GOFLO

Automatic Self Cleaning Intake Screens

Case Study: Cochwillan Hydropower System with GoFlo Travelling Screen

Maximising the benefits of hydropower using innovative GoFlo travelling screen technology

The Cochwillan hydropower scheme is an exemplar project demonstrating the benefits of combining hydropower with innovative water screening technology.

Partners

Gloucestershire based Renewables First, who specialise in the feasibility, consenting, design and construction of low and high head hydropower systems throughout the UK and overseas, was hired by Carter Jonas land agents (acting on behalf of Penrhyn Energy Ltd) for their consultancy, design and installation procurement services for the hydropower component of the Cochwillan scheme.

GoFlo Screens Ltd, a sister company of Renewables First, was commissioned to design, manufacture and install their innovative GoFlo travelling water screen, in order to meet stringent eel screening regulations and boost energy capture from the turbine.

Working collaboratively, the two company's project managed all stages of the scheme from feasibility, through to the design and consenting stages, installation and final commissioning.

Scheme details

The scheme is located in North Wales on the Afon Ogwen on the Penrhyn Estate, Cochwillan. The installation comprises a 90 kW Crossflow hydro turbine, exploiting a net head of 8 metres and a maximum flow rate of 1.59 cubic metres per second.

The water intake is located adjacent to an old weir and the turbine is located on land within a natural meander of the river.

90kW Crossflow turbine

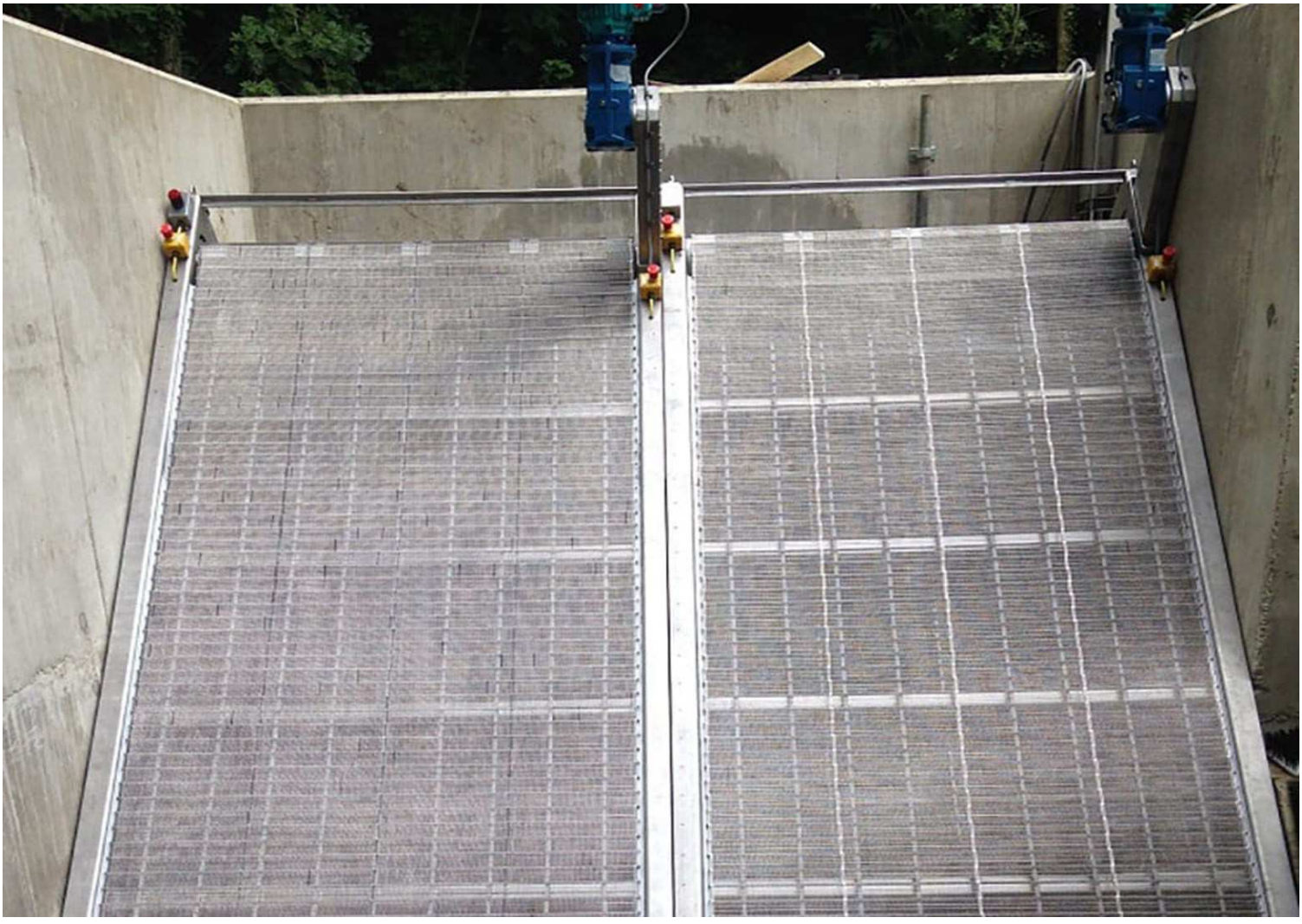
The GoFlo travelling screen at the hydro intake

