



# Building the 1<sup>st</sup> EPR

(European Pressurised water Reactor)

## in France at Flamanville

More information on the Flamanville 3 project at [www.edf.com](http://www.edf.com)

***In less than 20 years, EDF has built up an unparalleled nuclear power generation capacity which helps to safeguard the country's energy supply: 58 reactors with a total installed capacity of 63.1 GW provide more than 85% of the electricity generated by EDF and rank France as the second largest electronuclear power generator in the world behind the United States.***

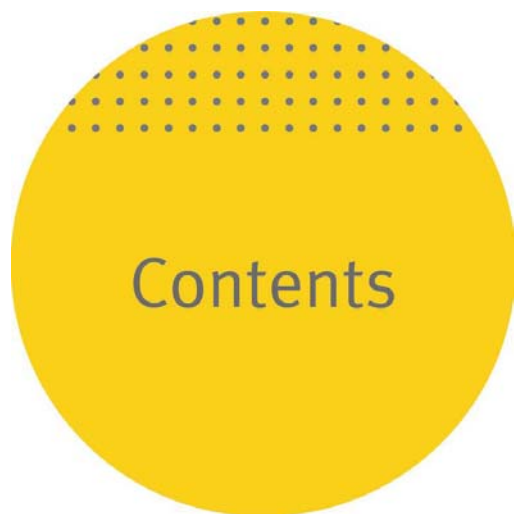
***Further nuclear power, EDF has diversified production facilities representing all energy types: conventional thermal (coal, fuel-oil, gas) and renewable energy (hydroelectric, solar, wind, biomass).***

***Following ten years in which no investment was made in new production methods, EDF will bring over 6000 MW into service by 2012, the equivalent of the production of six nuclear power stations, over 2/3 of which will be fossil-fuelled capacity to boost peak production potential.***

***The development of the 1<sup>st</sup> 1650MW EPR in Flamanville (Manche) meets the required investment in new production capacity and is an essential step towards the renewal of EDF's nuclear fleet. When it comes on stream, an event planned for 2012, it will provide EDF with a high-performance reactor and a proven organisational structure delivered for the building of about 10 reactors in the world by 2020.***

***The announcement by the French President in January 2009 confirming the construction of a second EPR in Penly (Seine-Maritime) run by EDF is excellent news for the company.***

***In the words of Pierre Gadonneix, EDF's Chairman and CEO, "This endorsement supports the Group's long-term industrial strategy to develop CO2-free production resources, particularly nuclear. It is also excellent news for the whole of the nuclear industry and for employment in France. The construction of a second EPR driven by EDF will enhance security of supply in France and in Europe in the years to come, in a context of rising demand."***



## Building the 1<sup>st</sup> EPR (European Pressurised water Reactor) in France at Flamanville

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# Nuclear energy: a valuable asset to France

*The global demand for energy is expected to increase by 60% by 2030\* while the demand for electricity could even double. Oil, gas, and in the longer-term, coal resources are limited. Energy has thus become a rare treasure, and prices are sure to continue in an upward trend in the long term.*

*At the dawn of the 21<sup>st</sup> century, the main question is how to satisfy these new needs, whilst at the same time acting against global warming.*

*Experts agree that simply turning to sustainable energy and energy saving cannot suffice to cope with the wide range of new needs. There is no getting away from the fact that nuclear energy, which represents 17% of the world's electrical energy production and does not produce greenhouse gases, is emerging as an indispensable source of energy. Worldwide, nuclear capacity of 140 GW is therefore at the study stage for construction by 2020, and over 300 GW by 2030.*

## 1.1 Guaranteeing continued energy self-sufficiency and security of supply in France and Europe

✓ **In Europe, demand for energy** is expected to grow by 0.5% per year. Demand for electricity should grow by 1.6% per year by 2030.

Following a period of relatively abundant supply due to overcapacity of electrical power plants by comparison to the demand actually consumed, all countries are today faced with the same situation:

- some of their plants are growing progressively more obsolete,
- increasing demands are being made by environmental legislation,
- there has been a substantial increase in demand.

Given this situation, **many of the power generating plants in Europe will have to be renewed by 2030** (600,000 MW of production capacity, or the equivalent of a little more than five times the current nuclear capacity in France today).

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\* Source: IEA (International Energy Agency)

Following Finland, the first country to begin construction of an EPR reactor, at the start of 2008, the United Kingdom announced the launch of a vast programme to construct new nuclear production capacity. The Italian government has also voted in new law at first reading demonstrating that country's wish to reintroduce nuclear production on its territory.

✓ **In France**, the **energy independence** ratio has risen from 24% in 1973 to about 50% since 2000. **France is an electricity exporting country** – French contractual exports reached 90.9 TWh in 2005. The same year, EDF's nuclear assets produced 46% of the European Union's nuclear energy (*source : Eurostat*).

A recognised and undisputed success for France, the nuclear programme also contributes to the **necessary diversification of energy sources**.

Change in level of energy self-sufficiency of France since 1973 (%)

Years	1973	1979	1985	1990	1995	2000	2003	2004	2005	2006	2007
France	23.9	24.6	45.7	49.7	51.8	50.1	50.4	50.1	49.8	50,6	50,4

*Source: DGEMP – French General Directorate for Energy and Raw Materials, part of the French Ministry of Industry*

## 1.2 Efficiently helping to fight global warming and addressing the issue of fossil fuel depletion

### ✓ Zero CO<sub>2</sub> emissions

The **Kyoto protocol** came into force in 2005 and sets CO<sub>2</sub> emissions reduction targets for industrialised countries. France's lead in the generation of nuclear and hydraulic energy allows it to maintain its emissions at the same level as in 1990. In fact, a kWh of electricity produced by **EDF in France** emits **6 times less greenhouse gases** than the average for European electricity producers.

**European Union** heads of State and government leaders also approved the action plan produced by the European Commission in 2007 stating the European Union's ambitions in this field up to 2020:

- to reduce greenhouse gas emissions by at least 20%,
- to improve energy efficiency by 20%,
- to achieve a proportion of 20% renewable energies.

