Province of Zeeland

Action 23
Joint Excursion to a Tidal Energy facility
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1 Introduction Action 23: Joint Excursion Tidal Energy Facility

Action 23 aims at learning from the best practices on low head and low flow tidal energy initiatives in Europe. This action is also an opportunity for Pro-Tide members to see initiatives first hand and meet other experts in the field of Tidal Energy. Furthermore it creates the opportunity to exchange knowledge and involve these initiatives in different Pro-Tide actions.

This report contains:
- **An overview of all possible best practices in Europe and beyond.** The technical manager of Pro-Tide NL, has composed a list of all possible initiatives that are interesting for the Pro-Tide members to visit. This list has been distributed amongst the partners which originated in a shortlist of three initiatives.
- **An overview and assessment of the three selected best practices within the NEW region which can be visited by Pro-tide.** An short assessment has been made to decide which location will be visited by the Pro-Tide members.
- **A visit report of the Joint excursion at EMEC, Orkney Islands** which contains all lessons learned during the joint excursion.
## 2 Long list of Possible Best Practices

<table>
<thead>
<tr>
<th>Site</th>
<th>Technique</th>
<th>Environment</th>
<th>Economy</th>
<th>Public-Private Partnership</th>
<th>Remark</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Lake Schwa, South Korea</td>
<td>Barrage type, 7 m diameter bulb turbine, make Andritz</td>
<td>Built also for water quality reasons in the formerly closed basin. Fish friendliness unknown.</td>
<td>World’s largest Tidal Power Plant (250 MW) Economy is favourable, due to average head of 8.2 meter.</td>
<td>Commissioned by Korean Government (K-Water)</td>
<td>Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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<td>2 La Rance</td>
<td>Barrage type, 5 m diameter bulb turbine, make Alstom</td>
<td>Sensitive: During its building phase the estuary was blocked completely, took years to recover. Fish friendliness unknown, Sedimentation proves to be a problem</td>
<td>Favourable, due to average head of 8.2 meter</td>
<td>Commissioned by French Government in 1963, owned now by EFD.</td>
<td>Uncertain whether the power plant would be free for a visit (strategic object of national importance).</td>
</tr>
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<td>3 Annapolis Royal, Nova Scotia, CA</td>
<td>Annapolis Tidal Power Plant came online in 1984. It can make as much as 20 megawatts of electricity and has a daily output of roughly 80-100 megawatt hours</td>
<td>The generating station harnesses the tidal difference created by the large tides in the Annapolis Basin, a sub-basin of the Bay of Fundy. The tides in the Bay of Fundy in Canada are the greatest in the world, with amplitude between 16 and 17 meters near shore.</td>
<td>The Annapolis Tidal Station currently houses a seasonal interpretive centre that is open to the public. The Annapolis Tidal Generating Station Interpretive Centre is open seasonally from May until October. Visitors learn about how this innovative generating station works.</td>
<td>Opened in 1984, the Annapolis Royal Generating Station was constructed by Nova Scotia Power Corporation, which was, at the time, a provincial government Crown corporation that was frequently used to socially benefit various areas in the province</td>
<td>Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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<td>Various locations, e.g. Jiangxia Tidal Power Station, 3.9 MW. 6 bulb turbine generator units, operating in both ebb and flood tides. The maximum tidal range in the estuary is 8.39 m (27.5 ft).</td>
<td>Jiangxia power plant is the fourth largest tidal station in the world after Sihwa, La Rance in France and Annapolis in Canada. Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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<td>5</td>
<td>The Kislaya Guba Tidal Power Station is an experimental project in Kislaya Guba, Russia. The station is the world's 5th largest tidal power plant with the output capacity of 1.7 megawatts (2,300 hp). Old .4 megawatts (540 hp) French-built generation unit was dismantled. In 2004 was installed first new .2 megawatts (270 hp) generation unit, and in 2007 – second, 11.5 megawatts (2,000 hp).</td>
<td>The site was originally chosen because the long and deep fjord had a fairly narrow outlet to the sea which could easily be dammed for the project. There are plans for two larger scale projects based on this design near Mezen, on the White Sea and Tugur on the Sea of Okhotsk. Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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<td>6</td>
<td>Various Free Stream Turbines, e.g.: - OpenHydro - Voith - Andritz - Scotisch Renewable No special protective area, fishing grounds, Environmental Impact Assessment ongoing</td>
<td>Testing Centre, now self supporting Erected by Public funding, now an self-supporting entity, financed by contract (Berth-rental and research) Attractive location, because of the various techniques, approach and operation as a Testing Centre. Location also attractive because of Churchill Barrier project</td>
