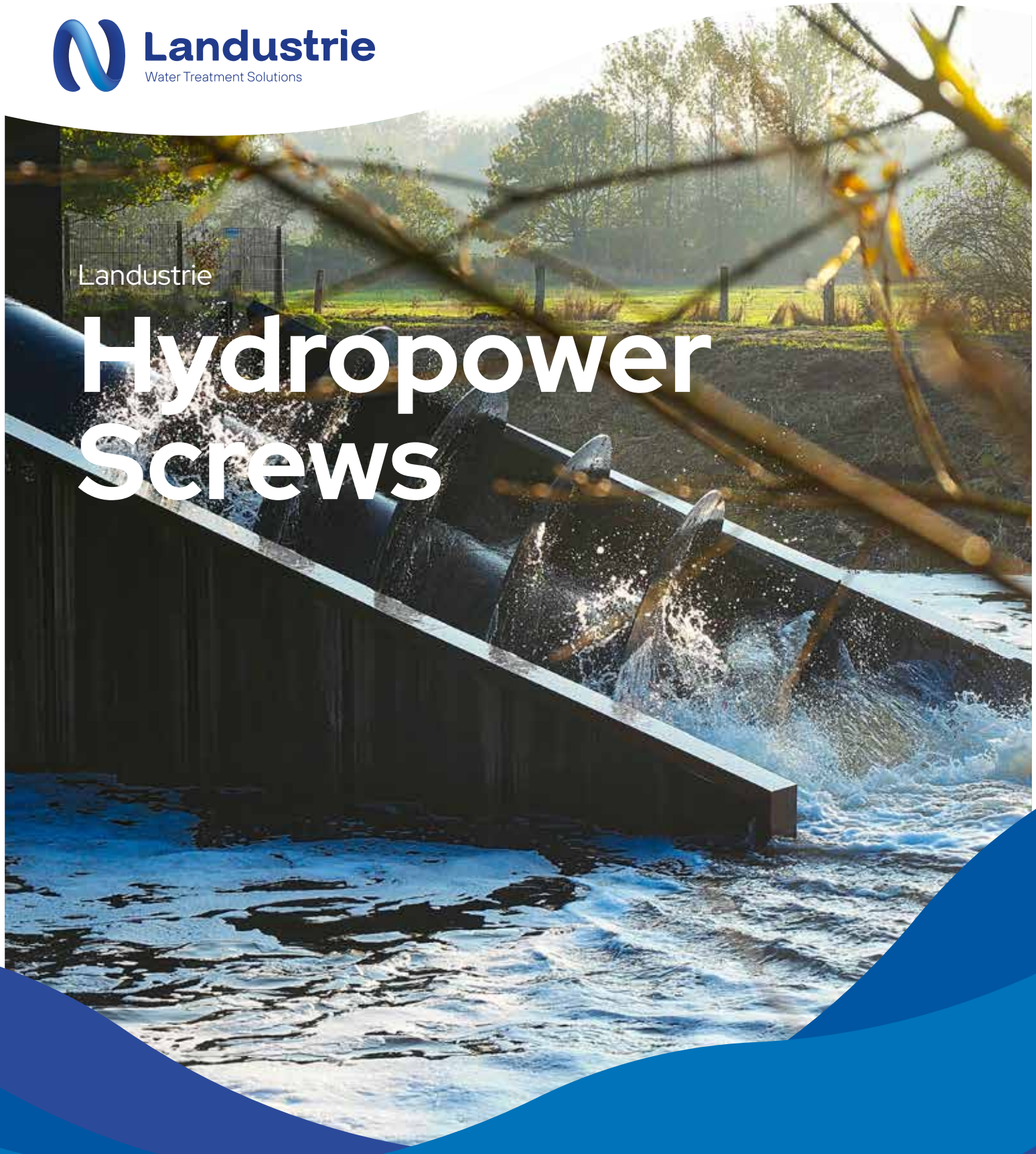
Landustrie
Water Treatment Solutions



Landustrie

Hydropower Screws

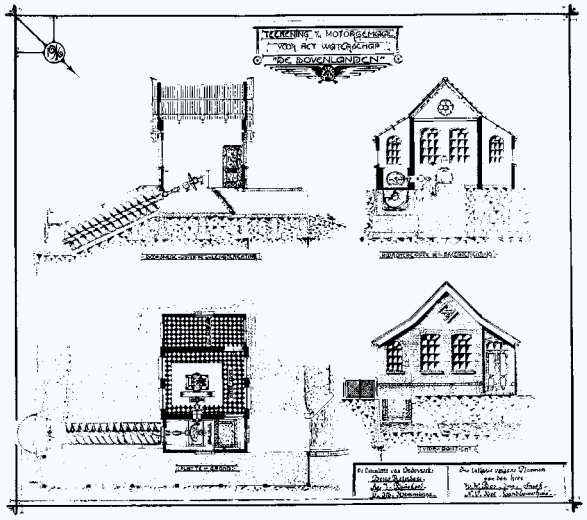
Landustrie is part of Noardling

Over 250 years of experience

2024 : a new chapter begins

The journey of our collective “water power” began in 1880 with the foundation of Hubert, followed by the establishement of Landustrie in 1913. Since the early days of our shared history, Frisian craftspeople have been developing sustainable solutions in our water world. In 2011, the addition of Desah’s innovative capabilities further strengthened our commitment to reliable quality.

As of 2024, we have begun a new chapter together. Noarding now combines the strength of three brands: Desah, Hubert, and Landustrie. This enables us to supply futureproof water technology solutions across the entire water cycle.



Landustrie hydropower screw pumps

Flowing water is a relentless, never ending source of power for pure, clean renewable energy. All you need to benefit from this natural resource is a Landustrie hydropower screw system.

