

A large white offshore wind turbine stands against a backdrop of a blue sky with wispy clouds and a deep blue ocean. The sun is shining from the upper left, creating a lens flare effect. The turbine's three blades are spread out, and the nacelle is visible with the ALSTOM logo.

OFFSHORE WIND POWER

**Major companies join forces in
an ambitious industrial project
in France**



The consortium created by EDF Energies Nouvelles, with Alstom as the exclusive supplier of turbines,

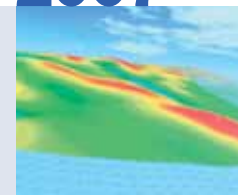
submitted a bid on the 11th of January 2012 in response to the call for tenders issued by the French government, covering four projects: **Fécamp, Courseulles-sur-Mer, Saint-Brieuc and Saint-Nazaire.**

The consortium brings together five strategic partners: DONG Energy, wpd Offshore, Nass&Wind Offshore, EDF Energies Nouvelles and Alstom.

A team which has demonstrated its expertise and is building a lead:

knowledge of sites, in-depth studies, technical innovation, positive local support...

from
2007



Technical studies: wind surveys (3 to 5 years of on-site measurement) and detailed environmental studies.

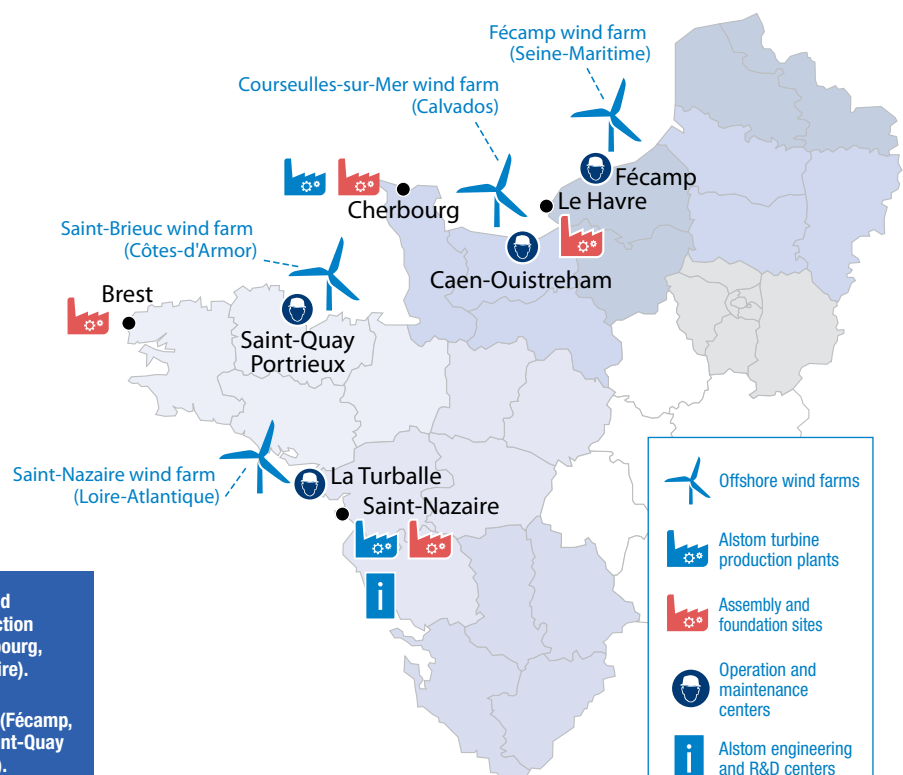
from
2008



Dialogue with fishermen and local stakeholders (more than 100 local meetings per site).

An ambitious industrial project that will create 7,500 jobs

Alstom, the exclusive supplier of new generation 6 MW wind turbines, has planned to create **four plants** to produce all the key components of the wind turbines together with an engineering and R&D center creating **5,000 stable and highly-skilled jobs**. At the same time, the consortium expects to create **sites for the construction of foundations and the assembly of the turbines**, together with operations and maintenance centers, which will see the creation of **2,500 jobs**.



The economic benefits for the ports

- 2 plants (blades and towers) in Cherbourg.
- 2 plants (generators and nacelles) in Saint-Nazaire.

- 4 assembly sites and 4 foundation construction sites (Le Havre, Cherbourg, Brest and Saint-Nazaire).
- 4 operation and maintenance centers (Fécamp, Caen-Ouistreham, Saint-Quay Portrieux, La Turballe).

