

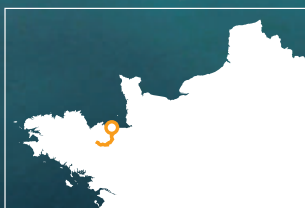


The Rance Tidal Power Station is in the Rance Estuary in the department of Ile-et-Vilaine.



# THE RANCE

## TIDAL POWER STATION



NOVEMBER 2012

**MEMOGUIDE**



The power station under construction



The Rance Tidal Power Station lock

## HISTORY

The Rance Estuary has one of the world's highest tidal ranges (13.50 meters).

In 1943 industrialists, technicians and engineers began working on an in-depth civil and mechanical engineering research program. From the beginning, they focused on integrating the power station into the estuary. The development of "bulb" generators, a technological breakthrough, enabled them to put all the electromechanical equipment in the barrage and build a road between Dinard and Saint-Malo over the station.

Technical and economic studies concluded that this dam would have to be built dry. Walls made of hollow cylindrical boxes, filled with sand for stability, were unloaded onto the bottom of the estuary. The flow of the Rance was then interrupted for three years.

The Rance Tidal Power Station is located between the Briantais Point, on the right bank (The Saint-Malo side) and the Brebis Point, on the left bank (The Dinard/La Richardais side) and Chalibert Island in the middle. In 1966 General de Gaulle inaugurated the power station after

six years of work. Forty-five years later it is still one of just two industrial tidal power stations in the world.

## MONITORING - MAINTENANCE

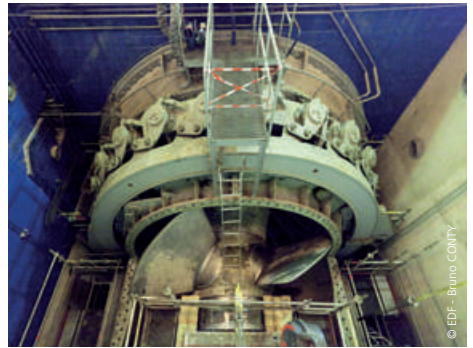
The Rance station's maintenance policy involves preventive and targeted care of the 24 bulb generators in order to guarantee the plant's security, safety and performance.

Various maintenance checks are performed at variable frequencies, depending on the equipment. A campaign to replace or refurbish electro-technical (circuit breakers, cables, transformers and alternators) and mechanical (turbines, valves, lock gates, etc.) equipment has been under way for several years.

Divers and a robot inspect annually the facility's concrete and submerged parts. The Regional Environment, Development and Housing Department (DREAL), an oversight entity that performs its own checks, reviews and releases inspection reports.



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One of the Rance Tidal Power Station's 24 generators

General de Gaulle inaugurating the station on November the 26<sup>th</sup>, 1966

## PRODUCTION

The Rance Tidal Power Station generates enough electricity to supply the equivalent of a city the size of Rennes.

The tide fills and empties the estuary twice a day with a maximum flow of 18,000 m<sup>3</sup>/s. The "double effect" operation boosts production time because the turbines are running during both high and low tide. They were specially designed to work in both directions.

A computer system runs the whole facility. A software controls the generators' and gates' operating conditions.

## THE ENVIRONMENT

The Rance Tidal Power Station produces clean, renewable and perpetual energy. The facility has no impact on the climate because it doesn't emit greenhouse gases (CO<sub>2</sub>). Whatever the constraints of energy production, the regularity of the estuary's tides is maintained in order to avoid a disruption of species living there.

A new ecological balance has developed itself in the estuary since the station was built. Fauna and flora are plentiful and varied.

## TECHNICAL INFORMATION

From the left to the right bank, the 750m-long facility includes a:

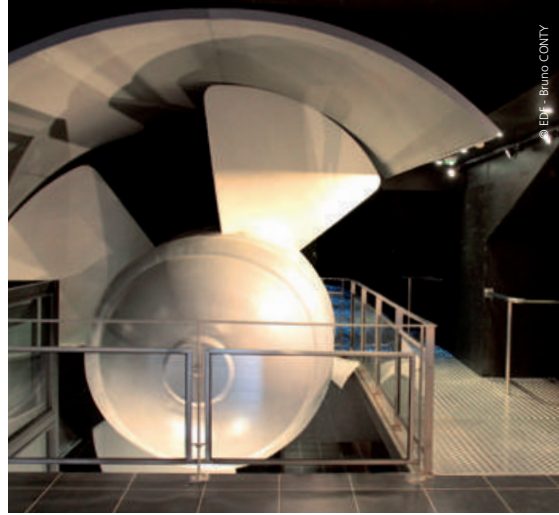
- ▶ 65m-long, 13m-wide lock restoring navigation between the tidal basin and the sea, allowing around 20,000 boats to pass through each year;
  - ▶ 390m-long, 33m-wide power station housing 24 "bulb" generators each producing 10 MW;
  - ▶ 163m-long rockfill dike completing the closing of the estuary between the station and Chalibert Island;
  - ▶ 115m-long mobile barrage with six 15m-wide, vertically rolling lift gates with a 10m lift height;
  - ▶ basin on the upstream side retaining up to 184,000,000 m<sup>3</sup> of water;
  - ▶ major road between Dinard and Saint-Malo carrying an average of 26,000 vehicles a day, up to 60,000 during summer.
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- ▶ Year it was commissioned: 1966
  - ▶ Maximum turbine flow: 6,600 m<sup>3</sup>/s
  - ▶ Consumption equivalent: 223,000 people

In addition, the power station's operation facilitates navigation in the estuary, the average water level being higher than it was before the facility was built.



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The Rance Tidal Power Station EDF Discovery Space



© EDF - Bruno CONTY

Model of a "bulb" generator in the Rance Tidal Power Station EDF Discovery Space

## SECURITY

Buoys attached to cables determine an area that bans navigation upstreams and downstreams from the power station, in a 300 m limit area that contains cameras allowing lock-keepers to monitor the surrounding area 24 hours a day. Boat operators use a high-frequency radio link to dialogue with the lock-keeper, who can intervene all day and night if the safety of people or of the facility is in jeopardy.



A 2005 prefecture decree allows line fishing in well-defined, clearly-marked areas around the dam. Anglers should observe the precautions common to all hydroelectric plants.

## TOURISM

The Rance Tidal Power Station is at the crossroads of world-famous tourist attractions, including Saint-Malo, Dinard, Mont-Saint-Michel and Dinan. Visitors flock to enjoy the Rance Valley with its preserved nature and castles.

This power station is world-renowned. Over 70,000 visitors (tourists, schoolchildren, students, engineers, technicians, etc.) of all nationalities visit the discovery space every year. Models, interactive terminals, a full-scale turbine, films and information panels explain how the station works and describe the plants and wildlife around it.

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