
- 74 m high and weighing no less than 1,175 tonnes, these 'jacket' type foundations will be installed.
- The wind farm will be the first in France to be equipped with 'jackets' type foundations. Their lattice structures have a limited impact on the environment.
- They will facilitate the circulation of water masses and biodiversity while promoting the artificial reef effect.

Shareholders

- Developer : Ailes Marines SAS
- Owner : Iberdrola Renovables Energia, SA

Next steps

- Drilling for the foundations and construction of the wind turbines will begin in 2022.
- Drilling at sea of the sites that will host the 62 wind turbines (3 feet each) and construction, in parallel, of the various parts that will make up the wind turbines — foundations, propellers, turbine.
- Commissioning will be at the end of 2023.
- Installation of the first wind turbines will be in 2023 and commissioning of the park will be at the end of 2023.

Winning consortium

- Ailes Marines consortium owned by Iberdrola following the acquisition of all its shares.

Tender attribution criteria

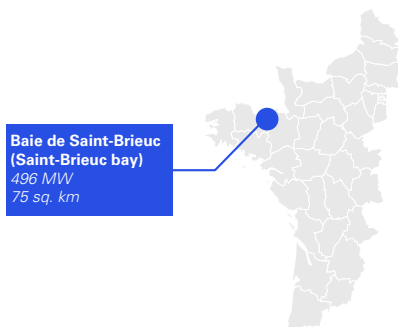
- The main criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Analysis

The installation of these wind turbines makes this site the first offshore wind farm in France. The project took 11 years to emerge, because it's the first of its kind, studies had to be done to evaluate the consequences for marine species, fishery resources, consultations were held with populations to tame the initial reluctance. The maintenance operations should generate a hundred jobs. This will ultimately cover 20 percent of the electricity consumption of the Loire-Atlantique department (1.5 million inhabitant).

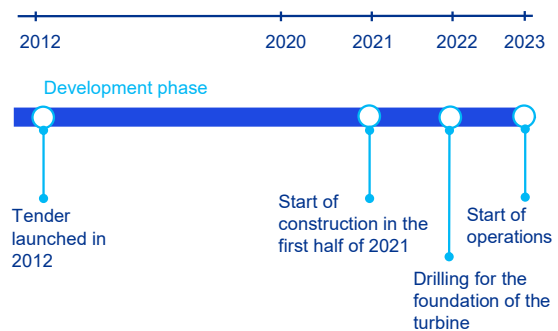
01 tender: Baie de Saint-Brieuc - Saint-Brieuc bay

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The offshore wind farm is expected to generate clean energy for 835,000 people.
- The manufacturing of the turbines, each 207 m tall, is expected to be handled by Siemens Gamesa Renewable Energy (SGRE). The turbines are planned to be fitted with the direct-drive technology and their blades (almost 82 m long) and are expected to sweep an area 18 percent bigger than the previous model. This could improve the annual energy production by 20 percent compared to its predecessors.
- The total value (CAPEX) of the farm is EUR2.4 billion.

Winning consortium

- Ailes Marines consortium owned by Iberdrola following the acquisition of all its shares.

Technology

- Fixed-bottom wind turbines
- 74 m high and weighing no less than 1,175 tonnes, these 'jacket' type foundations will be installed.
- The wind farm will be the first in France to be equipped with 'jackets' type foundations. Their lattice structures have a limited impact on the environment.
- They will facilitate the circulation of water masses and biodiversity while promoting the artificial reef effect.

Tender attribution criteria

- The main criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Shareholders

- Developer : Ailes Marines SAS
- Owner : Iberdrola Renovables Energia, SA

Next steps

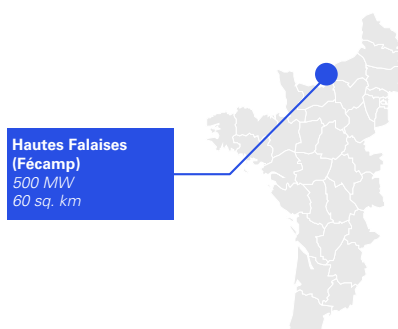
- Drilling for the foundations and construction of the wind turbines will begin in 2022.
- Drilling at sea of the sites that will host the 62 wind turbines (3 feet each) and construction, in parallel, of the various parts that will make up the wind turbines — foundations, propellers, turbine.
- Commissioning will be at the end of 2023.
- Installation of the first wind turbines will be in 2023 and commissioning of the park will be at the end of 2023.

