

## ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name of person updating the form

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Date submitted

June 27, 2012

Project name: La Rance Tidal Barrage

Planned  In Operation  Completed

Project description:

*Project Developer:* Électricité de France (EDF)

*Technology Developer:* Électricité de France (EDF)

*Technology type:* Tidal barrage

*Resource (wave, tidal):* Tidal

*Project scale (test site, prototype, array, commercial):* Commercial

*Installed capacity (MW):* 240 MW

*Project Website:* <http://www.edf.com/the-edf-group-42667.html>

*Launch Date:* November 26, 1966

*Additional Description:* The Rance Tidal Power Station is the world's first tidal power station and also the world's second biggest tidal power station. The facility is located on the estuary of the Rance River, in Brittany, France. Opened on the 26th November 1966, it is currently operated by EDF, and is the second largest tidal power station in the world, in terms of installed capacity. With a peak rating of 240 MW, generated by its 24 turbines, it supplies 0.012% of the power demand of France. With a capacity factor of approximately 40%, it supplies an average 96 MW, giving an annual output of approximately 600 GWh. The barrage is 750 m (2,461 ft) long, from Brebis point in the west to Briantais point in the east. The power plant portion of the dam is 332.5 m (1,091 ft) long. The tidal basin measures 22.5 km<sup>2</sup> (9 sq mi).

Location:

*Ocean/Water body:* Rance Estuary

*Closest city:* Saint Malo, Brittany

*Country:* France

*Coordinates: 48.6186886°, -2.017955°*

Process status: It took six years to complete, and was commissioned at various stages between August 1966 and December 1967. The following were the most important stages of its construction: January, 1961: commencement of work. 19th November, 1962: commissioning of the lock. 24th March, 1963: commissioning of the sluice-way section of the dam. 20th July, 1963: final closure of the dam across the estuary. 19th August, 1966: on-line connection of the first power set. 26th November, 1966: inauguration by the President of France. 1st July, 1967: inauguration of the road across the dam. 4th September, 1967: commissioning of the twenty-fourth power set. The plant is currently operating.

Licensing information (brief description):

*Please provide a brief description listing the organizations involved, licenses needed and duration of consent process. One paragraph should suffice.*

Key Environmental issues: The barrage has caused progressive silting of the Rance ecosystem. Sand-eels and plaice have disappeared, though sea bass and cuttlefish have returned to the river. By definition, tides still flow in the estuary and the operators, EDF endeavors to adjust their level to minimize the biological impact.

Environmental webpage: *link to project official environmental webpage (if available)*

<b>Baseline studies and project effects studies: La Rance Tidal Barrage</b>				
<b>General description</b>				
<b>Receptor</b>	<b>Monitoring program description including question and/or objective (several can be listed per receptor)</b>	<b>Design and methods (brief description)</b>	<b>Results (brief description)</b>	<b>Status (planned, underway, completed, with dates)</b>
Physical environment				
Benthos				
Fish and fisheries				
Large vertebrates				
Birds				
Marine uses/ users				
Other* (can be named)				
<b>Reports or Papers</b>	(Key papers on the areas addressed should be listed here; when possible the files themselves can be made available in downloadable PDF format, alternatively links to			

	the files or project website can be provided when available e.g. SeaGen.)
<b>Research Projects</b>	(past or on-going environmental research projects at the site)

<b>Monitoring and adaptive management: La Rance Tidal Barrage</b>				
<b>General description</b>	The Rance Basin has undergone a full scale evaluation of the ecological impact of the tidal power station during 20 years of operation. Significant impact during the 3-year construction phases and closing of the estuary provoked disappearance of marine flora & fauna due to salinity fluctuations, heavy sedimentation and accumulation of organic matter in the basin. The new ecological equilibrium, established in the space of 10 years remains fragile and being linked to the degree of stability of abiotic conditions, dependent to a large extent on the operation conditions of the power stations. By 1976, the Rance estuary was considered again as richly diversified: a new biological equilibrium was reached and aquatic life was flourishing again.			
<b>Receptor</b>	<b>Study description including question and/or objective</b>	<b>Design and methods (brief description)</b>	<b>Results (brief description)</b>	<b>Status (planned, underway, completed, with dates)</b>
Physical Environment	Mean water level and hydrodynamic regime.	N/A	The 2.5 m rise of the mean water level has resulted in a decrease of the tidal range which includes less volume of water entering the estuary the slack period to be longer.	Completed
	Sediment dynamics.	N/A	<ul style="list-style-type: none"> <li>Modification of tidal stream in the estuary, in particular during ebb has provoked more silt deposit in the low intertidal zone.</li> <li>When comparing the Rance estuary with other regional estuaries, sediments dynamic processes are similar to those of natural estuaries.</li> </ul>	Completed
Biological Environment	General Flora and Fauna distribution.	N/A	An increasingly diverse flora and fauna became established. The patterns of distribution of this flora and fauna, their grouping into ecological units and the nature of their interrelationships, indicate a variable degree of biological adjustment to the new environmental conditions.	Completed
Benthos	Distribution of benthic species and communities.	N/A	By 1980, the basin was providing habitat for 110 worm species and 47 crustacean species.	Completed
Fish and	New fishery	N/A	Scallops and Belon oysters are now the new	Completed

Fisheries	activities.		fishery activities.	
Birds	Utilization of the basin by overwintering birds.	N/A	<ul style="list-style-type: none"> <li>• Bird species variety is the same than before (120 species)</li> <li>• A well developed communities of fish-eating birds has been developed (gulls, guillemots, shags)</li> <li>• Birds adaptation: decrease of sand area (intertidal area)</li> <li>• Birds can also find food in the other Bays (mudflats)</li> </ul>	Completed
Large Vertebrates	Seals distribution.	N/A	Since 2000, a seal female has been living in the basin, passing through the sluice gates or even the lock. Despite vain attempts to send her back to join seal communities, she always goes back to the Rance estuary!	Completed
Reports or Papers	<ul style="list-style-type: none"> <li>• <a href="#">Laleu, V., 2009. La Rance Tidal Power Plant. 40-year operation feedback – Lessons learnt (ppt presentation).</a></li> <li>• <a href="#">Links Between Environmental Consequences of La Rance and Severn Tidal Power Barrages</a></li> <li>• <a href="#">Retiere, C., 1994. Tidal power and the aquatic environment of La Rance. Biological Journal of the Linnean Society, 51, 1-2: 25–36.</a></li> <li>• <a href="#">Andre, H., 1978. Ten years of experience at the “LaRance” tidal power plant. Ocean management Ocean Management, 4, 2–4:165–178.</a></li> </ul>			
Research Projects	N/A			