The GoFlo self-cleaning screen is located at the intake and is a modular system consisting of two screens located directly next to each other. With each of the two screens measuring 1.5 metres in width by 4.5 metres in length, the total screened area amounts to 13.5m^2. Given that the site is in close proximity to the sea, the water intake screen needed to comply with the strict screening rules under the Eel Regulations – hence a screen mesh with a 3 mm bar-spacing was specified.

Why use a GoFlo travelling screen at this site?

The requirement for a very fine screen mesh makes the Cochwillan site an ideal location for the GoFlo travelling screen. In response to tightening eel screening regulations, manufacturers of water intake screens have developed ever-finer screen meshes in order to protect aquatic life.

Whilst good for wildlife, ever-finer screen mesh requirements present a significant problem for hydropower systems because as the screens become finer they increasingly get clogged with debris which renders the hydro system inoperable or operating inefficiently.



The Cochwillan GoFlo travelling screen with 3mm bar spacing for eel regulation compliance

A GoFlo travelling screen removing debris

Screen blockages and reduced flow are the primary cause of turbine downtime or poor performance at most hydro sites. Blocked screens lead to significant losses of income if they aren't quickly unblocked.

Intake screen-cleaning systems have been commonplace for years and come in a range of shapes and sizes, but they all begin to struggle as the bar-spacing reduces and ever-finer debris gets trapped and requires removal. Not so with the GoFlo screen.

The GoFlo automatic travelling screen ensures that you meet environmental regulations, such as the Eel Regulations, whilst also greatly increasing the energy yield and therefore hydropower income generated by your system. Combining hydropower technology with the GoFlo travelling screen is a win-win situation. The annual energy capture of the Cochwillan scheme is calculated to be 487 MWh in an 'average flow' year, equivalent to powering 111 UK homes and producing an annual CO_2 emissions saving of 243,642 kg. Without the GoFlo screen, the energy capture would be significantly less.

GoFlo travelling water screen design – an attractive proposition

But what is it about the GoFlo screen design that makes it an attractive proposition for hydropower sites? As well as the economic benefits outlined above, the screens enable compliance with stringent fish and eel regulations. They offer long-term reliability and permanently clean operation. Screen maintenance requirements are straightforward and low cost. The screens are visually unobtrusive and are equipped with a sophisticated remote monitoring and control system. Furthermore, the screens are easily installed using purpose-designed hinged (pivoting) mounting frames that are securely fixed to the concrete inlet structure. The screens are simply lowered into the pivoting frames from a vertical position. Once secure within the frames, the screens are then tilted to their specified running position. The motors used to power the screens at Cochwillan are located well above the level of the screen. However, they are fully rated to withstand full submersion in the event of flood conditions.

How it works

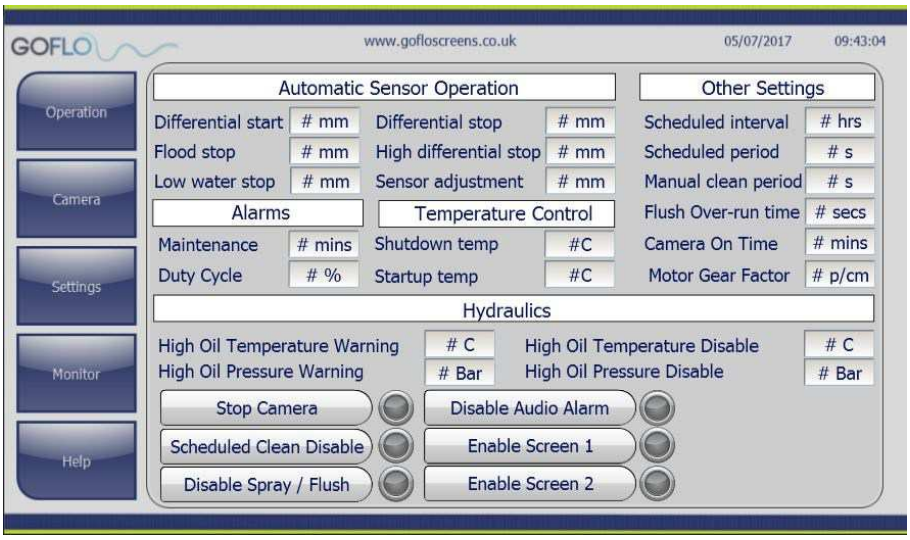
Once installed and operable, the screen remains stationary until integrated pressure sensors on the upstream and downstream sides detect a head loss across the screen, which triggers a cleaning cycle. Clearing debris is achieved by the screen mesh rotating, pulling trapped debris out of the water and dumping it into a flushing trough on the downstream side. Debris that doesn't freely fall off is blasted off with a spray boom that sprays outward from inside the mesh. Once debris is in the flushing trough, a pumped water supply which runs whenever the screen mesh rotates washes the debris down the trough back to the water course, downstream of the system. This is considered best practice for naturally-derived debris, because decaying leaves and natural debris comprise the base of the food chain in aquatic ecosystems. This all happens automatically and is tied into the control system.