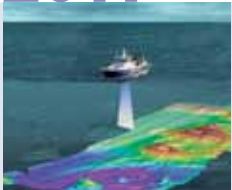


At 73.5m its blades are amongst the longest in the world.

A new generation of wind turbine manufactured in France

The "Haliade 150" is the first of a new generation of 6 MW offshore wind turbines capable of supplying the electricity needs of around 5,000 homes. Alstom can draw on 30 years of experience in wind energy for the design of this robust, simple and efficient offshore machine, which will be one of the best performers on the market by 2015. The production schedule includes the installation of a prototype in 2012. A real shop window for French talent, the technology developed by Alstom puts it in a strong position to create a French center of excellence and competitiveness in export markets.

October
2011



Completion of geotechnical campaigns in Haute-Normandie, Basse-Normandie, Brittany and Pays de La Loire.

December
2011



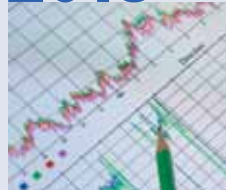
Partnership agreements with training organisations, fishermen's representatives and environmental organisations.

2012



Installation of first unit "Haliade" wind turbine by Alstom.

2012
2015



On-going technical and environmental studies, consultations and applications for authorization.

2015
2018



Construction of offshore wind farms.

from
2018



In operation.

A solid and reliable offer for 4 projects

Technically and economically strong

The four projects proposed by the consortium are based on in-depth **wind surveys and environmental studies** carried out over a period of around five years. We have also conducted **geotechnical investigations** on each site in order to choose the most suitable type of foundations for the proposed turbines. Our experience in the management of complex projects has been essential in developing proposed solutions that are **realistic and economically robust**, helping to guarantee the successful completion of projects.

Consultation already well advanced

A long-standing consultation process with all local stakeholders – fishermen, cities, elected representatives, local residents, environmental organisations and local



authorities – has already allowed a broad consensus to be created in the four sites. In each area we have signed **agreements with the relevant Regional Fishermen's Committee**. These agreements are a key stage in the work carried out over the last several years. They constitute the basis for dialogue with the fishing community throughout the development, construction and operation of the wind farms. We have

also introduced a number of structures to **encourage employment and inclusion and help** create training programmes relating specifically to the trades required in the offshore wind power industry.

Our strengths in brief

Creation of a French wind power industry

- cutting-edge wind generation technology, **manufactured in France.**
- the industrial programme that **creates the greatest value for the country.**
- a total of **7,500 jobs** : 5,000 in producing the turbines, 2,500 in construction, operations and maintenance.

Successful consultation

with sea users and local decision-makers.

Reliable proposals

both technically and financially.



- **viability of projects guaranteed** by 5 years of wind surveys and geotechnical test drilling at the sites.
- realism and economic robustness to **ensure the completion of the projects.**

A project backed by solid and credible French and European companies

who will pool their strength and talent to help them win.



A unifying European consortium

Initiated by key French companies

- **EDF EN**, a major player in renewable energy and a subsidiary of EDF.
- **Alstom**, one of the world leaders in industrial electric generation equipment.

Including a leading European player in offshore wind

- **Dong Energy**, a Danish energy company, world leader in offshore wind power (1.1 GW in operation, 2.2 GW under construction and more than 20 years' experience).

Bringing together two development partners, both experienced renewable energy groups, with long-standing relationships with the sites

- **Nass&Wind Offshore**, which has been present on the Saint-Brieuc and Saint-Nazaire sites for the last 5 years.
- **wpd offshore**, which has been present on the Fécamp and Courseulles-sur-Mer sites for the last 5 years.

Between them the partners have a portfolio of 20 GW of offshore wind farms under development or construction or in operation.

TO FIND OUT MORE :

www.edf-en.fr
www.dongenergy.com

www.wpd-offshore.fr
www.nass-et-wind.com

www.alstom.com/wind



Fécamp offshore wind farm

A project that protects the environment, creates jobs and has been welcomed locally



Reference points

- The offshore wind farm, with capacity of **498 MW**, will supply the electricity needs of more than **750,000 people**.
- Following surveys carried out on site over 5 years, the project respects the environment and protects fishing areas. It has been **supported by the fishermen, environmental organisations and many coastal city councils**.
- The **construction of foundations, the park installation** and the maintenance of the wind farm will create more than **900 jobs in Haute-Normandie**.