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<td>7</td>
<td>In 2007, all of the components required to construct SeaGen S were delivered to Harland and Wolff’s facility in Belfast for final assembly and testing. This location was also used as the installation hub for the project. In 2008 as part of the installation of SeaGen S, a 450m long duct was drilled using horizontal directional drilling. This duct is 20m below the seabed and protects the cable from damage: e.g. anchor drag. The foundation for Strangford Lough is of significant international importance for nature conservation, supporting a wide array of flora and fauna Environmental monitoring began in 2004 to inform an Environmental Impact Assessment (EIA). MCT implemented a £3 million Environmental Monitoring Programme (EMP) including Environmental monitoring began in 2004 to inform an Environmental Impact Assessment (EIA). MCT implemented a £3 million Environmental Monitoring Programme (EMP) including</td>
<td>The SeaGen S 1.2MW device was the world’s first grid connected commercial scale tidal device and has continued to lead the way in tidal current technology. Since installation, SeaGen S has exceeded the milestone of having generated over 8GWh of electricity. The success Developed and installed by MCT Marine Current Turbines. Private initiative, currently owned by Siemens Attractive location, because it houses the World’s first commercial Tidal Stream turbine.</td>
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<td>8</td>
<td>TTC, DenOever, NL</td>
<td>The Dutch Tidal Testing Centre (TTC) located in the North of Holland at Den Oever provides opportunities for tidal stream testing at intermediate scale. Offered is testing in a ducted channel, open water tow tests. Testing facilities available on site are a feed-in electrical grid-connection with a capacity of 160 kVA. Data acquisition and video link services are available via the network of Tidal Testing Centre. TTC offers developers access to two separate sluice gates. The sluice gates act like a ducted channel with water flows up to 5 m/sec depending on the hydraulic head over the gates. The basic function of the sluice gate is to discharge water from the IJsselmeer to the Wadden Sea, twice a day at times of low water on the sea side (ebb). TTC is a testing site, information about economy is not available. TTC collaborates with other test facilities such as ECN, NIOZ, EMEC and others and in international networks, for example on the development of standards in the International Electrotechnical Commission IEC to help advance the marine energy industry. Attractive location, though relatively small. Already known quite well.</td>
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<td>9</td>
<td>Ocean Mill, Borssele, NL</td>
<td>The Wave Rotor Turbine has combined two different turbine types on a single axis of rotation. The Wave Rotor is able to convert not only tidal current power, but also wave power into a rotation of vertical axis of the turbine. The latter is possible because waves are made up of circulating water particles. The rotor has a diameter of approximately five meters and is five meters deep (1:2 scale). The turbine has a 30kWp rated generator. The C-Energy demonstrator is installed on a jetty owned by Total Refinery Netherlands in the Westerschelde. The next step is to demonstrate large scale performance and long term durability. OceanMill and its consortium partners have started with the project to install a facility for 3 MW of clean tidal energy power, in one of the openings of the Dutch Oosterschelde Storm Surge Barrier (&quot;Roompot 10&quot;). On 30 May 2012, IHC signed an agreement to acquire Wave Rotor technology from Ecosys, which is renowned for its expertise in sustainable energy solutions. The official signing was made by Willem Steenge, Managing Director of IHC Tidal Energy, and Manon Janssen, Managing Director of Ecosys. Attractive location, though relatively small. Already known quite well. Also possible to visit during a conference or partner meeting in the Netherlands.</td>
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<td>10</td>
<td>Canadian Hydrokinetic Test Centre, Winnipeg River in Manitoba (CA)</td>
<td>Tested e.g. Clean Current Turbine. Proprietary generator, bearing, turbine blade and duct) and the bi-directional tidal technology, with added a central yawing bearing to provide the turbine with the ability to orient itself directly. Operation in a cold northern climate and begin to assess the challenges of frazil ice, debris and remote operation. This is also an ideal site to demonstrate. A study performed by the Energy Power Research Institute (EPRI) in Nov 2011 showed no evidence of fish harm or mortality when fish. The Centre is funded by National Research Council through its ecoENERGY program and is being undertaken in collaboration with Manitoba Hydro and the Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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in-line with the flood and ebb tides. The product family has been developed to suit tidal depths ranging from 7.0 to 20+ metres of water at LLWL.

