

ENVIRONMENTAL EFFECTS METADATA SURVEY FORM

Name of person updating the form

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Date submitted

September 22, 2014

Project name: MORILD II Tidal Power Plant

Planned

In Operation

Completed

Project description:

Project Developer: Straum

Technology Developer: Hydra Tidal

Technology type: Axial flow turbine

Resource (wave, tidal): Tidal

Project scale (test site, prototype, array, commercial): Prototype

Installed capacity (MW): 1.5 MW

Project Website: <http://www.straumgroup.com/hydratidal>

Launch Date: November 2010

Launch Date: November 2012

Additional Description: The Morild II tidal power plant has a unique and patented floating design that can be anchored at different depths, thus can be positioned in spots with ideal tidal stream conditions. There are four turbines that transmit power via hydraulic transmission to two synchronous generators. Each turbine is composed of two unique wooden turbine blades that can be pitched 180 degrees to utilize energy in both directions. The plant carries sea vessel verification, and is both towable and dockable, allowing maintenance in surface position and on site. The prototype transmits energy with an undersea cable and can be remotely operated from on-shore surveillance systems.

Location:

Ocean/Water body: The Gimsoy stream (Gimsøystraumen)

Closest city: Lofoten, Norway

Country: Norway

Coordinates (please use Mercator): 68.26542°, 14.26083°

Depth:

Process status: Hydra Tidal was founded in northern Norway in 2001. In autumn 2010 the MORILD II tidal power plant was successfully launched at sea and towed into location in the Gimsoy stream in Lofoten, Norway. In December 2010 the plant (1.5 MW capacity, four turbines) was thoroughly prepared, anchored and submerged into operational position. The opening ceremony marked the start of the planned two-year trial period for testing and verification. Due to some fatigue issues with the rig in 2011, the plant was recovered. The Morild II is currently (September 2014) out of service. The continuation of the demonstrations will be done through the company Straum AS.

Licensing information (brief description):

- Patent: Floating Device for Production of Energy from Water Currents

http://worldwide.espacenet.com/publicationDetails/biblio?locale=en_EP&adjacent=true&KC=A&date=20080818&NR=20070911A&DB=EPODOC&return=true&CC=NO&FT=D

- Patent: Floating Water Current Turbine with Counter Rotating Coaxial Rotors

http://worldwide.espacenet.com/publicationDetails/biblio;jsessionid=26CBE2EB1B5B862E8A86D0D975E35E3E.espacenet_levelx_prod_6?CC=EP&NR=1467091A1&KC=A1&FT=D&date=20041013&DB=EPODOC&locale=en_EP

Key Environmental issues: The environmental authorities have several important tools at their disposal in connection with activities in the Barents Sea–Lofoten area. For Norway’s territorial waters these are mainly based on the Nature Diversity Act, while for Norway’s exclusive economic zone and the Norwegian continental shelf, the most important tools are based on the Pollution Control Act, political action plans and strategies. Areas of concern include: marine protected areas, protection of seabirds, priority species, selected habitat types, alien species, and interference with shipping lanes.

Environmental webpage: <http://www.straumgroup.com/hydratidal>

| Baseline studies and project effects studies: MORILD II Tidal Power Plant | | | | |
|---|--|--|---|---|
| General description | | | | |
| Receptor | Study description including question and/or objective (several can be listed per receptor) | Design and methods (brief description) | Results (brief description) | Status (planned, underway, completed, with dates) |
| Farfield Environment | Comparison of carbon dioxide emissions with | Life cycle analysis of production and assembly, transport, | Carbon dioxide emissions are 40% lower than that of onshore wind. | Completed |

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| | similar wind projects. | operation and maintenance over the life span and recycling at the end. | | |
| Recycling | Discover how much waste will be created in the decommissioning of the plant. | Design engineering and analysis of materials. | 80% of the plant can be recycled after its life span, which is more than 30 years. For example, our turbines are made out of glued wood. This material can handle tough ocean environments and they last very long. After the turbines' life end, they can be chopped and used in a bio energy power plant for example. | Completed |
| Reports or Papers | <ul style="list-style-type: none"> Hydra Tidal has, in cooperation with Harstad University College and Kunnskapsparken Nord AS (Science/Competence park), made a report about CO2 emissions in connection with the production of a complete Morild power plant. | | | |
| Research Projects | N/A | | | |

Monitoring and adaptive management: MORILD II Tidal Power Plant

| General description | | | | |
|----------------------------|--|---|------------------------------------|--|
| Receptor | Monitoring program description including question and/or objective (several can be listed per receptor) | Design and methods (brief description) | Results (brief description) | Status (planned, underway, completed, with dates) |
| Physical environment | | | | |
| Benthos | | | | |
| Fish and fisheries | | | | |
| Large vertebrates | | | | |
| Birds | | | | |
| Marine uses/users | | | | |
| Other* (can be | | | | |

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|--------------------------|---|--|--|--|
| named) | | | | |
| Reports or Papers | (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.) | | | |
| Research Projects | (past or on-going environmental research projects at the site) | | | |