“ Analysis

By the end of 2023, the department of Côtes d'Armor, with this wind farm, will be the leading contributor of renewable energy in Brittany region, producing the equivalent of 9 percent of the total electricity consumption of the region. The output is enough to supply the needs of 835,000 people, including heating, and will help in avoiding the emission of about 200,000 tonnes of CO2 per year into the atmosphere. The project created a hundred jobs during creation and maintenance operations is expected to generate a dozen jobs. The economic prospects of the wind farm are estimated at more than EUR9 million of local tax benefits.

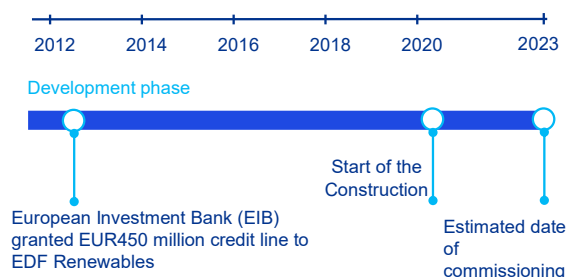
A01 tender: Hautes falaises - Fécamp

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The wind farm is expected to generate sufficient electricity to fulfil the demands of 770,000 people in Seine-Maritime. It is also estimated to offset two million tonnes of carbon dioxide.
- The electricity generated from the project will be sold under a 20-year power purchase agreement (PPA) signed by the partners in June 2018.
- The project will meet the electricity needs of 770,000 inhabitants which translates to nearly 60 percent of the inhabitants of Seine-Maritime.
- The total value (CAPEX) of the farm is EUR2 billion.

Winning consortium

- Eoliennes Off-Shore des Hautes Falaises (EOHF) - consortium composed of EDF-Energies nouvelles (EDF-EN), Enbridge and WPD Offshore

Technology

- Fixed-bottom wind turbines
- 7 MW per turbine (constructed by SGRE).
- Type of foundation will be gravitational.

Tender attribution criteria

- The main criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Shareholders

- Developer: Eolien Maritime France
- Operator: Eolien Maritime France
- Owner: EDF Energies Nouvelles Group, WPD Offshore GmbH, Enbridge inc. and CPPIB
- Turbine Manufacturer: SGRE

Next steps

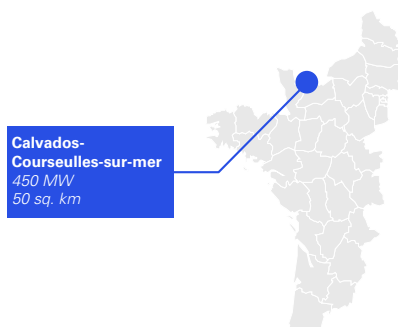
- Estimated date of commissioning is 2023.

Analysis

By the end of 2023, the Fécamp offshore wind farm will be producing the equivalent of 60 percent of the electricity consumption of the department of Seine maritime (777,000 inhabitants). EOHF has done an impact study on the consequences which was sufficient to dismiss the attacks of the project's opponents, especially about the risk of turbidity of the sea water, and the risk to run on marine wildlife. The public reporter dismissed the attacks of 7 associations which initiated an appeal to stop the project. These reluctancies have delayed the time of implementation of the project.