<table>
<thead>
<tr>
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<th>the integration of single units and small arrays into an existing utility grid.</th>
<th>were forced through operating turbines</th>
<th>University of Manitoba</th>
</tr>
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<tr>
<td>11 Verdant Power’s Roosevelt Island Tidal Energy (RITE) Project is located in the New York Harbor.</td>
<td>Verdant Power’s Kinetic Hydropower System (KHPS) utilizes horizontal-axis turbines that convert the kinetic energy of fast-moving (&gt; 1 m/s) water currents into clean renewable electricity.</td>
<td>Located in the East Channel of the East River, which is a tidal strait connecting the Long Island Sound with the Atlantic Ocean in the New York Harbor.</td>
<td>During 2006-09, Verdant Power completed a grid-connected demonstration of its KHPS (Gen4) at the RITE Project. The demonstration included the operation representing the world’s first operation of a grid-connected tidal turbine array.</td>
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<td></td>
<td>Conducted in partnership with the National Renewable Energy Laboratory, Sandia National Laboratories, and the University of Minnesota’s St. Anthony Falls Laboratory</td>
<td>Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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<tr>
<td>12 Atlantis Resources San Remo, Victoria, Australia</td>
<td>Atlantis has operated its own dedicated tidal power test facility in San Remo, Victoria, since 2006. The facility is connected to the local grid, with several Atlantis turbines having exported power from testing programmes up until the most recent decommissioning of an AN system</td>
<td>The San Remo facility offers a shallow water, sheltered, near shore location to conduct operational testing in generation mode as well as all forms of environmental monitoring. Assessments have been conducted on water quality, salinity, acidity, dissolved solids, turbidity, impacts on flora and fauna and noise and vibration.</td>
<td>The San Remo site is a testing site, information about economy is not available.</td>
</tr>
<tr>
<td></td>
<td>Owned by Atlantis Resources</td>
<td>The san Remo site is a testing site, information about economy is not available.</td>
<td>Location is outside North-West EU, not eligible for joint Pro-Tide excursion.</td>
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</table>
3 Short list of potential initiatives to be visited

SeaGen, Northern Ireland

SeaGen is the world’s first large scale commercial tidal stream generator.

Technique
The SeaGen generates 1.2 MW for between 18 and 20 hours a day while the tides are forced in and out of Strangford Lough in Northern Ireland. The SeaGen generator weighs 300 tonnes. Each driving a generator through a gearbox like a hydro-electric or wind turbine. The turbines have a patented feature by which the rotor blades can be pitched through 180 degrees allowing them to operate in both flow directions – on ebb and flood tides. The power units of each system are mounted on arm-like extensions either side of a tubular steel monopile some 3 metres (9.8 ft) in diameter and the arms with the power units can be raised above the surface for safe and easy maintenance access. The SeaGen was built at Belfast’s Harland and Wolff’s shipyards.

Environment
The impact on the marine environment is determined by means of a comprehensive environmental monitoring programme.

Economy
The tidal stream turbine in Strangford Lough produces enough energy to meet the annual power consumption of 1,500 British households.