Key figures

Project location	Fécamp – Seine-Maritime
Capacity and number of turbines	498 MW (83 Alstom 6 MW turbines)
Foundation type	Gravity Base Foundation
Distance from shore	> 13 km from Fécamp, > 15 km from Etretat
Area	65 km ²
Planned in-service date	From 2018

Working together with local stakeholders to produce tailored support measures

- Since 2008 summer a Local Consultation Committee was created to include elected representatives and social and economic stakeholders.
- The area in the tender submission is the one defined in consultation with local stakeholders from 2008.

Communities

Favourable opinions from 7 coastal communities : Fécamp, Etretat, Saint-Jouin-Bruneval, Senneville-sur-Fécamp, Le Tilleul, La Poterie Cap d'Antifer, Criquebeuf-en-caux and the Fécamp community cluster.

→ support for tourism and sustainable development projects (identified and budgeted by the consortium).

Fishing industry

Signature with the Regional Fishermen's Committee of Haute-Normandie of a "Cooperation charter" to cover the relationship between the project and the fishing industry.

→ support for fishery productivity and improved safety as well as strengthening of the downstream sector of the fishing industry.

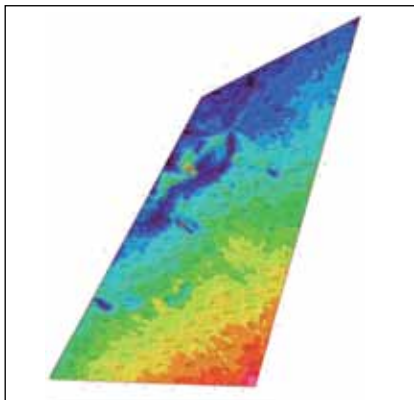
Environment

Partnership agreements with the "Ligue pour la Protection des Oiseaux" (LPO) in Haute-Normandie.

→ particular attention paid to bird life, a unique opportunity to improve knowledge of marine and coastal environments.

Employment and inclusion

Partnership agreements and letters of intent signed with local stakeholders in employment, training and inclusion.
→ creation of training and back-to-work structures.



Bathymetric chart produced by the consortium

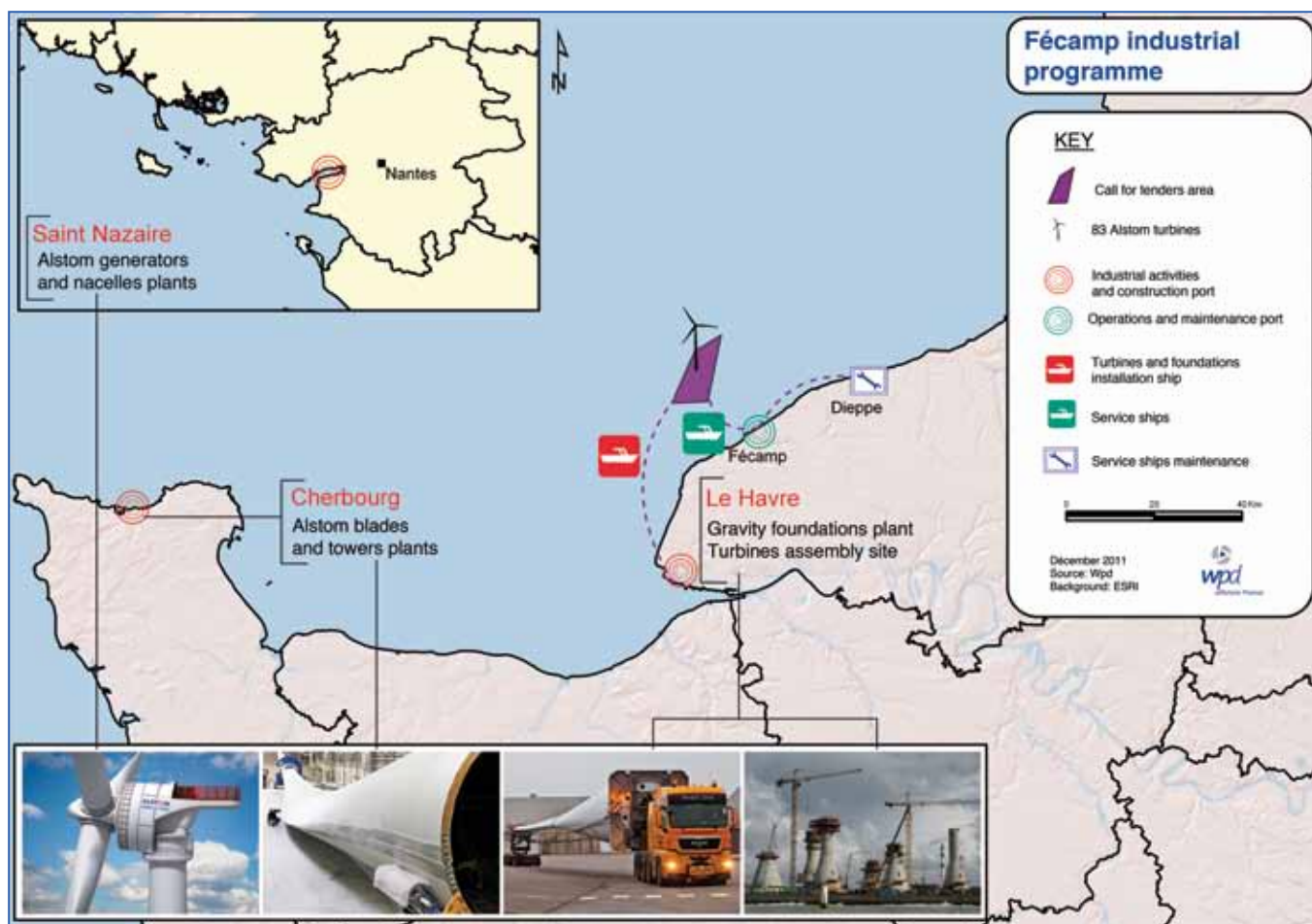
Respect for the environment and maritime activities