We design, build and install highly efficient, cost effective and environmentally beneficial hydropower turbine system solutions which are specifically designed for relatively low head, high flow river courses.

An environmental friendly solution can only be called a sustainable solution if it is economically viable. We help you achieve a truly sustainable project by combining years of hydropower engineering experience with professional project guidance throughout the process. With our experts providing all roles from initial site investigation, through engineering/design to manufacturing and installation, your costs are kept low; therefore, ensuring your project is truly an environmentally and financially sustainable solution.

Steinsau, Erstein, France

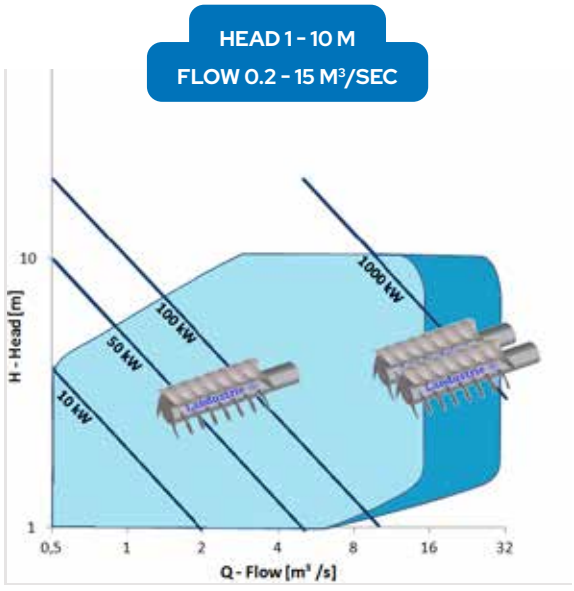
Selection

The Landustrie designed and manufactured hydropower screw systems operate more efficiently and cost effectively than any other turbine technology. Where a potential hydropower site has either a higher head or a higher flow, or both, multiple hydropower screws can be developed in series (stepped from one hydropower screw to another) or in parallel (hydropower screws next to each other).