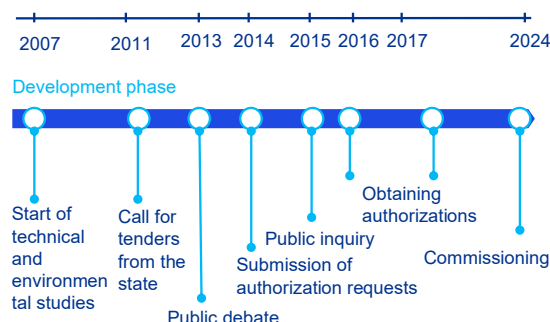
A01 tender: Calvados – Courseulles-sur-mer

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- Turbines are planned to be located 10 km off the Bessin coast and deployed within an area of about 45 km².
- Recyclable wind turbine blades will be used for the Calvados offshore wind farm.
- The electricity generated from the project will be sold under a 20-year power purchase agreement (PPA) signed by the partners in June 2018.
- The project will meet the electricity needs of 630,000 inhabitants, i.e. 90 percent of the inhabitants of Calvados.
- The total value (CAPEX) of the farm is EUR1.8 billion

Technology

- Fixed-bottom wind turbines.
- 7 MW per turbine (constructed by SGRE)
- Type of foundation will be monopieux.

Tender attribution criteria

- The main criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Shareholders

- Developer: Eolien Maritime France
- Operator: Eolien Maritime France
- Owner: EDF Energies Nouvelles Group, WPD offshore GmbH, Enbridge inc. and Réseau de transport D'Electric (RTE)

Next steps

- Start of technical and environmental studies from 2007.
- Call for tenders from the state in 2011.
- Public debate in 2013.
- Submission of authorization requests in 2014.
- Public inquiry in 2015.
- Obtaining authorizations in 2016 and 2017.

Winning consortium

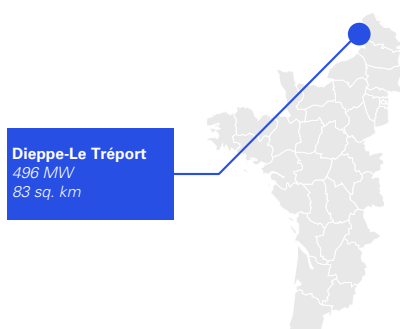
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Analysis

By 2024, this wind farm will be producing the equivalent of 90 percent of the electricity consumption of the department of Calvados (690,000 inhabitants). The prospects of the wind farm are estimated at more than EUR25 million of local economic benefits. Numerous studies have been carried out in the project area in partnership with environmental associations with the help of measurements at sea, laboratory analyses and numerical modelling, which has made it possible to define this project as adapted to environmental issues such as the visual impact, professional fishing, marine biodiversity, among others.

AO2 tender: Dieppe-Le Tréport

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The Dieppe-Le Tréport wind farm is expected to be located in an area of approximately 110 km², 17 km from Dieppe and 15.5 km from Le Tréport, in the French side of La Manche/the English Channel. It is being developed between water depths of 14 m and 25 m.
- The produced electricity will be transferred from the offshore substation to the onshore power grid.
- The French electricity transmission system operator RTE will oversee transporting the electricity generated by the Dieppe-Le Tréport wind farm to the grid.
- The total value (CAPEX) of the farm is EUR2.3 billion.

Technology

- Fixed-bottom wind turbines
- The project is expected to be powered by 62 8 MW Siemens Gamesa D8 offshore wind turbines.
- The Turbine model is based on Siemens Gamesa's proven offshore direct-drive platform.

Tender attribution criteria

- The project includes a FiT over a 20-year period.
- Offers were judged on price (40 percent of the mark), industrial aspects (40 percent), impact on environment activities (20 percent).

Shareholders

- Developer: Les Eoliennes en mer de Dieppe-Le Treport (EMDT)
- Owner: Caisse des depots et consignations, Sumitomo corporation, Ocean winds and RTE

Next steps

- Project development (area study, consultation, park design) from 2014 to 2018.
- Preparation of construction since 2019.
- Operation and maintenance from 2026.
- Dismantling in 2050.