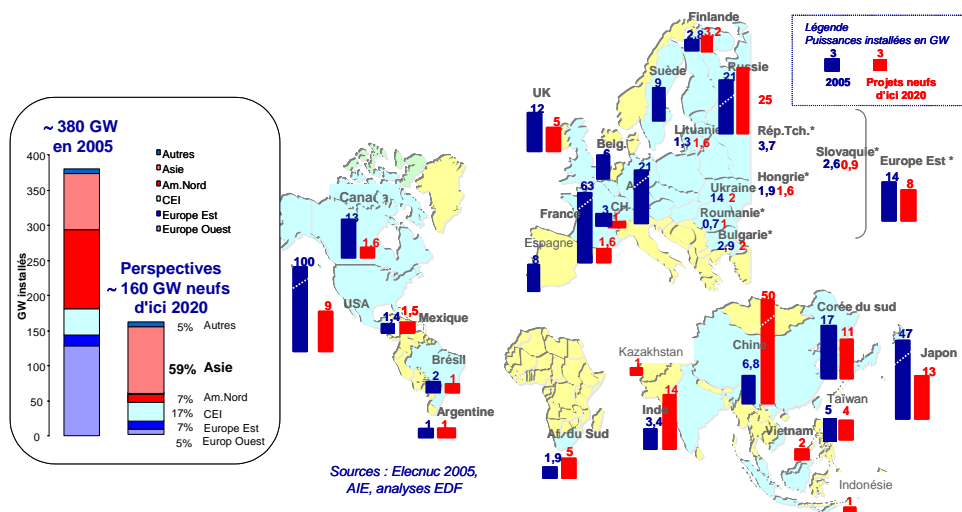
## ✓ Preservation of natural resources

Moreover, nuclear power prevents further exploitation of fossil fuel stocks, currently being depleted. In addition, nuclear power generation is characterised by very low fuel consumption contributing very little to generation costs which are mainly related to infrastructure and technology.

Uranium resources, raw material for generating nuclear power, are geographically well distributed especially in stable countries, such as Canada and Australia. These are abundant.

Known reserves total around 4 million tonnes according to the International Atomic Energy Agency (IAEA). They are expected to last for around 100 years at the current rate of world consumption and are sufficient to provide existing power-plants and those to be built till 2030. The IAEA estimates that undiscovered reserves represent 16 million tonnes, which would significantly increase the duration of consumption (by around 200 years, according to experts).

In addition, when the new “fourth generation” reactors are commissioned after 2040, this could reduce the quantity of natural uranium consumed by a factor of 50 and thus increase the lifetime of available reserves to over 10,000 years based on the current rate of consumption.



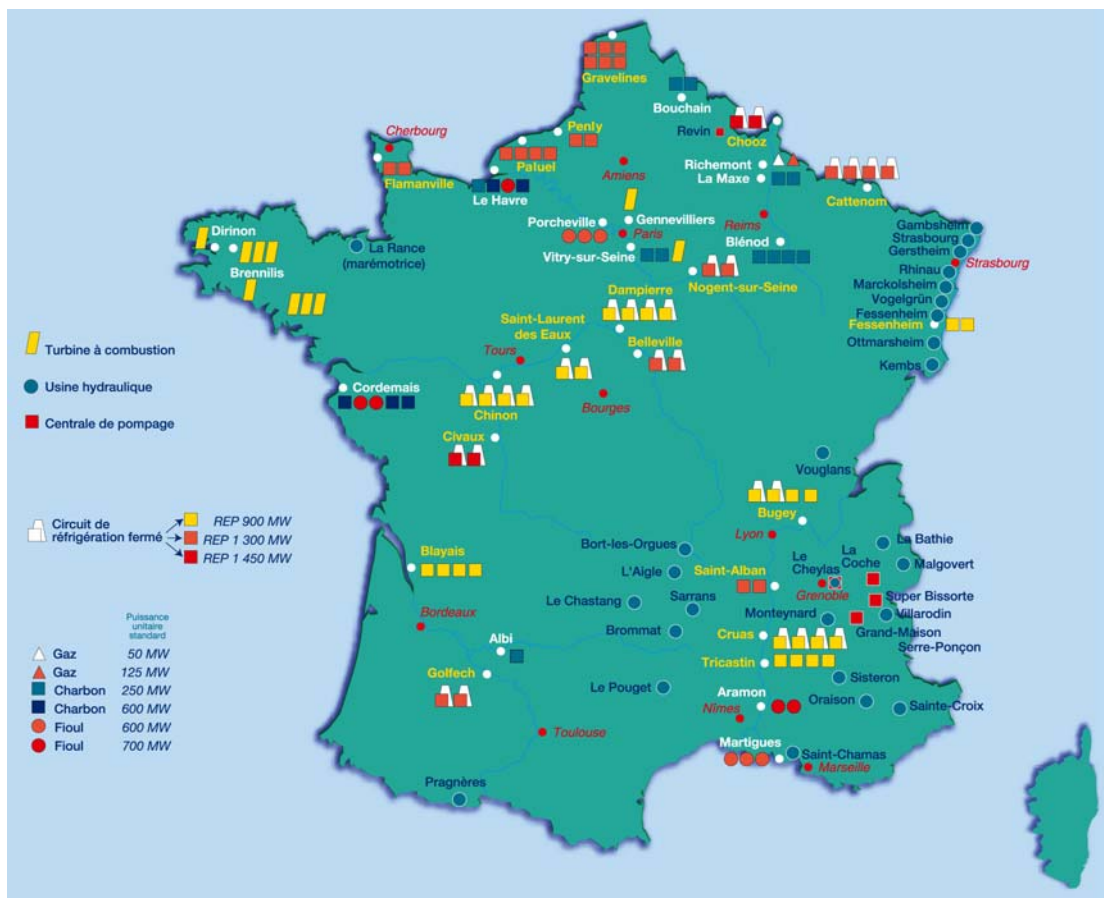
# 2

## EDF's electricity generation facilities: a major competitive contribution to the French energy mix

EDF's diversified generating capacity is the Group's major industrial strength.

EDF is the world's leading producer of nuclear electricity – the group operates nuclear generation capacity of 66 GW, 17% of the worldwide production.

Nuclear energy and hydro power combined enable the EDF Group to generate **95%** of its electricity in France **without releasing any CO<sub>2</sub>** and to make a substantial contribution to the country's **security of supply** and also to that of the European zone. Hydro power equally has a role to play in meeting the environmental commitments made by France and the European Union within the scope of the Kyoto Protocol.



December 2006



## 2.1 A generation capacity with competitive diversified sources

EDF has developed means of generation combining all energies: nuclear, fossil fuel (coal, oil and natural gas) and renewable energies (hydroelectric, solar, wind and biomass).