Public-private partnership
Siemens-owned Marine Current Turbines Ltd (MCT) was established in 1999. In 2008, the installation and commissioning of a commercial scale tidal turbine was completed; the SeaGen S 1.2MW, located in Strangford Narrows in Northern Ireland. In 2010 Siemens became a shareholder in MCT. In 2012 Siemens acquired the remaining shares in MCT with the intention of becoming the leading OEM in the emerging tidal energy market. MCT now operates within the Hydro & Ocean Business in Siemens Energy.

The European Marine Energy Centre (EMEC), Mainland, Orkney, UK

EMEC is a test and research centre focusing on wave and tidal power development based in the Orkney Islands, UK. It provides developers with the opportunity to test full-scale grid-connected prototype devices. The operations are spread over three sites: Billia Croo, Mainland (wave power), Fall of Warness, off the island of Eday (tidal power) and Stromness (office and data facilities).

Technique
On Mainland, Orkney many techniques are tested at the various sites:

OpenHydro uses the tidal test site at the Fall of Warness off the island of Eday. The test rig consists of two steel monopoles grouted into sockets drilled into the seabed, with a platform suspended from the piles to provide a working area. The turbine, which is six metres in diameter, is fixed to the piles using two steel collars, which allow the unit to be lowered into the sea using two 15 tonne hydraulic winches. The test rig allows for the turbine to be raised out of the water easily, reducing the cost and time for testing, maintaining and updating the device. To aid navigation, the test rig is painted yellow and yellow light (solar powered) is fitted in accordance with NLB requirements. The platform is also equipped with an AIS transponder. As the Open-Centre Turbine is designed to be deployed directly on the seabed using a gravity base, OpenHydro placed a blank, non-grid connected turbine on the seabed adjoining their test rig using the specially commissioned “OpenHydro Installer” in summer 2008. When commercially deployed the machines will be invisible from the surface.

The Scot Renewables Tidal Turbine is a floating tidal technology designed to minimise installation and operational costs. The device hosts two propellers which fold up while being towed. The system has been trialled through scale model testing and a 250kW prototype, the SR250, successfully connected to the national grid at the Fall of Warness tidal test site at the end of March 2011 and is currently in a two-year test
programme. The device, measuring 33m long, was constructed at Harland & Wolff in Belfast in 2010 and weighs 100 tons. Not deployed onsite, the device can be seen at Hatston Pier in Kirkwall, Orkney.

**Oyster 800 Wave Device**
The Oyster 800 Wave device is being tested in the test area in Billia Croo, Orkney. It is a near-shore wave energy device, typically deployed in 10 to 15 metre (m) water depth. The oscillating action of the waves against the wave energy converter (WEC) (or ‘flap’) drives hydraulic pistons which pump pressurised freshwater back to shore through a closed loop pipeline system.

**Environment**
EMEC cooperates with several academic institutes to investigate environmental impacts.

**Economy**
In 2013 300 people are working on renewable energy in Orkney. Renewable energy means employment for the people from Orkney and from outside of Orkney.

**Public – private partnership**
EMEC was established in 2003, EMEC was set up by a grouping of public sector organisations following a recommendation by the House of Commons Science and Technology Committee in 2001. Around £30 million of public funding has been invested in the Centre by the Scottish Government, Highlands and Islands Enterprise, The Carbon Trust, UK Government, Scottish Enterprise, the European Union and Orkney Islands Council. Since 2011 EMEC has become financially self-sufficient and a not for profit, private company, limited by guarantee, and owned by The Carbon Trust, Orkney Islands Council and Highland and Islands Enterprise Development Trust.
La Rance Barrage, near St. Malo, France

La Rance Barrage is the world’s first tidal power station, opened in November 1966. The facility is located on the estuary of the Rance River, in Brittany, France and currently operated by Électricité de France (EDF). La Rance was for 45 years the largest tidal power station in the world by installed capacity until the South Korean Sihwa Lake Tidal Power Station surpassed it in 2011.