- More than **15 consultancies** involved.
- **5 years of wind surveys** and the installation of a latest-generation wind measurement station (lidar).
- 2 years of **observation of bird life and sea mammals**.
- Specific **landscaping study** to ensure the integration of the wind farm into its environment.
- A **geophysical survey** and geotechnical drilling campaign to define the foundation type.
- A **risk evaluation** conducted by 3 specialist consultancies (DNV, Signalis and Géomines) to ensure safety throughout the life of the project.

Over 900 jobs created in Haute-Normandie

The industrial programme is based on the port infrastructure in the Haute-Normandie region: **the construction of gravity foundations and the installation of the turbines will be based in Le Havre** whilst the port of **Fécamp** will serve as a maintenance base. **All in all, this will represent the creation of 900 jobs.**

The key components of the Alstom turbine will be manufactured in Cherbourg and Saint-Nazaire (see map below).



TO FIND OUT MORE:

www.edf-en.fr
www.dongenergy.com

www.wpd-offshore.fr
www.alstom.com/wind



Courseulles-sur-Mer offshore wind farm

A project welcomed locally that will create businesses and jobs in the region



Reference points

- The offshore wind farm, with capacity of **450 MW**, will supply the electricity needs of more than **600,000 people** (90% of the population of Calvados).
- Following surveys carried out on site **over 5 years**, the project respects the environment and protects fishing areas.
- The project will generate **900 jobs in the Basse-Normandie region**: creation of plants in **Cherbourg** to produce turbine towers and blades, construction of foundations and park installation, the operations and maintenance in **Caen-Ouistreham**.

Key figures

Project location	Calvados
Capacity and number of turbines	450 MW (75 Alstom 6 MW Haliade turbines)
Foundation type	Monopile
Distance from shore	> 10 km
Area	< 50 km ²
Planned in-service date	From 2018

A project born out of local consultation dating from 2007

- **4 years of consultation with more than 120 local meetings** to define the best possible project off the coast of Courseulles-sur-Mer.
- The wind farm is located **away from the main fishing areas** of “Bouée de Cussy” and “le Creux” and respects the memorial sites of the Normandy Landing beaches.

Many supporters and partnerships

- **Support from coastal communities**, particularly Arromanches and Ver-sur-Mer.
- **Partnership agreements with Fishermen's Committee of Basse-Normandie (CRPBN) and the birdlife association “Ligue pour la Protection des Oiseaux”.**
- **Partnership agreements with local players in employment and training** (440,000 hours of work and 180,000 hours of training reserved for people out of touch with the workplace).