As electricity cannot be stored and is subject to variable demand, mainly depending on the seasons, diversity of the various means of generation used by EDF enables supply to be permanently adjusted to demand:

- Nuclear power and hydropower, due to low variations in generation costs, are used in normal periods of consumption (known as “baseload”),
- Hydropower with “modulable supply” (corresponding to reservoir dams) and fossil fuel power plants are used in “semi-baseload” and “peakload” periods.

Low variable generation costs, limited exposure to variations in fossil fuel prices thanks to the stock of nuclear power and hydropower plants combined with know-how in the fields of design, construction and operation enable EDF to operate an especially competitive generation capacity.

## 2.2 A unique experience on the complete fuel nuclear cycle

### ✓ Safety guaranteed by an experimented

For EDF, attaining the highest safety levels is a constant requirement for operating its nuclear plants, under permanent and strict scrutiny of the Nuclear Safety Authority who are solely entitled to authorise the commissioning or the ongoing operation of a nuclear plant.

EDF benefits from the experience accumulated through operating its 58 reactors and after 20 years of operation, it has encountered no events of consequence to man or the environment over a level 2 incident on the INES scale (*International Nuclear Event Scale*), which ranks accidents on a scale from 0 to 7.



## ✓ A long-term commitment

Like any industrial activity, the production of nuclear electricity produces waste. EDF manages it rigorously, limiting the amounts produced through selective sorting according to nature and levels of radioactivity and by opting for the appropriate processing.

- The operation and decommissioning of nuclear power stations mainly generate so-called "short life" waste, which loses at least half its radioactivity every 30 years. This includes filters, resins for purifying the water in the circuits, tools, worn parts, plastics and textiles from maintenance work, and rubble and scrap iron from demolished buildings.  
All this waste is removed to ANDRA's two disposal centres (French waste agency) in Morvilliers and Soulaines (Aube), where it is stored in high-security conditions until the radioactivity has decayed.  
The ongoing progress made in this domain has made it possible to reduce the waste volume by a factor of three between 1995 and 2007.
- Spent nuclear fuel also produces waste, 90% of which can be recycled to produce new fuel, and 4% of which is high activity "long life" waste made up of ashes from uranium burn-up. All of this waste is stored under extremely secure conditions on the COGEMA site at the Hague, in a space the size of an Olympic swimming pool.

After 15 years of research set in motion by the Bataille Act (1991), the law on radioactive materials and waste management was adopted by Parliament on 15 June 2006. Amongst other things, this law makes provisions for the concept of reversible storage of ultimate waste in deep geological layers by 2025.

## 2.3 Making the necessary investment

Over the period 2008-2010, EDF expects to invest over 35 billion euros, including 20 billion euros in France, in electricity generation, transmission and distribution.

Following ten years in which no investment was made in new production methods, EDF will bring over 6000 MW into service by 2012, the equivalent of the production of six nuclear power stations, over 2/3 of which will be fossil-fuelled capacity to boost peak production potential.

EDF will also increase the output of some of its nuclear power stations by providing them with new equipment and will invest 400 million euros for each reactor over the period 2015-2035 to prepare for a possible extension of the reactors' useful life beyond forty years, a decision that is within the purview of the ASN (French Nuclear Safety Authority). The American powerplants based on the same technology as the French ones, already have a 60 years useful life.

Finally, as confirmed by the "loi de programme" setting the major lines of the energy policy promulgated on 13 July 2005, EDF must prepare to replace its nuclear power stations. The construction project for a 1650 MW EPR reactor at Flamanville is part of this policy.



## The EPR: a crucial industrial challenge for the future

*The development of 2 EPR in France meets the required investment in new production capacity and is an essential step towards the renewal of EDF's nuclear fleet. When it comes on stream and the building of the EPR in Penly starts, an event planned for 2012, the 1<sup>st</sup> EPR reactor in Flamanville will provide EDF with a high-performance reactor and a proven organisational structure delivered.*

*The EPR is a development of existing technology. The EPR combines the latest technology in order to offer a powerful, safe, competitive and greenhouse gas-free electricity production.*

*Its construction will bring together players from all sectors of the French nuclear industry, in particular Bouygues, Areva, Alstom and Vinci. The EPR is thus a major asset for the French industry investing in the international revival of nuclear energy, especially in the United Kingdom, in the United States or in China.*


*It has been estimated that the cost of this investment could reach 4 billion Euros, based upon current economic conditions.*

### 3.1 A key step in the renewal of EDF's electricity production capacity

By the year 2020, the initial French nuclear power plants commissioned at the end of the 70s will be 40 years old and will have to be gradually renewed. Within this context, EDF has opted for EPR technology to prepare for the necessary renewal of its stock of nuclear power plants in operation.

Commissioning of the 1<sup>st</sup> EPR reactor at Flamanville is thus planned for year 2012.

At the same time, EDF is carrying out engineering and maintenance actions to ensure optimum lifetime for its facilities, under the control of the French nuclear safety authorities.



## 3.2 Demonstration of essential industrial know-how to contribute to the world nuclear renewal

The EPR is a pressurised water reactor developed since the beginning of the 1990s by EDF and AREVA, in partnership with German electricity utilities.

The EPR combines all the latest technology relating to safety, environmental protection and technical and economic performance. Its conception draws on the experience acquired over 20-odd years operating French and German nuclear power plants and on innovation through research carried out by the CEA and German research organisations.

The EPR project in Flamanville represents an opportunity to build more than 10 EPR's by 2020 in four key countries: the UK, US, China...

EDF also carefully looks into the possibility to participate in the Italian new nuclear. EDF will duplicate in Penly the Flamanville's model.

The EPR reactor in Flamanville will also contribute to **upgrade skills** in the nuclear sector, a process initiated by the Group.

In fact, the Group will be recruiting **five thousand engineers and technicians over the next ten years**. Three major initiatives have been set up to achieve the Group's objectives, under the aegis of the Fondation Européenne des Energies de demain (European Foundation for Tomorrow's Energies) – revitalising and structuring energy education in the degree courses of the Grandes Écoles and principal universities, the creation of an international nuclear energy masters degree and specialised courses for training experts.