Once dimensioned with our own software, our enginneers utilise finite element analysis (FEA) software which calculates all the forces on the hydropower system and civil structures to ensure a robust and reliable hydropower plant. Additionally, all required hydropower screw drawings and calculations will be provided to you.

Our engineers will implement your sites specific and unique characteristics into your design. Some of these site specific variables which can be accommodated through ingenuity and flexible engineering, include:

- Sites with variable flow
- Sites with variable upper and/or lower water levels
- Inflow and outflow structures
- Unusual foundation restrictions



In-house production

To ensure the absolute highest quality product, we manufacture all of our own hydropower screws in our purpose built factory in Sneek, Holland, which is equipped to build screws from 250 to 5000 mm in diameter and lengths up to 25 meters. In fact, the largest operating hydropower screws in the world were built right here in Sneek.

In our 15,000 m² state of the art manufacturing facility, we have all of the latest technology to build the most durable and best performing hydropower screws currently available. From metal forming and welding to corrosion protective coatings and painting, through to final assembly, each step of the manufacturing process is under our roof and importantly, under our quality control programs.

In our facility for instance, we x-ray and/or perform ultrasonic tests in critical areas to further ensure your hydropower screw will be a robust and reliable system for decades to come.

In-house production facilities

Chapel Haddlesey, North Yorkshire, England

Widdington, North Yorkshire, England

Operation

The principle of the Landustrie hydropower screw dates back to 300 B.C., when Archimedes invented the screw pump. In the last decade Landustrie altered the design, making the screw pump suitable for hydropower: the Landustrie hydropower screw.

By placing the screw inclined in the flow direction of a river, the water stream is directed into the screw. When water enters the screw, the combination of potential and kinetic energy of the water forces the screw to rotate. The higher the potential or kinetic energy, hence a higher head or flow, the higher the output power.

The relatively slow rotational motion of the screw is transferred via a gearbox to the generator. Here the rotational energy is converted into electrical power, ready to use or to sell to the grid.

Applications

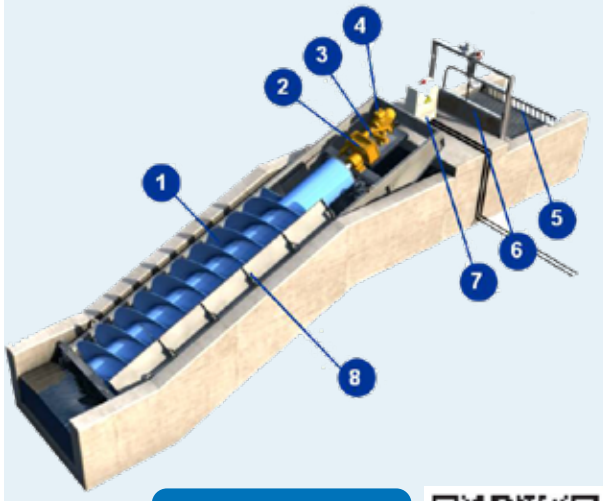
The checklist needed for a hydropower screw is limited:

Is there flow and is there head?

The most straight forward projects will answer yes on both questions. However, less obvious situations might be well suitable for a hydropower screw. Think about:

- A complete new site, where a head can be created in the river or canal.
- At an existing dam or weir, the hydropower screw can simply be added.
- A dysfunctional hydropower plant is also suitable to be replaced by the hydropower screw.
- Outlets of sewage treatment or hydropower plants.
- Existing hydropower plant's overspill or fish by-wash

1. Screw body
2. Gearbox
3. Brake
4. Generator
5. Trash screen
6. Sluice gate
7. Control panel
8. Trough



WATCH OUR VIDEO

Sustainable energy

Saving CO^2

Utilising a freely available source of energy and not producing any emissions or requiring fossil fuel, is the principle of sustainable energy generation: this characterises exactly, the hydropower screw.

Every kWh generated by the use of the Landustrie hydropower screw, can save up to 0.542 kg of CO^2 emissions.