Technique
La Rance Barrage. The system used consists of a dam 330m long and a 22km² basin with a tidal range of 8m, it incorporates a lock to allow passage for small craft. The plant consists of 24 bulb type turbine generators 5.35 metres in diameter, 470 tonnes in weight, and rated at 10MW each which generate electricity whether the tide is going in or out (developed by Électricité de France). This peak of 240MW of power is sufficient to power 4% of the homes in Brittany - equivalent to the consumption of a town the size of Rennes. The average power generated is 68MW for an annual output of around 600 million kWh units of electricity.

Environment
The La Rance tidal plant produces sustainable energy. It has no impact on climate because it does not emit any greenhouse gases. The pattern of the tides is preserved so that the impact on species living in the estuary is minimal. The operator, EDF, monitors the tides and weather forecasts to program the barrage operations on a weekly basis.

Since the construction of the barrage a new ecological equilibrium has been established in the Rance estuary. The main water level in the lagoon is higher than it was before the construction which promoted an increase in boating and sailing activities.

The environment has remained healthy but there have been changes. The barrage has caused limited silting of the Rance ecosystem but this has been manageable. Sand-eels and plaice have reduced in numbers but sea bass and cuttlefish have returned to the river. The tides still flow in the estuary and the operators of EDF adjust the level to minimize the biological impact.

Economy
The development costs were high but these have now been recovered and electricity production costs are lower than that of nuclear power generation (1.8c per kWh, versus 2.5c per kWh for nuclear).

Public-private partnership
The La Rance tidal plant is owned by EDF, the France government has an interest of 80 percent in EDF.

4 Assessment on best practices short list

The long list, which is compiled by the technical manager of Pro-Tide NL is discussed with the different partners. The discussion has led to a compiled ‘wish-list’ of three initiatives within the NWE region. The three different initiatives have been discussed during the partner meeting November 2013 in France. The three options in the short-list are very different:

1. A large scale commercial tidal stream generator
2. A successful tidal testing centre, and a
3. Long running tidal power plant.

A majority of the partners would have wanted to visit SeaGen. SeaGen is the world’s first large scale commercial tidal stream generator and therefore very interesting to visit and to hear first-hand their experience. But after contacting SeaGen it became clear that it was not possible to visit the site because of maintenance work. After a short discussion during the Partner Meeting in France the second choice, EMEC, was contacted and a site visit was arranged. La Rance became third on the wish-list because of the ‘older’ technique used in the power plant. Also a few of the partners already visited La Rance.

EMEC has already 10 years of experience functioning as a tidal testing centrum. They have a lot of contacts and experience in different fields of tidal energy. Besides the testing centrum also different developments in Orkney have taken place in the field of renewable energy (wind, hydrogen and tidal energy). The Orkney Council is therefore also contacted to visit the Churchill Barrier, which is currently under research to see if, when opening this barrage, tidal energy can be generated.
5 Site-Visit Orkney Islands by Pro-Tide 16th and 17th of June 2014

Lessons learned

6 Program Site-Visit

The project partners of the Pro-Tide have visited the Orkney Islands in Scotland to see first-hand the development of tidal and wave energy at the Orkney Islands and the benefits and challenges these developments bring. To get a good idea of the different activities at the Orkney Islands the project members of Pro-Tide:

- visited EMEC; an organisation that facilitates test sites;
- had a look around to see different tidal devices in action on- or off-shore, and;
- met with people from OREF (Orkney Renewable Energy Forum), Aquatera (consultancy in the field of marine energy), Green Marine Energy Support Services and the Scottish Insurance Company.

7 Short Background The Orkney Islands

The Orkney Islands is an Island group situated at the North side of Scotland. An important income of the inhabitants of the islands is agriculture followed by tourism, oil and fishery. A new upcoming source of income is the development of renewable energy, more specifically the development of wave and tidal energy.

8 Site-Visit at EMEC, Stromness

Let’s Get Metal Wet! Is the motto of EMEC. A simple catchy sentence with a world of challenges behind it. The members of the project Pro-Tide visited the EMEC Offices in Stromness to hear and see first-hand what these challenges are.