## 3.4 A very high safety track-record

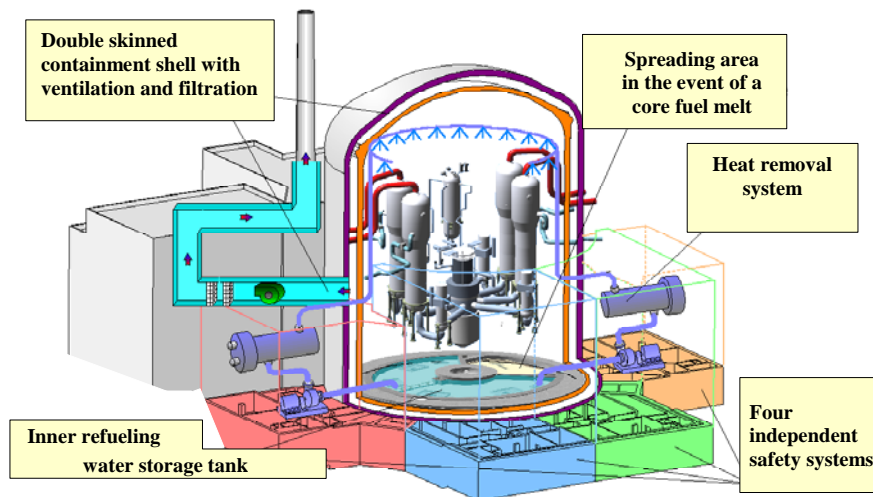
The EPR under construction at Flamanville costs **€4 billion in 2008**, which corresponds to a cost for electricity produced by the new reactor of **€54 per MWh in 2008 euros**.

The EPR is therefore competitive, in the long term, compared with other means of production. In Europe today, construction of a combined cycle gas turbine costs 45% more than in 2006 and construction of a coal-burning thermal power station costs 54% more.

Current estimates of the production costs of a new base installation stand at a minimum of 68 euros per MWh for a combined cycle gas turbine and 70 euros per MWh for a coal-burning thermal power station, based on the lowest hypotheses for raw materials costs and CO<sub>2</sub>.

### 3.4 A very high safety track-record

The EPR reactor is equipped with high-level protection. Four safeguard systems co-exist to ensure they can independently and entirely perform one of two safety functions essential in protecting people and the environment in all circumstances: shutting down the nuclear reaction and cooling the reactor.



### 3.5 Enhanced environmentally-friendly solutions

The EPR will enable the production of energy free of greenhouse gas emissions.

The EPR design and operation goals mainly ensure:

- **More effective use of fuel:** a continuous electricity production, a 17% reduction in fuel consumption compared to 1,300 MW reactors,
- **Significant reduction in liquid and gaseous radioactive effluent release** compared to France's best nuclear power plants (-30%, excluding carbon 14 and tritium, for which the quantities are equivalent),
- 30% reduction in radioactive waste generated.



### 3.6 Improved performance

Successor to the French N4 reactors (Chooz and Civaux) and German KONVOI, the EPR is in keeping with existing techniques. It offers a greater flexibility of use and a lower operating cost. The EPR will help to consolidate French skills in the nuclear industry and prepare for the renewal of the French and European generation capacity.

The EPR will become **the world's most powerful reactor** (1,650 MW, as compared to 1,500 MW for the most recent models), with its improved performance.

**Its forecast service life is 60 years.**

In addition, EPR has a **Unit Capability Factor of 90%** (compared to around 83% for nuclear power plants currently), mainly due to the reduction in average refuelling outage durations, with an equivalent level of nuclear safety. This duration will be reduced to 16 days as opposed to the current length of 30 to 45 days, depending on the various types of plants. Annual electricity production will therefore rise by 36% compared with current reactors.

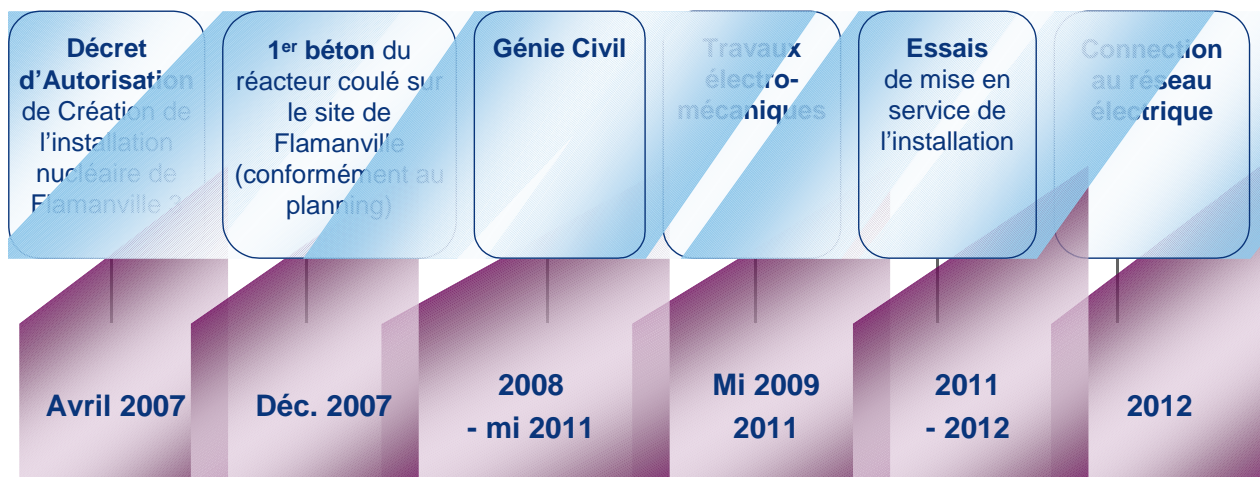


## Flamanville EPR: 5 years work for a 2012 launch

*In line with the publicised timetable, EDF began work on constructing the nuclear buildings for the future EPR power station in December 2007.*

*Construction has now entered a decisive phase. At the end of 2009, at peak activity, the site should employ over 2,500 people.*

*The organisational structure in place, driving the project forward, gives EDF complete control and management over the whole process. Over 500 EDF engineers and technicians are currently at work in all the company's departments to ensure its success.*



