**Project title:** NanoPulse industrial laundry waste water recycling

**Main applicant:** G2O Water Technologies Limited

**Technology developer:** G2O Water Technologies Limited and Hydrasyst Membranes UK Limited

**Industry partners:** Johnsons Service Group PLC (Industrial Laundry sector)

**Demonstration capital cost:** £926,514

**Funding awarded:** £458,071

**Project timeline:** August 2019 – January 2021

**Photo:**


**Project description:** G2O Water Technologies Ltd., Hydrasyst Membranes UK Ltd. and Johnsons PLC propose to design and install a NanoPulse laundry filtration device at Johnson's industrial laundry site in Shaftesbury, UK. The NanoPulse system is an innovative solution for recycling waste water from the laundry sites, delivering energy savings by reducing the amount of heating required between wash cycles.

The technology improves on Hydrasyst's PurePulse filtration system, which works by pumping effluent through hollow ceramic fibre membranes to remove contaminants before reuse. By coating the ceramic fibres with G2O's Graphene Oxide (GO) membranes it is expected that performance will improve in several areas including:

- Increased flowrate through the ceramic fibres – reducing operating pressures.
- Increased separation performance – allowing water and detergents through but excluding contaminants.
- Increased availability – anti-fouling membrane surface halves the backwash requirement and reduces the associated energy consumption.

**Size of target market:** The key target vertical market for NanoPulse is commercial laundry effluent.

There are approximately 110 commercial laundries in the UK. The market has been characterised by rapid consolidation of sites in recent years due to the high capital costs associated with running a modern laundry. The big four commercial operators are Johnsons, Berendsen, CLEAN and Fishers in Scotland.

Once proven in demonstration, the NanoPulse technology will offer a clear economic return on investment by delivering significant reductions in operating costs through energy reduction to the industrial laundry operators.

**Barrier to market:** There is a reluctance to dedicate scarce capital into an 'untested' recycling technology without operational demonstration sites in the UK. The current trend for 'big four' laundry companies is to invest in multi-million pound 'super laundries', processing very high volumes and using a lot of automation. Therefore, it is important to get 'designed in', which will not happen without a working UK site.

**Initial TRL:** TRL 5

**Targeted final TRL:** TRL 8

**Estimated energy and carbon savings:** A typical commercial laundry uses large volumes of water at or around 45-50°C. This water, taken from utility supply has to be heated from 5-10°C, so heating of some 35-40°C is required by heating the water in gas fired boilers.

The NanoPulse system will receive the effluent from the laundry machines at typically 42-45°C. A small amount of heat loss will occur passing through the steel pipework and ceramic membranes of the NanoPulse system, but the clean permeate produced will still be at c.40°C. Therefore, the bulk volume of water only has to be heated by 5-10°C to achieve wash floor temperature, realising significant gas savings.

There will also be energy savings elsewhere in the supply chain resulting from reduced water consumption, reduced chemical inputs, reduced backwashing, and reduced effluent, creating more capacity at sewage treatment works. It is estimated that each laundry will reduce water consumption by 31,000$m^3$ per annum, saving the utility company 43MWh per annum, per laundry.

**Why IEEA funding was important to this project:**

A system that is capable of recycling significant amounts of laundry effluent water costs hundreds of thousands of pounds. The industry is keen to make the savings, but is sceptical of investing in new expensive equipment until it is proven. The IEEA funding subsidises the large up front cost of the demonstration, which could not be afforded solely by the SME's involved in this project. With a successful commercial demonstrator in the UK, there is an opportunity to roll this technology out across the market, improving the UK's carbon footprint.