

# SMARTER PUMPING, GREENER WATERWAYS



**Green WIN** is an EU funded project seeking ways to reduce the high level of carbon emissions caused by pumping water around Europe's rivers and canals. **Canal & River Trust** (UK), **Waterways Ireland** (IE), **Rijkswaterstaat** (NL), **Université de Liège** (BE), **Voies Navigables de France** (FR) and **Vlaamse Landmaatschappij** (BE), teamed up to tackle this - with **IWI** and **NIWE** providing invaluable support.

Industry experts, **Arcadis** helped us 'benchmark' our current pumping regimes. We then started testing the efficiency of pumps and controllers in a purpose built test tank at the University of Liège. This phase is followed by 'in situ' trials in operational conditions at 11 pumping sites in France, Ireland, and the UK, where we will try to find optimal ways to deploy these 'smarter' technologies.

## Progress to date and future activities

### University of Liège

- Constructed the test tank and carried out an initial 'trial runs' using an old pump and a variable speed drive to control the pump. It was considered 'commissioned' (fully fit for purpose) in early 2022.
- The final test facility will allow simulated pump operation to a maximum 24m depth and with a varying flow rate [0.0524;0.5325] m<sup>3</sup>/s with accuracy and a flow rate [0;1.065] m<sup>3</sup>/s with enough accuracy.
- Liège technicians captured data from the first WI pump trials in Summer 2021 which delivered valuable information for calibrating the computational model to replicate a broader range of real-world operating conditions, which will prove useful for extrapolating the pump performance beyond the conditions tested in the test lab.
- It was confirmed that the tests can simulate site specific (Ireland and UK) duty points, head, and flow and that we can overlay factory pump performance curves with test tank results.
- Refined the methodology for testing of pumps at Liège - ensuring the test plan is (or will be) based on industry recognised testing standards i.e. ANSI/HI 14.6, 11.6, and / or ISO 9906. ISO 9906 'characterisation' is something that's only come to the fore recently, but Liège have refined their test regime so that we offer this additional service and assurance.



### Canal & River Trust (CRT)

- Installed a submersible pump at **Tinsley** on the Sheffield and Tinsley Canal in May 2020.
- Pumping at **Devizes**, near Caen Hill, on the Kennet & Avon Canal (K&A) is over 29 sets of locks with a 3.7 km rising main and 72.5m static head. The replacement technology should increase efficiency over the unusually high level of output needed.
- **Calcutt** on the Grand Union Canal pumps water over 3 sets of locks with a 450m rising main and 4.93m static head. There is a history of pump blockage in autumn so the replacement will feature improved technology and filtration mechanisms that reduce this problem. A **Pump Control Panel** being tested in Liège is planned for use at Calcutt.
- **Seend** PS (also on the K&A) features back pumping over 5 sets of locks with a 1km rising main and 2.6m static head. Improvements are planned as current pumps are sat high in the water causing them to trip on over temperature.

### Voies Navigables de France (VNF)

- A new pump and automated controls were installed at **Crissey** on the Center Canal, at the junction with the Saône River. At 2200 m<sup>3</sup> per lockage the volume of water passing through the lock quickly brings down the level of the reach and is why a pumping station was needed to raise the water swiftly from the Saône.
- Prepared the **Stock** PS at Diane-Cappelle which pumps water into the Canal de la Sarre. Installation was planned for mid-2022. It is one of the highest energy-use pumping stations operated by VNF, consuming around 370 MWh/year.



### Waterways Ireland (WI)

- A new pump was installed in April 2022 at **Richmond Harbour (Clondra)** pumping from River Camlin into the Harbour. It replaces the very old installation, which needs replacing with some form of dual duty stand by system.
- Submersible pumps are to be installed at **Drumshanbo** to pump water from Lough Allen across Drumshanbo and Drumleague Locks to maintain water levels for navigation on the Lough Allen canal section. Current installation has a low head high discharge single submersible pump.
- Submersible pumps at **Lock 35 at Shannon Harbour** will improve pumping from River Brosna into Shannon Harbour over locks 35-36. Very old pumps are currently in use and like Calcutt in the UK, have difficulties with weed, debris and blockages.
- A smart pumping system is planned for **Leinster Aqueduct** where the Grand Canal crosses the river Liffey. Current pumps are relatively new, but optimised system controls incorporating variable speed drives should improve efficiency.



### Vlaamse Landmaatschappij (VLM)

- Commissioned an eco-hydrological study as part of a Land Development Plan (LDP) for “Mijn Mangelbeek” to help them apply integrated water management in this part of Limburg’s attractive “De Wijers” region.
- They homed in on the open space between the villages of Heusden and Zolder - where subsidence was caused by abandoned mineshafts. They assessed pumping performance there and though LRM, the company responsible had installed new pumps, they were unsure how efficient they were. Green WIN and Arcadis identified potential energy savings and LRM committed to fund future changes to the pumping operations identified. Local communities were consulted throughout, and the final report was presented to over 100 people at an online meeting in Dec 2021.

### Rijkswaterstaat (RWS)

- RWS provided high level, technical support and co-ordinated production of a *Review of Current Practices and Baseline Audit*, and a *Pumping technologies and renewable energy* report. They are leading development of a *Common measurement methodology*, and a *Green Performance Dashboard* - though this is delayed until after pumps have been tested in Liège / in situ in UK, Ireland, and France.



### Promoting and sustaining the project

We will continue to promote Green WIN, present our findings / recommendations to EU policy makers and encourage other organisations to install equipment or adopt the improved systems and processes demonstrated.

We have embedded our *Greener Pumping Toolkit (GPT)* on the NIWE website <https://waterwaysnetwork.eu/greener-pumping-toolkit> This assists waterway managers with pump replacement planning, and the *Pump Life Cycle Cost Calculator* is an online tool in the GPT which estimates potential energy savings for both old and new pumps.

We will ensure documentation, the GPT and our pump selections and test results remains available to support pump station design improvements and efficiencies.

**Green WIN continues until 30<sup>th</sup> June 2023.** We would be very happy to hear from you. For further information please contact; Chris Barnett / [chris.barnett@canalrivertrust.org.uk](mailto:chris.barnett@canalrivertrust.org.uk) / [www.nweurope.eu/GreenWIN](http://www.nweurope.eu/GreenWIN)