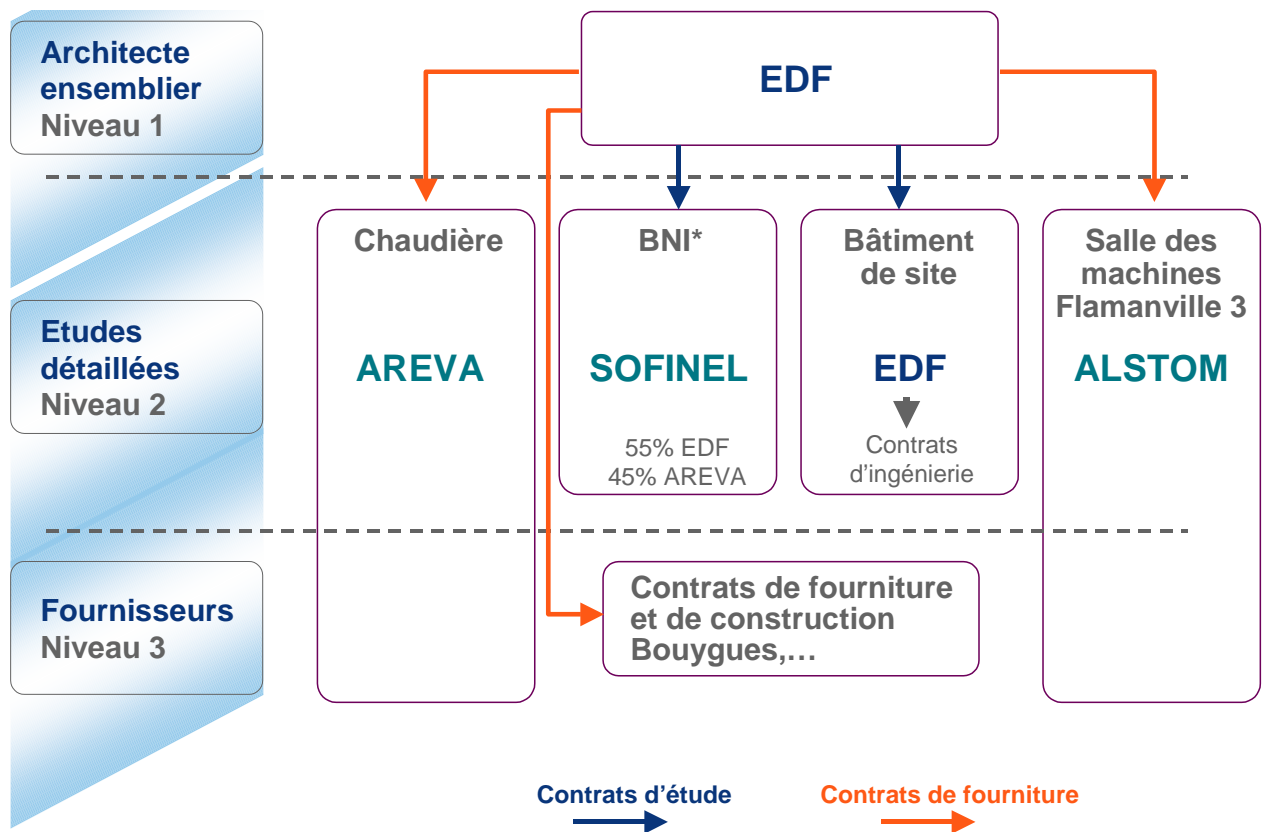
## 4.1 EDF, at heart of running the Flamanville 3 project

EDF is taking full control of the project and manages all aspects, from design through to engineering studies and construction on site.

Accordingly, EDF has defined various lots (studies, construction, materials) and places contracts directly. It is therefore EDF that manages relationships between all the project's industrial players. EDF oversees the quality of each contract, particularly equipment manufacture.

The project, especially the construction site, is subject to constant and rigorous control by the Autorité de Sûreté Nucléaire (ASN - French Nuclear Safety Authority), which, with total independence, controls nuclear safety and radiation protection.

Inspectors from the Autorité de Sûreté Nucléaire carry out **over 2 checks a month** on EDF, day or night, seven days a week, either scheduled or spot checks



\* BNI : îlot nucléaire hors chaudière

✓ **Awarding the major contracts – reconciling responsibility and simplicity in intercommunication.**

Building Flamanville 3 involves around 150 top-level contracts. This process helps limit the proliferation of contracts and hence the number of intercommunications.

The 6 largest contracts account for about 70% of the project budget.

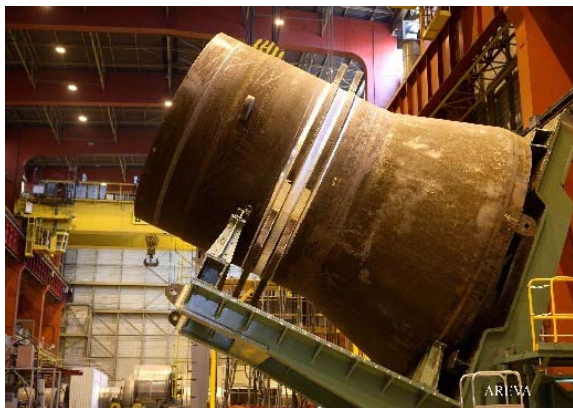
The **major contracts for constructing** the EPR reactor have been awarded to:

- the Bouygues Group in August 2006, for studies and all the major civil engineering work at the site for the construction of all the industrial buildings (concrete shell of the reactor building, main structural framework of the machine room, etc.);
- the Alstom Group, in August 2006, for studies and machine room supply (turbogenerator and auxiliary installations);
- AREVA NP, in January 2007, for supplying the boiler for the future installation;
- Endel / Bocard for the nuclear pipework;
- Spie / Cegelec for the electrical installations;
- Solétanche / Vinci for work at sea.

Over 99% of the contracts have already been placed.

**Manufacture of very large components is underway.**

The elements of the reactor vessel are being assembled at Areva's factory, while manufacture of the steam generators is proceeding according to plan. The turbogenerator is being built (machining and assembly) at Alstom's factories.





## 4.2 August 2006 – November 2007: 15 months to prepare the ground

### Preparatory work at the EPR site ended in December 2007.

In fifteen months the preparatory phase covered:

- platform preparation work;
- driving two kilometres of underground technical galleries for laying pipes and cables;
- preparing to drive the discharge at sea gallery;
- installation of most of the cooling water pipes, the largest of which are 3.5 metres in diameter.

700,000 m<sup>3</sup> of rock was extracted which will all be reused on site either for embankments or as a component in the concrete infill.



