

Canal & River Trust leads EU-funded Green WIN project

A new transnational project part-funded by the European Union looks at the environmental efficiency of water management on inland waterways, with a particular focus on pumping operations and how they can be made more efficient... and greener

WI IS SUPPORTING THE EU INTERREG

North West Europe project Green WIN (for 'Greener Waterway Infrastructure'), which addresses excess energy use and high carbon emissions in waterway management across North West Europe. Waterway management organisations (WMOs) rely on pumping equipment and systems to keep waterways operational, but need to adapt and make their infrastructure more carbon-efficient. Cost pressures restrict WMOs from taking such steps. The project tackles this by jointly trialling technologies and more efficient ways of deploying them. Pumping water has a big carbon impact across NWE, accounting for 25-33% of annual electricity use by WMOs, and roughly 20% of total emissions.

The project brings together the Canal and River Trust (lead partner), Waterways Ireland, Ministerie van Infrastructuur en Waterstaat (Netherlands), Université de Liège (Hydraulics in Environmental and Civil Engineering), Voies Navigables de France, and Vlaamse Landmaatschappij. The project covers a range of waterways, both large commercial waterways and smaller waterways for recreational uses.

The project starts this autumn 2018 with an audit of the current situation, assessing the scope for improvement and developing ways to maximise the effectiveness of equipment. The second phase involves piloting new technologies, trialling new equipment and assessing the potential for modifications to existing. The third phase involves convincing

Right outside the Little Venice offices of the Canal & River Trust, where we met the project's initiators on July 17, one focus of the Green WIN agenda was in evidence: a 'bubble wall' produced by pumps on each side of the Little Venice junction, to prevent vegetation and debris from floating into Paddington basin.



other WMOs to use the processes developed and adopt the greener technologies piloted (with new or adapted equipment). The estimated net change to be demonstrated is 778,000 kWh of energy saved, and CO₂ emissions reduced by 195 tonnes.

The main outputs and pilots will be an infrastructure audit, technology trials, investment, procurement and business planning guidelines (a Greener Pumping Technologies Toolkit) and an established support network. Green WIN will roll these out to other WMOs by encouraging them to carry out new installations as their existing equipment reaches 'end of life'. Environmental groups, industry and water managers' networks will act as advocates, promoting the outputs of the project and helping reduce barriers to wider uptake/greater public awareness.

Long term effects will be greater take up of greener technologies by WMOs outside the partnership, lower energy usage, reduced emissions and more WMOs involved in taking forward the technologies demonstrated in the project.

IWI will act as an advocate for the project, helping the partners to achieve wider uptake and greater public awareness of the benefits that Green WIN can deliver. Involvement from SMEs and industry feature strongly in the project, while other stakeholders are universities, environmental groups and water management networks.

Back-pumping on English canals

The Trust will research improvements to back-pumping at four critical sites on the system. The Kennet & Avon Canal has back-pumping systems at Seend – 5 locks, a rising main about 1km long and a static head of 12.60m, and pumps that tend to fail when overheating – and Devizes – the famous Caen Hill Flight of 29 locks with a rising main 3.7km in length and a static head of 72.50m. Proposed replacement of the two Flygt pumps will need to feature technology that increases efficiency over the unusually high level of output at such an 'energy-hungry' site. The other sites are the 3 locks at Calcutt on the Grand Union Canal, with a rising main of 450m and static head of 4.93m, and Gloucester Dock, where water is pumped from the River Severn through four Weir pumps that were designed to be between 79.5 and 81% efficient. The proposed replacement needs to feature technology increasing this efficiency to more than 90% and extend the service period from beyond its current 24,000 running hours or three years.

Back-pumping on Ireland's canals

Waterways Ireland are looking at improved back-pumping systems at four locations. Richmond Harbour on the Royal Canal has an old pump delivering 225 l/s from the Cramlin River, and the 11.6 kW installation is only 75% efficient. The dedicated pump house will be re-engineered to host two pumps. The Grand Canal is supplied with water from the River Brosna into Shannon Harbour over locks

35-36. Here too, the pumps are old and affected by ongoing difficulties with weed, debris and blockages. An old 1994 pump delivers water from Lough Allen across Drumshanbo and Drumleague Locks to maintain water levels for navigation on the Lough Allen canal. The fourth pumping station is at locks 16-18 on the Grand Canal, where the pumps are relatively new but system controls need to be optimised; variable speed drives could improve efficiency.

Vulnerable canals on VNF system

VNF pumps up to 1 m³/s from the river Saône over a static head of 10.75m at Crissey lock on the Canal du Centre. Under the project, VNF aims to trial a dual pump system with higher performance, featuring improved starter engines and motors, also delivering greater efficiency through automation. The Stock pumping station at Diane-Cappelle pumps water into the Canal de la Sarre. It is one of the highest energy-use pumping stations operated by VNF, consuming around 370 MWh/year.