Winning consortium

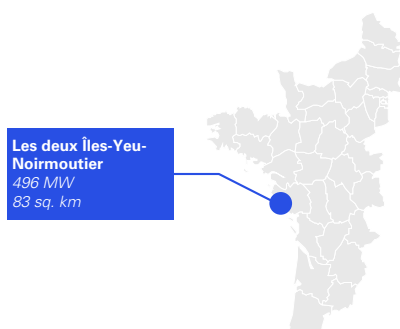
- NA

Analysis

By 2030, this offshore wind farm will be producing the equivalent of 55 percent of the electricity consumption of the department of Morbihan (800,000 inhabitants). The prospects of the wind farm are estimated at more than EUR10 million of local economic benefits. The project created a 350 jobs during creation and maintenance operations should generate at least a dozen jobs.

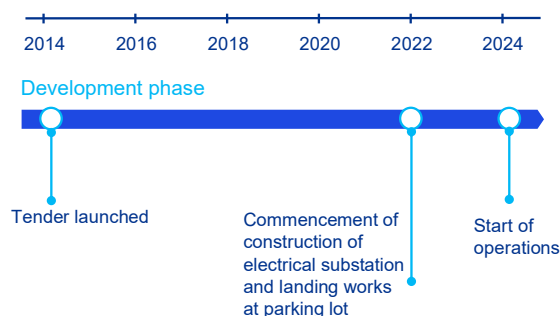
A02 Tender : Les deux îles – Yeu – Noirmoutier

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- It is estimated to have an average annual production capacity of 1,900 GWh, which is expected to be sufficient to meet the annual electricity demands of 800,000 people.
- The offshore wind farm might comprise SGRE offshore wind turbines spaced 1,000 m and 1,600 m apart.
- The project infrastructure might also include an offshore high-voltage station (OHVS).
- The total value (CAPEX) of the farm is EUR2 billion.

Winning consortium

- Engie,
- EDP renewables,
- Sumitomo,
- Groupe
- Caisse des Dépôts

Technology

- Fixed-bottom wind turbines
- 62 wind turbines with a unit power of 8 MW as well as an offshore electrical substation connected to the terrestrial electrical grid, on a surface of area of 83 km².

Tender attribution criteria

- Projects' regulatory mechanism includes a FiT over a 20-year period.
- Offers have been judged based on three criteria: Price (40 percent of the mark), industrial aspects (40 percent), impact on environment and pre-existing activities (20 percent).

Shareholders

- Developer: Les Eoiliness en mer de Vendée
- Owner: Caisse des depots et consignations, Sumitomo Corporation, Ocean winds and RTE

Next steps

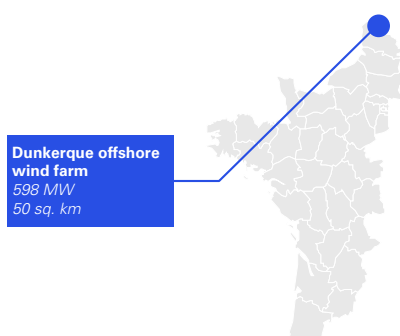
- Construction of the Gué-au-Roux electrical substation to start in 2022.
- Work to create the underground power line to start in 2022.
- Landing works at the Grande Côte parking lot to start in autumn 2022.
- Work at sea to start in 2024.

Analysis

By 2024, this offshore wind farm will be producing the equivalent of 115 percent of the electricity consumption of the department of Vendée (690,000 inhabitants). The prospects of the wind farm are estimated at more than EUR20 million of local economic benefits. The project created a 750 jobs during creation and maintenance operations should generate at least 70 jobs.

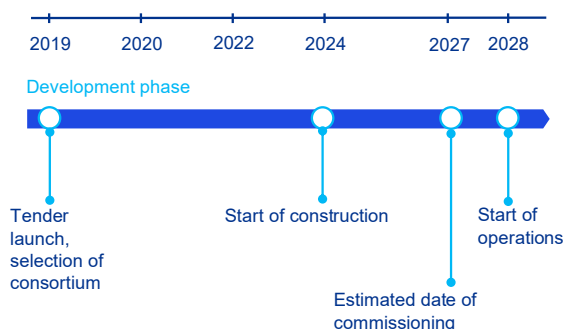
A03 Tender: Dunkerque Offshore Wind farm

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The project is expected to generate 2,300,000 MWh electricity, which is enough to power 500,000 households.
- Its cost is estimated to be about US\$1,554.1 million with an estimated power generation capacity of 250–750 MW.
- 1,100 industrial jobs potentially created (800 for the construction stage and 300 for the operating stage).
- Operating permit has been granted for 20 years.
- The project is estimated to be spread over an area of 50 km². The turbines are planned to be mounted on fixed monopile foundations and are expected to be interconnected by 66 kV inter-array cable.
- The total value (CAPEX) of the farm is EUR1.4 billion.