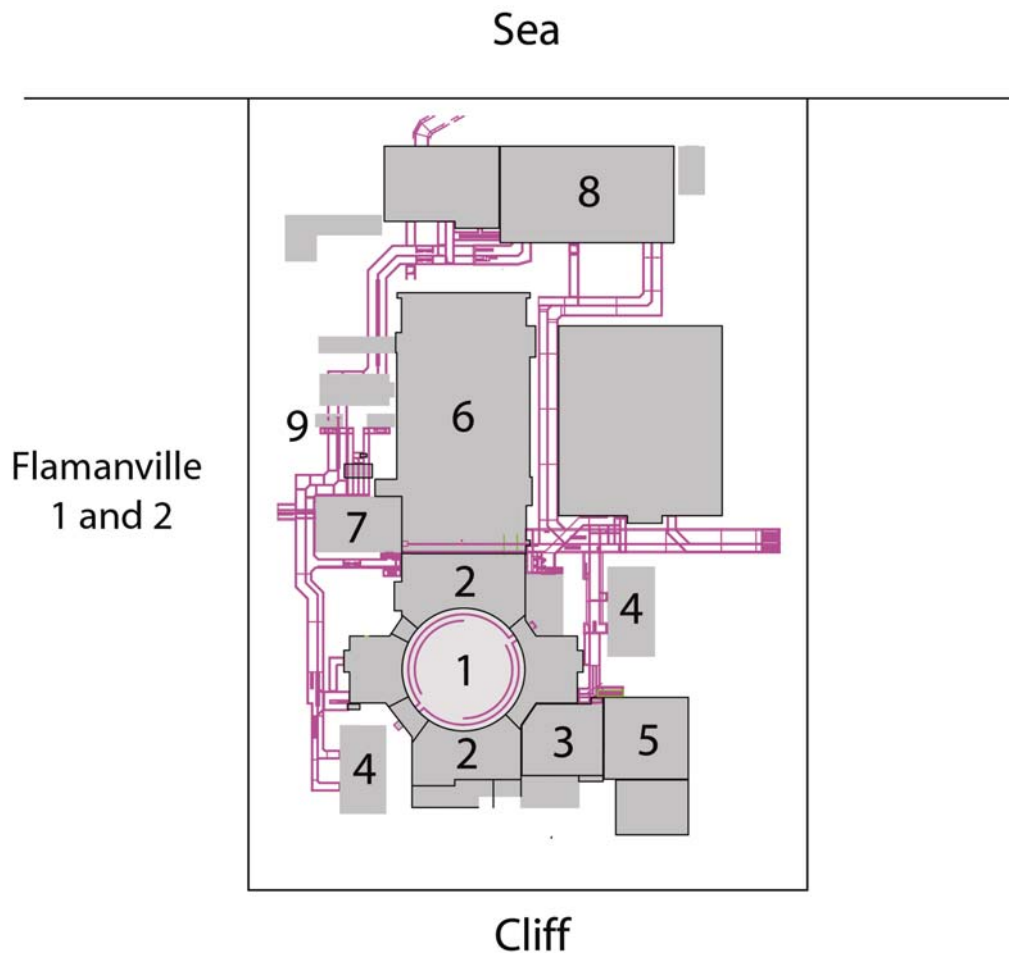
*The EPR site in Flamanville in December 2008 (EDF Médiathèque – Alexis MORIN)*

### 4.3 2008: civil engineering work began

Construction work on the reactor began on 3 December 2007.

Work at the site is progressing and EDF is using all the resources required to ensure that the range of activities is carried out to the quality standards demanded and checked rigorously by the Autorité de Sûreté Nucléaire during its supervisory visits, in order to guarantee the safety of the future EPR reactor.

EDF and its industrial partners have taken all the necessary steps to forestall and manage unforeseen events, inherent to this type of project. In particular, EDF has taken action internally and with its suppliers to improve the quality of supervision and control over the whole of the site.





## ✓ Nuclear island

Work is progressing on four main constructions:

### **Reactor building (1 on the plan)**

**The base slab (or footing) of the reactor building is complete.**

**The horizontal part of the liner**, a metal skin to ensure the reactor building is sealed, **has been laid on the footing.**

The first vertical elements (or gusset), which form the base of the building's containment shell, are being assembled. This is a circular ring seven metres wide and four metres high.

As for the fuel and electrical buildings (2 on the plan), the footings of the buildings are complete and a peripheral wall six metres high has been built.

The three metre thick footing, the building's foundation slab, has been poured at the nuclear auxiliaries building (3 on the plan).

Finally, work on the diesel buildings (4 on the plan), which are used as an emergency electricity supply, and the effluent treatment building (5 on the plan) is about to begin.

## ✓ Conventional island

### **Machine room (6 on the plan)**

**Assembly is proceeding according to plan.**

The supports on which the turbogenerator table will be laid are complete. Reinforcement work will last for four months before the concrete is poured. The outer enclosure of the metal framework is assembled.

As for the pumping station (8 on the plan), reinforcement work in the water intake zone has begun, and the initial formwork has been laid. At the discharge structure, reinforcement of the lower part of the footing and the walls is complete.

### **Energy discharge platform (9 on the plan)**

The platform infrastructure is progressing well. The main transformer pits are complete and those for the emergency and auxiliary transformers are underway. Reinforcement of the footing is in progress.

## ✓ Technical galleries (*in pink on the plan*)

The technical galleries connect the buildings of the future power station to each other and allow the electrical and mechanical fluids to circulate, particularly water for the emergency cooling circuit. At present, 75% of the galleries are complete. The rest will be completed as work on the buildings progresses.

## ✓ Discharge at sea construction work

The structure should be delivered in 2010 so that under water tests can be carried out.