To see a GoFlo screen in operation, go to :

www.gofloscreens.co.uk/features-and-options/goflo-tv/

The GoFlo travelling water screen can be controlled automatically or manually and incorporates numerous features designed to maximise the effectiveness of the system. The screen can also be monitored and controlled remotely via a mobile device.

System performance can be monitored using real-time trend graphs that monitor key parameters in the system and the data is exportable for long term monitoring. Any events that cause system alarms are displayed locally and sent by email to the customer. As an extra option, the GoFlo team can also monitor your system for critical alerts and take any action necessary to clear the alarms.



Granular system operational and control settings provide for optimisation of the system when environmental and seasonal characteristics of the watercourse change.

The scheme at Cochwillan incorporates the sophisticated GoFlo monitoring and control feature enabling full remote control of the system. The control and monitoring system is equipped with a mobile device interface, meaning that it can be monitored and controlled from anywhere with a suitable internet connection. The Cochwillan control system communicates purely via the mobile 4G network so that it can be controlled remotely.

Integrated day / night camera

A high quality day and night vision CCTV camera is installed overlooking your GoFlo screen. You can view this via the built-in web interface to allow you to check for problems that require addressing or just look at how well GoFlo is doing at keeping your intake screen free of debris!

Our customer testimonial ……

“The team at Renewables First provided us initially with clear and concise review of a partially planned project providing an alternative design.

Following approval and their appointment to the project we found the firm very reliable and all members of the team throughout the process easy to work with, and they worked well along-side independently appointed civils contractors.

Subsequently in relation to the ongoing running of the scheme they have been very helpful, al-ways easily contactable via phone or email, providing technical support to resolve any problems or answer any queries.”

Suzanna Williamson MRICS
Surveyor

For and on behalf of Carter Jonas LLP

Made in the UK

The GoFlo travelling screen system was developed by experienced hydro engineers based in the UK. One of the greatest benefits of using a GoFlo travelling screens, aside from UK content, is the exceptional customer focussed UK based support available to ensure the system is operating efficiently and trouble free over its lifetime.

Find out more

Here's how you can find out more about the GoFlo travelling water screen.

If you are at the design stages of a hydropower scheme or already an existing site owner, use the Hydropower Income Calculator www.gofloscreens.co.uk/additional-income-calculator/ to estimate the potential increase in income that could be achieved by using a GoFlo system.

More generally, the use of GoFlo screens is not exclusive to hydropower systems. They can also be used in many other contexts, including water utilities, industrial abstraction, and power plants.

You may also be interested in using the Pricing Calculator www.gofloscreens.co.uk/budgetary-pricing-calculator/ to give you an idea of the budget required.

If this appeals complete the Measuring Up Guide www.gofloscreens.co.uk/measuring-up-guide/ and submit more details about your site and our expert engineers will contact you to discuss the site in detail.

Enquiry and contact info

If you have a specific screening project in mind, you may find it useful to complete the 'measuring-up guide' on our website here: **www.gofloscreens.co.uk /measuring-up-guide** Alternatively just call our office and speak with one of the GoFlo engineers who will be happy to help.

GoFlo Availability: GoFlo screens are available throughout the European Union. Availability outside of the EU is by special arrangement.

GoFlo Head Office

The Mill
Brimscombe Hill
Brimscombe
Stroud
Gloucestershire
GL5 2QG
UK

Contact

Email : info@gofloscreens.co.uk
Tel : +44 (0)1453 884400
Web : www.gofloscreens.co.uk

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