The European Marine Energy Centre (EMEC) in Stromness, Kirkwall is a self-sufficient company since 4 years that specialises in scale and full scale testing for both wave and tidal devices. Before being self-sufficient the organisation was publicly funded. Partners of the project Pro-Tide decided to visit Orkney to learn from its already vast experience in the field of tidal energy, to share the latest developments in the field of tidal energy and to see first-hand how a testing centre as EMEC is operating.

High qualified jobs

The number of people working on renewable energy in the region has been growing since the start of EMEC. It is estimated that now 300 people are working in this sector. Because of the research done in this field this development also provides more highly qualified jobs which is a good development for the Orkney Islands that is considered to be a region with a shrinking population. EMEC activities attracts employment of service companies and knowledge institutes (universities, engineering offices, consultancy firms).

Challenges

The challenges that come with the development and running of tidal and wave testing sites and development of renewable energy in general are diverse:

- The costs for boats for the placement and maintenance of the devices
- Infrastructure for testing sites
- Supply-chain issues

What me impressed is that since EMEC started 10 years ago a whole industry around Tidal Energy on the Orkneys was formed: building a new pier, maintenance, specialized ships, supply chain and research and education. – Leo van der Klip, project leader Pro-Tide, The Netherlands

Most of the ProTide partners are in the process of setting up different Tidal Testing Centres and we have all learned from the pioneer EMEC, our conclusion is also to get more metal wet! – Dave Parkes, Dover Harbour, England
The partners of Pro-Tide also had the opportunity to visit the new build pier in Kirkwall; this pier is partly used as dry-dock for installations and as transport location from where devices are transported to a test site or where devices are towed on land to be transported elsewhere. During the discussion with EMEC it became clear that the costs of the transport and maintenance of the devices are an important part of the BC. The development of a supportive supply chain to facilitate the transport and maintenance of the devices is necessary.

More related challenges that need to be met:
- Grid connection and limitations in Scotland (last in, first out principle)
- Monitoring not robust: primary issue: acoustic output on sensitive wildlife (regulator concern, becomes developers concern)

Good Prospects
Tidal energy is still in development and challenges need to be met, but EMEC shows it can be done and gives good perspectives for the future.
Regarding testing of tidal turbines, EMEC is very advanced in their facilities (infra-structure) and also in the PPP (public Private Partnership). Turbine manufacturers know to find EMEC and EMEC has good exposure to the world.
Regarding Wave Energy EMEC is well equipped. The variety of systems tested indicates that Wave Energy is not yet at the same stage of development as Tidal Energy.

Missing Link
Regarding tidal energy sole focus of EMEC lies on free stream devices. This indicates that a focus on low head (as TTC-GD) would be unique and fills-up a missing link. The Tidal Testing initiatives within Pro-Tide can very well benefit from the vast experience of EMEC, whereas extension to low flow/low head would be complementary to EMEC.
9 Bilia Croo Wave Site

The project partners of Pro-Tide together with Matthew Finn of EMEC have visited the Bilia Croo Wave Site. At this site devices are tested. Here monitoring of the devices takes place, e.g. measuring of the capacity. At the site transformers are in place to put the electricity on the net.

Impressive to visit the well organised control and monitoring station. The variety of wave energy devices being tested might indicate that wave energy is in an earlier stage of development; not so much converged as Tidal energy devices. Jacob van Berkel, technical manager Pro-Tide NL, the Netherlands

10 Boat tour to Fall of Warness test site

The project partners of Pro-Tide have undertaken a boat tour to the Fall of Warness tidal testing site. Here the Pro-Tide team had the opportunity to see the Open Hydro test rig. The OpenHydro has a turbine which is 6 meters in diameter. The OpenHydro is testing at Fall of Warness since 2006 and is continuing its test with new generations of their devices, the 7th generation 6 m diameter turbine is installed in the test rig in April 2014. The device was the first tidal turbine to be grid connected in Scotland.
Meeting with different parties active in the sustainable energy field at Orkney Islands

After the Boat trip the pro-Tide team members had a meeting at the office of Aquatera where Christina Bristow of Orkney Renewable Energy Forum (OREF) introduced representatives of Aquatera, Green Marine and the Scottish Insurance Company. Aim of this meeting was to share knowledge and to learn from experiences of the marine consultants and experts in Orkney.