Low civil costs

Different from standard turbines, the civil works for the Landustrie hydropower screw are fairly easy: an existing or new weir, an inlet and a place to hold the trough of the screw.

Compared to a standard turbine, there is no need for a complicated turbine house design, penstock, forebay or sand trap. Less civil works also results in less construction time.

High efficiency

The Landustrie hydropower screw maintains its high efficiency, even if the available flow decreases to 20% of the design flow.

In cases of higher flows, or a fluctuating head, the hydropower screw performs better than any other standard turbine type and is the turbine to use in virtually any low head site!

Quiet

Installing machinery like the Landustrie hydropower screw into a new environment, should never result in detrimental sound levels.

Careful design, based on the river flow and level, is one of the solutions to eliminate or reduce noise levels. Many years of experience in our labaratory has resulted in the quietest running hydropower screw in the world.

Additionally, covers over the screw and a proper powerhouse design can be applied, ensuring no significant impact on the surrounding sound levels.

Fish Friendly

Improving the local eco-system is one of the advantages of the hydropower screw. The water quality downstream and the quality of life for fish are increased. We have been involved in multiple studies to test how the screw affects passing fish, showing no harm at all. To enhance the fish friendliness even more, resilient fish bumpers can be installed on the leading edges of the turbines blades. In addition to designing a safe, fish-friendly turbine that enables downstream migration through the turbine, the hydropower screw is often combined with a fish pass, to stimulate upstream migration.

General rule of thumb calculation

Electrical power output:
H (m) x Q (m^3/s) x g (m/s^2) x ŋ (%) = P (kW)

Annual energy production:
P (kW) x 8760 (hours) = kWh/year

Annual revenues:
price/kWh x kWh/year = revenue/year

Short payback period

As for any investment, the payback period for a hydropower project is one of the decisive factors for proceeding. A short installation time, high efficiency and 24/7 electricity generation turns the hydropower screw into an economically feasible investment. Besides the parameters of the location, the head and flow, the tariff at which the electricity can be sold is key to the payback calculation. If you are unaware of your local feedback tariff, please contact us and we can assist you.

Durable & trouble free

The hydropower screw operates at a relatively low rotational speed of 20-50 rpm, resulting in very low levels of wear and tear on the mechanical components, ensuring decades of trouble free operation. The turbine is also able to cope with large debris.

Flood proof

When installing a system into a river, one should always design by keeping the extreme values in mind, like a Q100 level. It could be the case that this level will flood the generator room. Instead of building up high above this level, we can also make a compact and flood-proof design. For instance with a wall mounted bearing and a watertight door.

Before and after flooding at Goldsborough, UK

Operation mode

Constant speed

When the available flow, the upper water level and the head, are fairly constant troughout the year, the constant speed system is the most efficient way of operation.

Variable speed

In case the water levels and flow do vary significantly, a variable speed system could provide the best overall power generation. An extra advantage is the capability of regulating the upper water level, by regulating the speed of the screw.

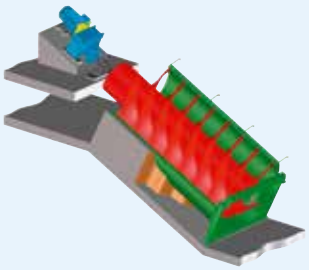
Remote control

Full remote control and monitoring of your hydropower system on your PC or smart phone, from anywhere in the world, is a low cost option that most customers choose.

Water-in-oil detection

As the lower bearing is placed under water, inspection is a difficult task to perform. We invented the water-in-oil detection alarm for early warning of potential maintenance problems. This alarm system gives a signal when a certain amount of water, or other conducting medium, enters the lower bearing and has polluted the oil in the bearing housing. All our ECO lower bearings can be fitted with the water-in-oil detection.