The pumping station at Briare on the Canal de Briare supplies water from the Loire to the canal's summit level and several reservoirs. The station was partially restored in 1995 and is one of the major pumping stations operated by VNF (6 motor pumps with of 720m³/h capacity, pumping 3-5 millions m³ of water per year). It has high energy consumption (around 750 MWh/year). Technologies proposed need to integrate pumping station automation and water flow and energy monitoring.

Broader system research

The University of Liège has the laboratory facilities and brings complementary academic expertise to the partnership, supported by the 'sub-partner' Service Public de Wallonie, Direction Générale Mobilité et Voies Hydrauliques. Green WIN partners will work in their laboratory to carry out the early stage testing of small-scale models or full-size versions of pumping equipment that will later be trialled in the pilots in Ireland, France and

the UK. The laboratory can also host hydraulic modelling to test multiple scenarios on a 'dummy' waterway network (probably based on the network downstream of Liège). A second strand of the project looks at network optimisation and 'Smarter Management' techniques, standardisation of how WMOs measure CO₂ emissions from equipment/technologies and if equipment featuring RE components can deliver CO₂ reductions.

Another organisation involved is the Rhineland-Palatinate Environmental Authority in Germany, an associate partner). Like other partners, they represent national and regional interests, and operate across several sectors. Expertise in integrated water management, facilitating waterway freight transport and addressing environmental issues, and harmful effects to water systems are all needed in Green WIN.

Another sub-partner is Trinity College Dublin, which will support WI with trials of Pumps as Turbines (PAT) technologies). The project will run through to May 2021. ■

UNESCO supports Global Water Museums Network

A GLOBAL NETWORK OF WATER museums received the formal seal of approval from UNESCO in June 2018, as part of its International Hydrological Programme (IHP). The network is seen to be a precious vehicle for spreading knowledge and awareness of water as the 'lifeblood' of civilisation. Our member Civiltà dell'Acqua, a key player in the [museum of inland navigation at Battaglia Terme](#), developed the project in collaboration with the University of Venice Ca' Foscari, the Netherlands IHP Committee, the UNESCO Regional Office in Venice and the Water Museum of Venice.

'Creation of a global network of museums dealing with water is a hugely important event', comments IWI Council member Edo Bricchetti. 'We know that the subject is daunting, but it is important to underline that water is the most essential ingredient of civilisation itself. Memories (museums), places (canal sites) and people (the community) together create a dynamic for reimagining and regenerating human activities on and around water. The project will help to promote new ideas about reusing the waterways both for their purely technical functions and as an emotional experience.'

Civiltà dell'Acqua director Eriberto Eulisse (winner of the Innovation award at the WCC in Inverness, 2016) has been appointed coordinator of the network. He recognises that the ambition is vast: 'looking at all sustainable uses of water and at all forms of water museum makes this a cross-cutting initiative, but this is what UNESCO

is supporting us to do, under its IHP'. Among the 28 partners who launched the project idea in Venice in 2017, the network currently includes: Kahramaa Water Awareness Park, Doha, Qatar • Living Waters Museum, Ahmedabad, India • National Water Museum of China, Hangzhou, China • Ecomuseo Martesana, Milan, Italy • Museu da Agua, Lisbon, Portugal • Travelling Museum of Water, London, UK • the National Waterways Museum, Canal and River Trust,



UK • Santorini Water Museum, Greece • Water Museum 'Leonida Truta', Cluji-Somes, Romania • Water Museum of Bavaria 'Haus am Strom', Germany • Water Museum of Venice, Italy • World Water Museum, Hydria, Greece • Museo del Agua 'Agua para Siempre', Tehuacan, México • Yaku Parque Museo del Agua, Quito, Ecuador. Expressions of interest have been received from 60 organisations on all continents. UNESCO supports the combination of scientific surveys (water quality, good practices of uses, environmental impacts, etc.) with the cultural and social involvement of people who live from and by the water. The added value of the network comes from exchanging information on all these

aspects, working on the same internet platform www.watermuseums.net.

The recognition is particularly meaningful for the Martesana Ecomuseum, since UNESCO has thus validated the concept of extending the museum itself (within its 'four walls') to the entire corridor or territory concerned. The ecomuseum follows the watercourse and bears witness to the water itself which never stops. As Leonardo da Vinci observed: *Lacqua che tocchi de fiumi è l'ultima di quella che andò e la prima di quella che viene. Così il tempo presente.* ('The water of the rivers you touch is the last of that flowing away and the first of that which is flowing towards us; such is the present time.') The complexity of the water civilisation embraced by da Vinci suggests bringing together the technical and environmental aspects with the emotional, cultural and social dimensions of water... and waterways.

The museums naturally present widely varying approaches and techniques for hydraulic structures, as well as for water channels or bodies. Many of them exhibit outstanding hydraulic heritage comprising artefacts, techniques and oral knowledge passed down from generation to generation. Every civilisation has passed down to new generations invaluable knowledge and heritage related to water.

The common goal of all members of the network is understanding, preserving and maintaining our planet itself. The inland navigation dimension that is central to IWI's objectives is present in four of the founding water museums. ■



The Caen Hill flight of 29 locks on the Kennet and Avon Canal, where back-pumping was installed in the mid-1990s