During the discussion the different projects within Pro-tide where discussed and contact details exchanged to further exchange information. Aquatera is specialised in environmental advices, strategic planning, project development, wave resource studies and grid work. Clients are companies and governments all over the world. Aquatera is currently working on a new project design for a bridge with tidal energy production (Shetland islands). The aim of the project is to pay the construction with the production of tidal energy.

Kevin Hancock of the Scottish Insurance Company points out the importance of getting the devices covered for damages. He works for companies in Scotland and England and advises to take into account the time to prepare the insurance of the devices.

Terry Norquay of the Green Marine Energy Support Services tells about the companies specialisations for the provision of dedicated vessels and expertise for marine industry. With an experienced team of skippers of tugboats Green Marine Energy Support works all over Europe. Green Marine started out as a fishing company. But saw a market in the handling and transport of heavy and valuable equipment for the marine industry. In Orkney they are working for different tidal and wave turbine producers that do tests at EMEC. It was interesting to hear that this company has been able to transfer from the fishing industry towards marine support service industry for renewable energy.

Meeting people, talking to each other face to face gives you more information and understanding, but also more questions arise. So we could have spent a couple of days more with the Scottish people to discuss more subjects, we will keep in touch with each other. – Dave Parkes, Dover Harbour, England
12 Site visit to Churchill Barrier, north Mainland Orkney, June 17th 2014

Peter Bevan and Stuart Leslie of Orkney Islands Council show the Churchill Barriers to the Dutch Pro-Tide partners. The Churchill Barriers are a series of four causeways in the Orkney Islands, Scotland. They link the Orkney Mainland in the north to the islands of South Ronaldsay via Burray and the islands of Lamb Holm and Glimps Holm. The barriers were built in the 1940s as naval defences to protect the anchorage at Scapa Flow. Now they serve as road links from Kirkwall to Burwick.

Peter Bevan explains the research that has been done by the Orkney Council to come up with solutions for the wave overtopping problem generated from the East at No 2 Churchill barrier in combination with tidal energy capture. Research on the different options has been done by JBA, Mott Mac Donald. This research has shown that adding energy is not going to ‘pay the bill’ to make an opening in the barrier. Nevertheless the Orkney Council has decided to do further research on the possibilities of combining road safety and energy production as it part of their policy towards a vital Orkney community.

13 Meeting Dutch Pro-Tide partners with Orkney Council

Gann Barr, Jim Foubister, Stuart Leslie and Peter Bevan of Orkney Islands Council at School Place, Kirkwall, Orkney and Johanna Yates of Scottish European Green Energy Centre.

After presentations of the Churchill Barrier by Peter Bevan and Stuart Leslie the Interreg project Pro-Tide with focus on the Brouwersdam, all conclude that there are a lot of similarities between the Brouwersdam project and the Churchill Barrier project and decide that investigating of cooperative funding is a good idea. Also the possibilities of cooperation with more European partners should be investigated. Furthermore exchange of information will take place regarding the pre-competitive dialogue that the project Brouwersdam has initiated. This pre-competitive dialogue was initiated by the project team to tackle the knowledge gap and provide input for the preparation of the tender. The process and strict rules, to not harm the position of the market players, that are fundamental for this type of dialogue are documented by project Brouwersdam and will be exchanged with the Orkney Council.

Conclusion meeting
Remarkable similarities (but also differences) exists between the Churchill Barrier project and Pro-Tide projects. It seems that Pro-Tide has a broader technological and PPP scope. On the other hand, the Orkney project is more focussed and direct. This implicates that there are good arguments for setting up a mutually beneficially cooperation.