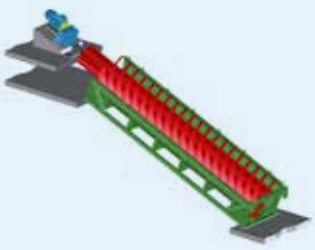
Type of trough



Steel trough for grouting

The trough is fastened at the structure and then casted with concrete. The generator and gearbox are attached to a concrete foundation.

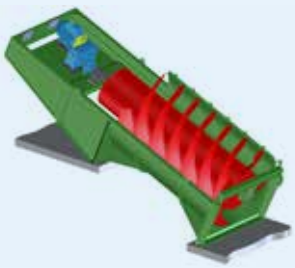
+ Lower unit costs
- Higher civil costs
- Longer installation period



Semi-compact trough

The trough is fully self-supporting, but the generator and gearbox will be directly attached to a concrete foundation.

+ Lower unit costs
o Average unit costs
o Average installation costs



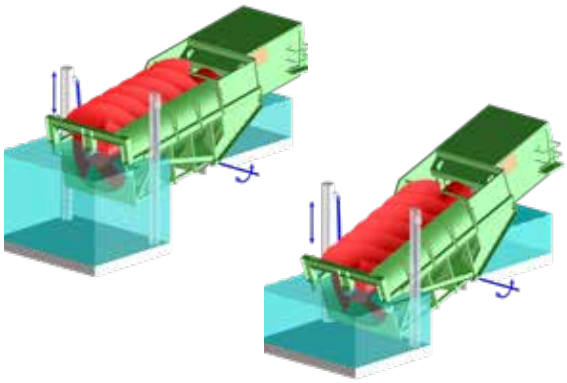
Compact trough

This trough is fully self-supporting, including the generator and gearbox. At both ends is a small foundation where the trough is attached.

+ Easy plug-and-play installation
+ Limited civil costs
- Higher unit costs

Adjustable

One of the results of our R&D is the adjustable angle of the Landustrie hydropower screw. The highest effciency is reached when both the lower and upper end of the screw are halfway in the water. In case of a significant fluctuation of the water levels, this can become an issue. By using a hydraulic system, the angle of the screw can be automatically and continuously adjusted to the most optimal position, thereby increasing annual power output significantly.



The bearing is mounted to the wall with special anchors, instead of to the floor. Using a special seal on the outside and an extra concrete closure on the inside, the drive unit room can be made completely gas- and airtight. An extra advantage is that the forces on the civil construction will be absorbed over a larger area, reducing stress on the civil structure.

foot-mounted bearing

wallt-mounted bearing

Control panel

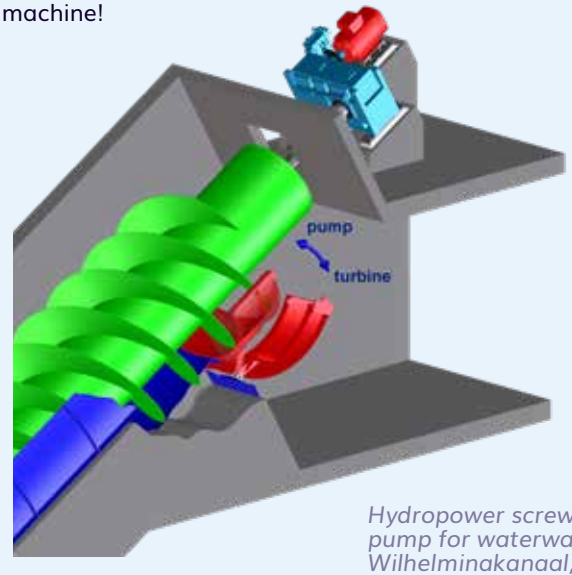
The control panel is the core of your hydropower system, integrating your custom-designed screw into an efficient, fully automated operation. Built in-house at our Sneek facility, it ensures compatibility with your site's unique characteristics for safe and optimal performance in any condition. Equipped with upstream and downstream water level sensors, the control panel continuously monitors key parameters—like gearbox oil, generator phase temperatures, and RPM—guaranteeing efficient, reliable operation at all times.