Winning consortium

- NA

Technology

- Fixed-bottom wind turbines
- 46 wind turbines, each with a capacity of 10–16 MW, for a total capacity of approximately 600 MW.

Tender attribution criteria

- The selection process is set in two phases: (i) pre-selection planned based on the applicant's technical and financial capacities and (ii) A second phase consisting of competitive technical discussions with the French State. At the end of this period (approx. 4 to 6 months), applicants should submit a final offer.

Shareholders

- Developer: Eolieness en mer de Dunkerque (EMD)
- Owner: RWE Renewables, EDF Energies Nouvelles Group, Enbridge Inc. and RTE.

Next steps

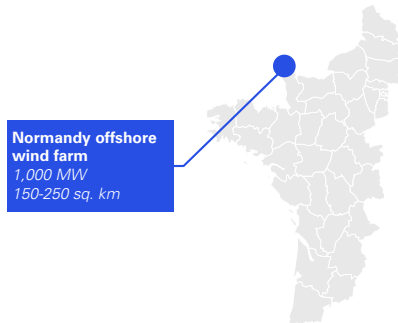
- Selection of the consortium in 2019.
- Starting of construction in 2024.
- Estimated date of commissioning in 2027.

Analysis

By 2027, the department of Nord, with this offshore wind farm, will be a leading contributor of renewable energy in Hauts-de-France region, producing the equivalent of one percent of the total electricity consumption of France inhabitants. The output is enough to avoid the emission of almost 250,000 tonnes of CO₂ per year into the atmosphere. The project will create a couple hundred jobs during creation and maintenance operations should generate a hundred jobs.

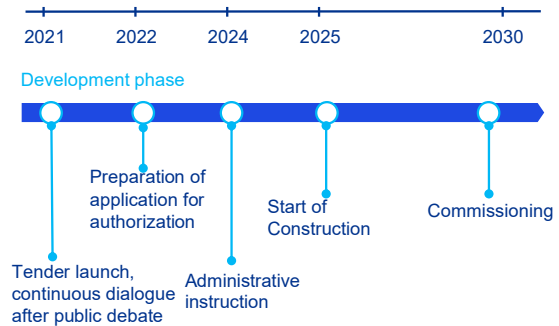
A04 tender: Normandy Offshore Wind Project

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The Manche and the Seine-Maritime are territories with capacity adapted for this type of project. However, considering the wind energy potential identified off the coast of Seine-Maritime during the public debate within the 10,500 km² zone, it was decided to reserve the connection possibilities to Seine-Maritime for possible wind farms that could be established later.
- Capacity of the connection is 1,250 MW (1.3 GW). This capacity is greater than that of the fourth Normandy wind farm of 1 GW in anticipation of new offshore power generation projects.
- The total value (CAPEX) of the farm is EUR1.5–EUR4 billion.

Winning consortium

- NA

Technology

- Fixed-bottom wind turbines
- Direct current technology is chosen for the connection. This considers the environmental characteristics of the channel, power of the wind farm and its distance from the coast. This wind farm has a power level and distance which are nearly two times more than those of the planned wind farms in Normandy.

Tender attribution criteria

- The key criterion for selecting the winner is the reference tariff proposed in the candidates' bids.
- Specifications include a lower limit equal to the lowest proposed reference tariff and an upper limit of EUR75 per MWh.*

Shareholders

- Eoliennes en Mer Manche Normandie, a project company of EDF Renouvelable and Maple Power
- A joint venture of Enbridge and CPPIB; Iberdrola Renovables France
- Ocean Winds; Shell; a consortium formed by the Total and RWE groups
- A consortium of Vattenfall, wpd, and the Banque des Territoires

Next steps

- Dialogue after public debate in 2021.
- Preparation of applications for authorization in 2022/23.
- Administrative instruction in 2024.
- Construction to take place from 2025–2028 and commissioning will be in 2030.