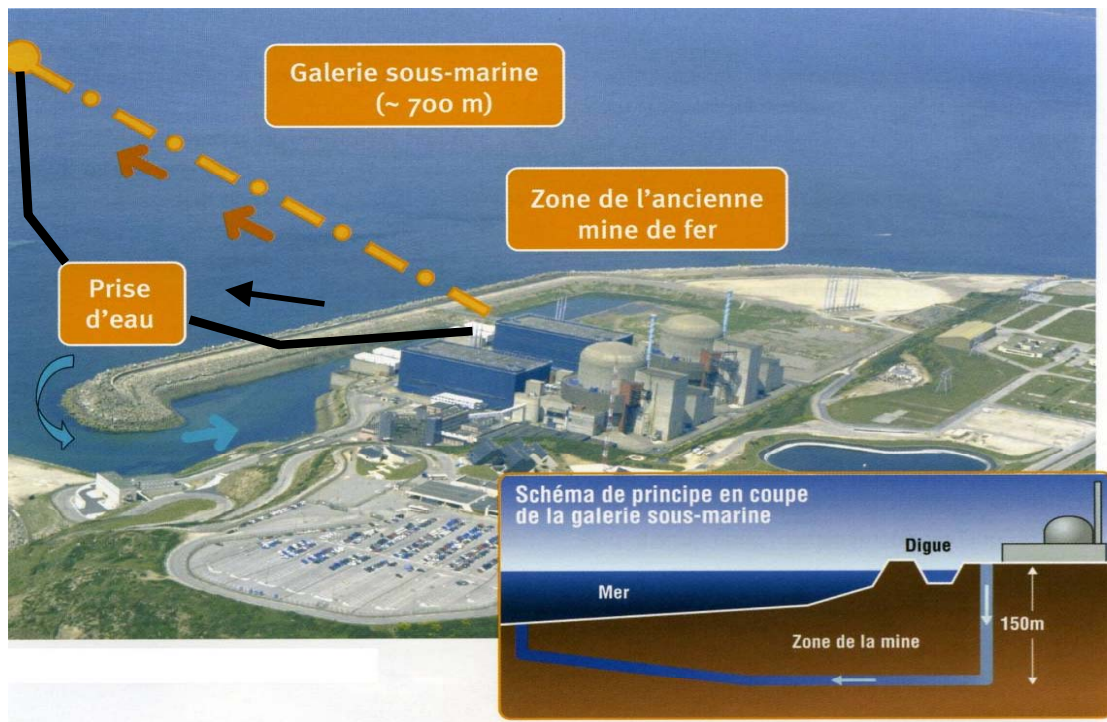
### Shaft at sea

Excavation of the shaft at sea and putting in place the metal liner that will be used as formwork for concreting ended in September 2008. This was a world first for such a large diameter (six metres). The liner has been encapsulated.

### Earth sink

Given the technical difficulties encountered when the earth sink was excavated, EDF decided to turn to a new excavation technique using a "mole".

This solution means that the structure will be delivered on time with only a small cost overrun (about 1% of the construction cost of the "mole" or the EPR?) in complete safety for those working on it.



Delivery of the mark two simulators in Lyon and Montrouge less than one year after pouring the first concrete is a first for a phase of a new project. Future teams of operators responsible for running the reactor will be trained on it and can already work specifically on the safety documents in the EPR technical repository.



## 4.5 2009: Preparing for forthcoming stages

**2009 will see the start of electrical and mechanical assembly in the nuclear island** (pipework, valves, pumps, tanks, etc.), **and assembly of large components in the machine room** (particularly assembly of the rolling bridge which will make it possible to install the other components).

The auxiliary transformer, an electrical transformer that will supply the EPR site with the electricity needed to assemble and bring equipment into service, will be powered up.

At the same time, civil engineering work will continue over the period 2009-2011.

In the nuclear building, the heavy floor work on which the large components of the primary conduit will be laid.

Work will continue in the machine room where the table that will support the turbogenerator will be poured.

At the same time, excavation work on the new sea gallery could begin using a mole.



## The EPR: advancing local development in Cotentin

*The choice of Flamanville from among EDF's 19 nuclear generation facilities as the future EPR site was based mainly on specific technical criteria. In addition, there is a general consensus among local elected officials and economic agents that Flamanville will benefit from this choice, notably in terms of its positive impact on the local economy.*

*On 1<sup>st</sup> August 2008, at EDF's request the project was recognised as a "Key Project" ("Grand Chantier") by the French Prime Minister*

### 5.1 A sound choice built on local consensus

The choice of Flamanville as the future EPR site is a sound one, for industrial reasons:

- suitable land is readily available,
- the coastal location means that there is significant cooling capacity available.

The **presence of a highly-developed nuclear industry in the Cotentin region** has allowed local firms to acquire specific know-how concerning the conception, construction, maintenance and dismantling of complex industrial units.

The consensus amongst elected representatives and local economic actors to accommodate this French leading-edge project was also a decisive factor in choosing the site.

## 5.2 Important economic effects on the Manche *département*

Building of the first EPR, which is expected to take five years, will have a considerable impact on the economy in Normandy, bringing about a growth in activity. The new demand, in particular for manpower, will be felt not only in Flamanville itself but throughout the Contentin *département* and even across the Lower- Normandie region.

**Construction** of the EPR is expected to lead to the signing of **150 contracts** with local firms involved in construction and equipment supply, for which EDF will call on the assistance of the Chamber of Commerce and the National Employment Agency.

Action has been taken with the assistance of the Chamber of Commerce to identify local and regional businesses that can be included in the tendering process, including subcontracting in large contracts, and with the National Employment Agency to promote local jobs (profile identification, training...). Numerous trade associations will be able to provide technical services (civil engineering, local manufacture of equipment, electrical and mechanical work, etc.) or site services (accommodation, industrial sites, transport, site logistics, etc).

During the construction phase, the number of **people working** on the site should reach **2,500** at its peak, which is comparable with the level reached here when the existing plants 1 and 2 were being built. The accommodation available would therefore be brought up to demand.

**Running** the new power station will mean the creation of **300 direct permanent jobs** (both EDF staff and that of contracting firms) and almost a hundred indirect jobs (catering, retail, crafts, services and small businesses).

The significant amount of maintenance work which is already being provided for the two plants currently in operation (in the order of €35 million spent annually) will of course be increased concomitantly to cover the new plant.

The running of Flamanville 3 will also boost the finances of the local communities accordingly from its taxes, in turn giving rise to new opportunities for local development.

### 5.3 Working hand in hand with the public authorities

On 1 August 2008, at EDF's request and with the support of all the local players, the Prime Minister awarded Major Construction Site designation.

The designation will lead to a Major Construction Site programme, which is a true socio-economic development plan. It has three aspects:

- a training policy to help recruit a local labour force;
- financing for infrastructure construction;
- post-construction aid to maximise the benefits of the installations in the regional economy.

Local consultation will take place throughout its life.

With this designation, local authorities will benefit from aid in financing the infrastructure required at the site (road transport services or improving crossroads) and for the people employed at the site and their families.

This work could be financed by anticipating future fiscal resources, with EDF paying part of the interest on the loans that local authorities will have to take out.

#### **Quick assessment of the Major Construction Site designation and the initial results**

By 31 December 2008, EDF will have spent 5.8 million euros, and committed a further 14 million euros.

Road works have been completed, in consultation with the local authorities, to improve and make safe the movement of vehicles and routing of equipment to the site (new southern transport services to the site, improving the Dielette and Helleville crossroads).

Money has also been invested to build or extend accommodation for people working at the site, with the creation of 472 places in Siouville, Les Pieux, Flamanville, Surtainville and Saint-Germain.