Design choices tailored for a project that fits with its environment

- **A liaison team with the Regional Fishermen's Committee** set up in 2012 in order to define the wind farm monitoring protocol and to apply the measures resulting from the consultation process, such as the launch of an artificial reef pilot programme in the Baie de Seine.
- An undertaking to support the local tourism, heritage preservation and sustainable development projects.



Observation of bird life

Respect for the environment and maritime activities

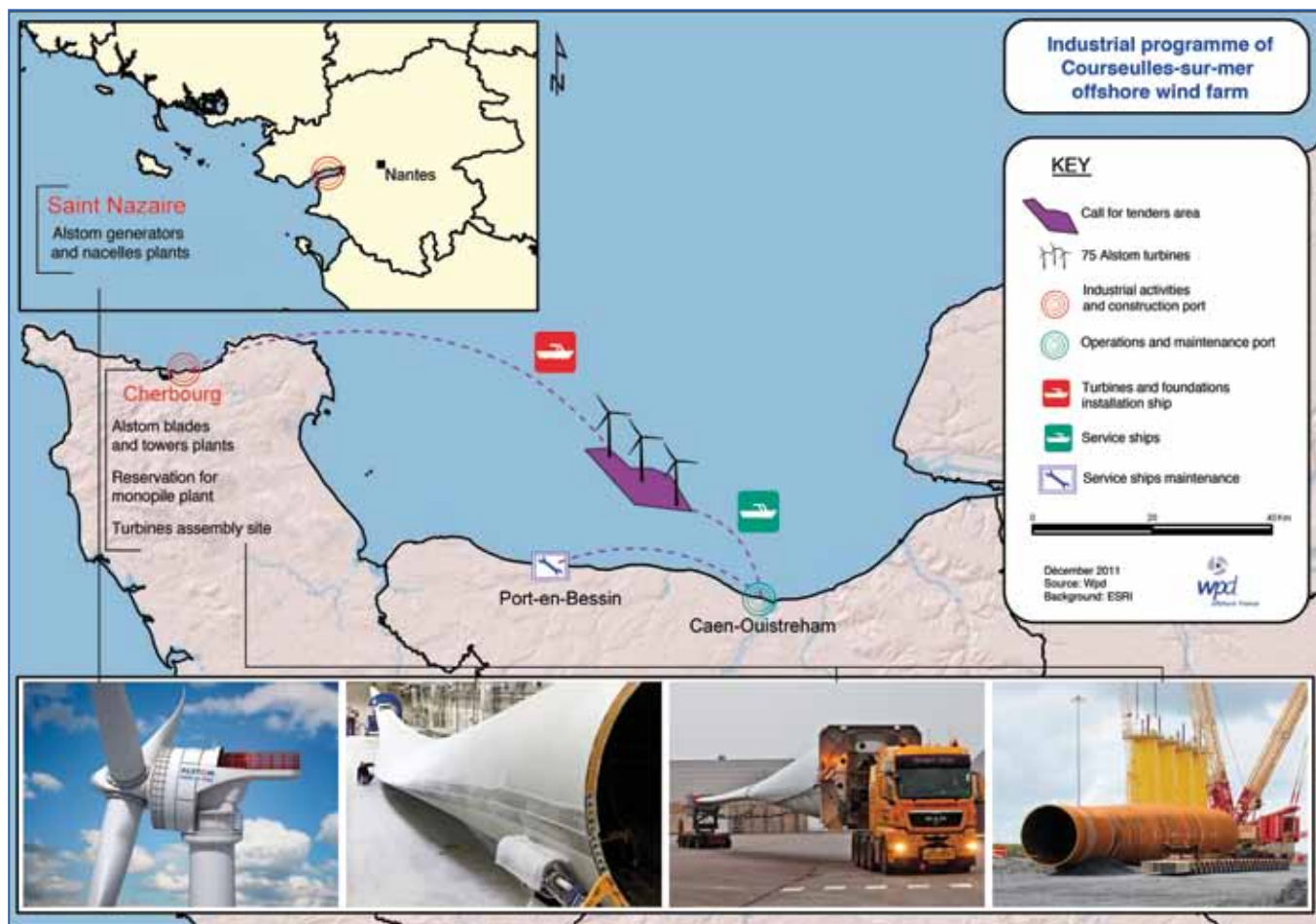
- More than 20 locally or internationally recognised **survey offices*** involved.
- **5 years of wind surveys** and the installation of a latest-generation wind measurement station (lidar).
- A **geophysical survey and geotechnical drilling campaign** to define the foundation type.
- 2-year **observation programme for bird life and sea mammals** by boat and radar.