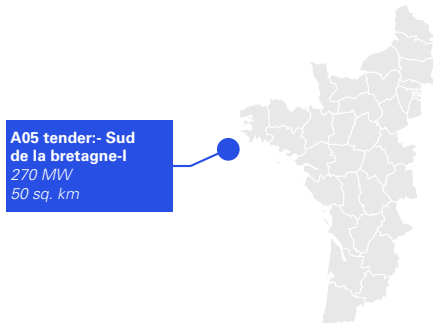
Analysis

By 2030, the department of La Manche, with this offshore wind farm, will be a leading contributor of renewable energy in Normandy region, producing the equivalent of two percent of the total electricity consumption of France inhabitants. The output is enough to avoid the emission of almost 500,000 tonnes of CO₂ per year into the atmosphere. The project will create hundreds jobs during creation and maintenance operations should generate a hundred jobs.

Note: Assuming a lower limit of EUR50 per MWh, one additional point is equivalent to a reduction in the reference tariff of is equivalent to a reduction in the reference tariff of approximately EUR 0.4 per MWh.

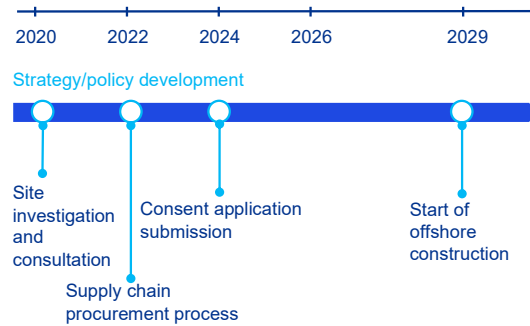
A05 tender: Sud de la Bretagne-I

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- This is expected to be the world's first fully competitive floating commercial-scale tender.
- The French government has announced in September 2021 that Eoliennes Flottantes Bretagne Grand Large, a company owned by EDF Renewables and Maple Power, has been selected to participate in the tender process.
- Water depth will be 60–100 m.
- The total value (CAPEX) of the farm is EUR600–700 million.

Winning consortium

- NA

Technology

- Fixed wind turbines
- Total CAPEX will be EUR600–700 million.
- Capacity will be 270 MW.
- Surface area will be 50 km².

Tender attribution criteria

- The main criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Shareholders

- EDF Renewables, a subsidiary of the EDF Group, and Maple Power, a joint venture between CPP Investments and Enbridge Inc.

Next steps

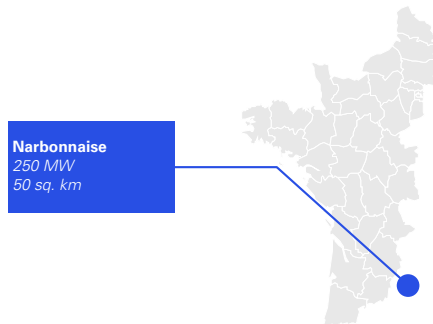
- Commission of the wind farm will be in 2029.

Analysis

By 2026, with this offshore wind farm, will be the leading contributor of renewable energy in Bretagne region, producing enough energy to supply the needs of 850,000 inhabitants, including heating, and helping in avoiding the emission of almost 200,000 tonnes of CO₂ per year into the atmosphere. Through studies done to implement the project, one of the conclusions is the risk of colliding with the wind turbine blades. This is a protected species in France. Since it is impossible to avoid a collision, the company will finance the establishment of a reserve for these birds. The project created 750 jobs during creation and maintenance operations should generate a hundred jobs.