Work has also begun on a slipway in the port of Dielette for unloading heavy items for Flamanville 3.



# 6

## Appendices

### Key statistics on the EPR

#### Technical data

Reactor power capacity	<b>1,650 MW</b>
Unit Capability Factor (period over a year in which reactor is operating)	<b>&gt; 90%</b> <b>(or +10% of the current French nuclear output)</b>
Lifetime	<b>60 years</b>
Time for construction	<b>5 years</b>
Commercial Operation Date	<b>2012</b>

#### Environmental performance

Change in volume of radioactive waste (by comparison with 1 300 MW plants)	<b>- 30%</b>
Liquid radioactive waste per MW produced (excluding tritium and carbon 14) (by comparison with 1 300 MW plants)	<b>- 30%</b>
Gaseous radioactive waste per MW generated (excluding equivalent tritium and carbon 14)	<b>-30 to -40%</b>

#### Economical data

Amount to be invested	<b>€4 billion</b>
Number of jobs created	<b>300 permanent direct jobs</b>
Number of jobs needed to build the Flamanville EPR between 2006 and 2012	<b>More than 2,500</b>
Number of scheduled working hours	<b>7,500,000 hours</b>



## Safety: the top priority

Fully aware of the risks of a site like this, intensified by its very compact nature with many technical activities taking place at the same time, EDF put in place a very substantial safety action plan, from very early on in the project.

Training and awareness-raising for everyone are activities organised at regular intervals on the site. When they arrive, all employees who need to work at the site, whether EDF or supplier employees, permanent or otherwise, are given a document translated into several languages summarising the major safety measures.

”On the spot “ measures are also organised with regards to sensitive safety subjects, such as the movement of different types of vehicles around the site, activities taking place near each other and blasting.

Videos and posters are used all over the site to remind people throughout the day of their responsibilities and the need for vigilance to minimise on-site risk.

A day-long safety forum was held on 18 September 2008 for all contractors and their employees at the site allowing further exchanges and awareness raising for everyone.

All accidents at the site are systematically analysed with the people concerned, contractors’ supervisors and EDF’s safety managers. Situations classified as near accidents are also noted and analysed to draw from them all the lessons needed to avoid further risks.



## Environmentally an exemplary site

To underline its concern for the environment, EDF strives continually to improve environmental performance with the objective of also obtaining an ISO 14001 certification for new construction sites. This became a fait accompli when the ISO 14001 certification awarded in 2006 was confirmed for the Flamanville 3 site in 2007.

Certification, awarded by an external body, ensures that Flamanville 3 is managed so as to control the environmental impact of its activities over the long term.

Along with the ISO 14001 certification, 2007 was marked by:

- creating the post of environment officer at Flamanville 3, previously covered by a quality/safety/environment officer, to improve environmental oversight and ensure that contracts respect this aspect,
- setting up a programme of analytical surveillance of rainwater effluent, discharges of water treated at the north purification station and effluent from the drainage pit collecting water from the bottom of the excavations,
- setting up structure for dealing with waste produced by EDF and contractors while at the same time carrying out design and sizing studies for a waste sorting area to handle waste from multiple activity zones from 2008,
- creating an environment training module for staff from EDF and suppliers who supervise the construction work,
- continuing to hold bi-monthly site meetings specifically on the environment.

In 2008, a great deal of effort has already been devoted to several wide-ranging objectives, principally:

- maintaining the ISO 14001 certification, plus further continuous improvement in environmental performance,
- construction and operation of a waste storage area designed to improve storage of waste from multiple activity zones in transit to approved storage and treatment centres.

Over and above the statutory requirements, we strive constantly to improve the professionalism and day-to-day behaviour of people working on the site, whether they are EDF or supplier staff, so as to develop a strong environmental culture in everything we do.



## Transparency and information: our commitment

The Flamanville Local Information Commission has taken over responsibility for monitoring the site in the same way as it has been monitoring work on the two reactors that have been operating at the site for the past twenty years. It meets several times a year and an accurate report is produced, at each meeting, on the progress of construction work at Flamanville 3. An extensive inspection of the site takes place during some of these meetings.


Accordingly, in November 2006, an agreement was signed between the chair of the La Manche Conseil general (Regional Council), the chair of the national association of Local Information Commissions, the chair of the Flamanville Local Information Commission and EDF to facilitate access to information on Flamanville 3 project, including in-depth technical surveys.

The local press is automatically invited to LIC meetings and site visits allowing them to report the discussions to all local inhabitants.

In addition, every fortnight, EDF distributes an information bulletin on current activities to elected representatives, community groups and local journalists.

There is a special website for the Flamanville 3 construction site containing technical information, disseminated information reports , site photos and videos, so that everyone can have a look at the work.

A Public Information Centre is also open to everyone (insert opening hours) where specialists can answer all visitors' questions, as constraints arising from the reinforced Vigipirate plan restrict opportunities to visit the site.



# Inter-Contractor Association: creating a Major Construction Site to make life easier for people working at the site

## Mission:

The aim of the Inter-Contractor Association (ICA) is to manage activities and installations common to contractors working on the site.

Accordingly, the ICA deals with:

- staff reception
- staff catering
- staff housing
- staff transport to the site.

When they arrive at Flamanville 3, employees working on the site are met by the ICA:

- to give them information on the housing available - apartments, houses, furnished rooms, lodgings, bungalows, social housing, hotels and caravan sites
- to provide information on the catering and transport services.

## Accommodation:

The ICA identifies housing available in the area surrounding the EPR site by researching the market.

It also manages four accommodation sites with a total of 236 mobile homes, an operation formalised by agreements between EDF, the ICA and the municipal wards where the sites are located:

- capacity: 472 employees,
- accommodation reserved for employees who have been transferred,
- accommodation for two people consisting of two separate bedrooms with a common living area,
- distribution of accommodation - 390 places at Les Pieux, 30 at Siouville, 42 at Surtainville and 10 at Saint Germain le Gaillard.

On 16 October 2008, 405 people were living in this accommodation.

To date, all accommodation requests from people working at the EPR site have been met.

## Transport:

Free transport is now provided for employees:

- shuttle buses between the Les Pieux accommodation site and the EPR site run according to the needs of the contractors working at the site,
- shuttles are available between the car park at the Château de Flamanville and the EPR site to minimise on-road parking,
- a shuttle bus also runs between Cherbourg railway station and the EPR site to facilitate employee travel to the EPR site.