- A **landscape study** to optimise design of the wind farm and ensure its integration in the environment.
- A **risk evaluation for the ships** conducted by 3 specialist consultancies (DNV, Signalis and Géomines).

**(Ifremer, Biotopie, GONm, GMN, LPO, Setup Environnement, Université de Caen, GL Garrad Hassan, Fugro and others.).*

Cherbourg: the focal point of the industrial programme

The industrial programme includes the creation in Cherbourg of one **plant to produce the turbine blades and one plant to produce towers**. The foundations will also be manufactured in Cherbourg and the turbines will be assembled there. **Operations and maintenance will be run out of Caen-Ouistreham**. In total, the industrial programme for the Courseulles-sur-Mer wind farm will allow the creation of more than **900 jobs in Basse-Normandie**.



TO FIND OUT MORE :

www.edf-en.fr
www.dongenergy.com

www.wpd-offshore.fr
www.alstom.com/wind



Saint-Nazaire offshore wind farm

A job-creating project integrated into the local economic industry



Reference points

- The offshore wind farm, with capacity of **480 MW**, will supply the electricity needs of more than **700,000 people**.
- The proposed project has considerable **technical advantages** that will limit its **environmental impact**, and has received the **support of the fishing industry**.
- The industrial programme includes the creation in Saint-Nazaire of **facilities for the construction of the Alstom generators and nacelles**, which will create **500 jobs in the local area**.

Key figures

Project location	France – Loire Atlantique
Capacity and number of turbines	480 MW (80 Alstom 6 MW turbines)
Foundation type	Monopile
Distance from shore	>12 km
Area	78 km ²
Planned in-service date	From 2018

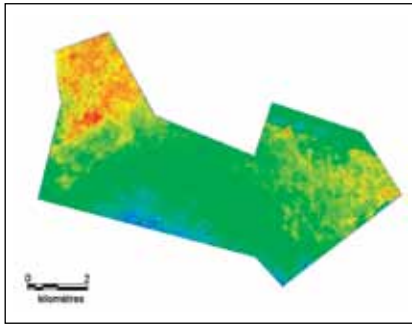
Working together with local stakeholders to produce tailored support measures

A project well integrated with the local economic industry

- A **regional industrial presence** for construction, operations and maintenance.
- **Involvement of local SMEs** following signature of agreement with Neopolia.
- Creation of an “**Employment-Training-Inclusion**” plan to help structure the ground upstream of local industrial activities.

Specially tailored support measures

- **Fishing industry**: a project supported by the Pays de la Loire Regional Committee backed by tailored resource management and protection measures.
- **Environment**: particular attention paid to bird life, a unique opportunity to improve knowledge of marine and coastal environments.
- **Tourism**: development of tourist projects relating to wind farms, support in managing tourist flows.



Bathymetric chart produced by the consortium

Respect for the environment and maritime industries

- 4 years of wind measurement + 1 year of latest generation measurement (lidar).
- 2 years of bird life studies in cooperation with recognised environmental bodies (Ligue pour la Protection des Oiseaux, Bretagne Vivante).
- Geotechnical survey (offshore test drilling) to determine foundation type.
- Guaranteed maritime safety : reports from DNV and Signalis.

An industrial programme that will create 500 local jobs

The industrial programme includes **the creation in Saint-Nazaire of facilities for the construction of the Alstom generators and nacelles, and the creation of an engineering center in the Pays de La Loire region.** In addition, new industrial facilities will be required for **foundations and Operations and Maintenance (see map below).**

In total, the industrial programme for the Saint-Nazaire wind farm will allow the **creation of more than 500 local jobs.**



Focus on Alstom: a future industrial center of excellence at Saint-Nazaire



Creation of two **plants with capacity for 100 machines per year:**

- 1 generator production facility
- 1 turbine nacelles production facility

Creation of the **1st French engineering center dedicated to offshore wind power in the Loire-Atlantique region.**

TO FIND OUT MORE :

www.edf-en.fr
www.dongenergy.com

www.nassetwind.com
www.alstom.com/wind