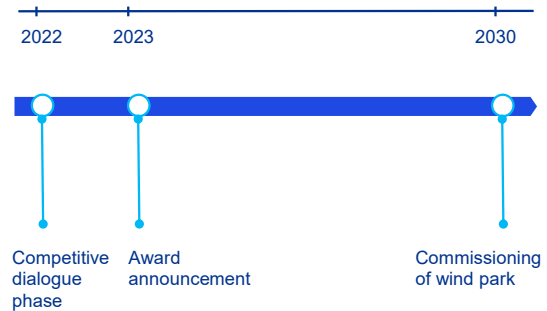
A06 tender: Narbonnaise

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The first park will be located off the coast of Narbonnaise, while the second park would be located off the Gulf of Fos, both at a minimum distance of 22 km from the coast.
- There will be 13 to 20 wind turbines in each zone.
- An extension of 498 MW for each wind farm is planned, leading to a total capacity of 1.5 GW allocated by 2025 in this area.
- Capacity will be 250 MW for each wind farm.
- Surface area will be 50 km² for each farm, located between 16 km and 63 km from the coast.
- The total value (CAPEX) of the farm is EUR1.6–EUR2.2 billion.

Winning consortium

- NA

Technology

- Floating wind turbine
- Each 250 MW wind farm would share certain connection infrastructures with its subsequent 498 MW extension amounting to 750 MW in total. They are thus part of an innovative dynamic that allows, to reduce the environmental impact of offshore wind farms and the costs of connection. There would then be a single electrical substation at sea, and a single connection path at sea and on land.

Tender attribution criteria

- The key criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Shareholders

- RWE et Bourbon Subsea Services.

Next steps

- Competitive dialogue phase will run until end of 2022.
- The awards for the winners will be announced in 2023.
- Commissioning of the wind park is planned in 2030.

Analysis

By 2030, with this offshore wind farm, will be the leading contributor of renewable energy in Occitanie region, producing enough energy to supply the needs of 350,000 inhabitants, including heating, and avoid the emission of almost 100,000 tonnes of CO₂ per year into the atmosphere.

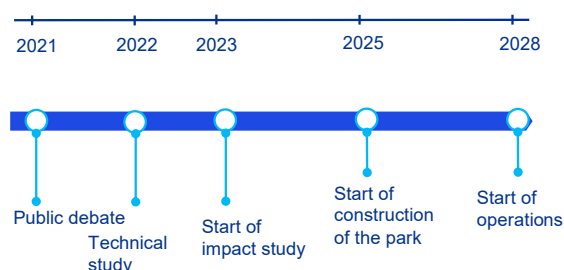
A07 tender: Sud Atlantique-I and II

Location of selected sites



Source: French Ministry for Sustainable Development

Tender and project timeline



Source: French Ministry for Sustainable Development

Key features

- The design will consider the results of the ongoing or future environmental studies. The preservation of biodiversity is a major issue in the realization of this project and will be a priority throughout its construction and operation, since the location is close to the Marine Nature Park of the Gironde estuar, and the French EEZ.
- In total, the two wind farms are expected to produce a volume of electricity equivalent to the electricity consumption of approximately 1.6 million people.
- The total value (CAPEX) of the farm is EUR1.4–EUR2.2 billion.

Winning consortium

- NA (not yet awarded)

Technology

- The first wind turbine will be fixed-bottom. The second one could be either floating or fixed-bottom foundation, depending on the result of the first one.
- Capacity will be between 498 MW and 1,000 MW.
- Surface area will be 743 km².

Tender attribution criteria

- The main criterion for selecting the winner is the level of the reference tariff proposed in the candidates' bids. This represents 70 percent of the total score of the offers.

Shareholders

- Owner: Ministère de l'Environnement, de l'Énergie et de la Mer.

Next steps

- Public debate in 2021.
- Technical study will be in 2022.
- The impact study by the winner will be from 2023 to 2025.
- Construction of the park from 2025 to 2030.

Analysis

By 2030, this offshore wind farm will be producing the equivalent of 1 and 2 percent of the electricity consumption of France on a year basis. The construction of the offshore wind farm should last 5 years, which is much less than the first ones, it's because of technology used and the means deployed for the construction. The project is expected to create a thousand jobs during creation.



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