Upper bearing

The standard upper bearing, is a Landustrie foot-mounted bearing. This specially designed bearing, is mounted on a foot at the inside of the drive unit room, leaving the tube of the screw rotating in the wall. If a watertight drive unit room is not required, a foot-mounted bearing is the bearing to choose. The wall-mounted bearing is a unique bearing fully designed, tested and patented by us.

Landustrie hydropower screw pump

In some situations where a combination pump storage/ hydropower generation system is possible, we are able to provide a Landustrie Hydropower screw pump; all in one machine!



Hydropower screw pump for waterway Wilhelminakanaal, Tilburg

Installation

Our teams are renowned for the quality of work in the field. Under any condition, the installation and maintenance teams are able to deliver high quality and fast solutions. On-site tuning to your specific site characteristics is one of the skills of the team.

Windsor Castle, UK

The Landustrie hydropower screws can always be installed by our specialised installation team. Another option is the use of a Landustrie supervisor, who will ensure proper installation of the screw, together with a local team.

Heudreville, France

Expertise

When starting a hydropower project, a reliable and experienced turbine manufacturer is what you need to achieve a successful result. We are that manufacturing partner!

Our company is involved in the hydropower sector in more than 70 countries worldwide. By combining our strength and qualities with local partners, projects have been realised in such diverse locations as uninhabitable mountain areas and British Queens garden at Windsor Castle.
Varying from one small turbine generating electricity for a household to large scale projects with six screws and anything in between. All this experience is put in force, in order to create your unique hydropower project!

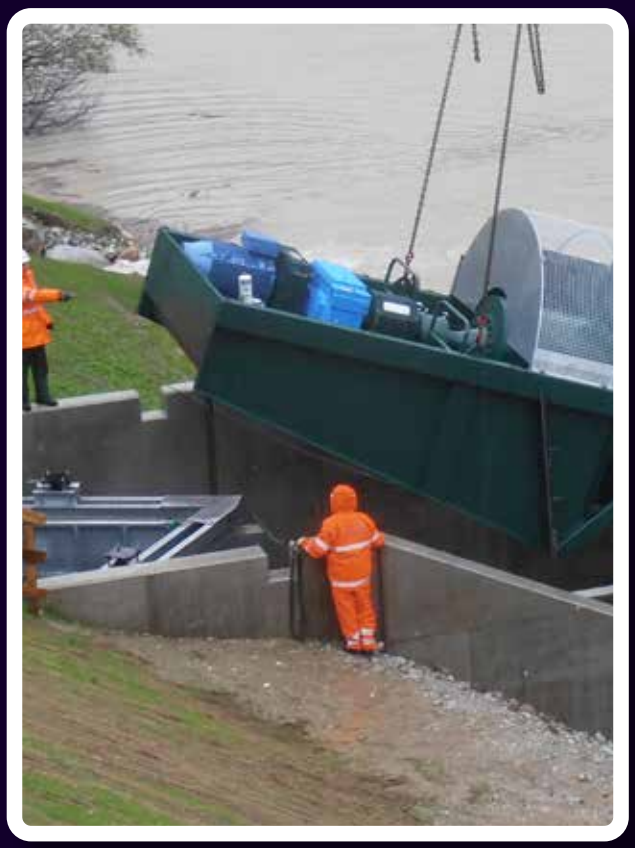
After sales

Both preventive and if required, corrective maintenance for the installation, can be provided by Landustrie. Furthermore, replacement parts are easily available and can be quickly dispatched to your site for quick maintenance, ensuring the all important system up-time is achieved.

The knowledge of the manufacturing process and decades of experience operating and maintaining hydropower turbines, makes Landustrie the clear choice to provide full after sales support for any hydropower screw.

For more information:

AFTERSALES@NOARDLING.NL



Warburg, Germany

Maintenance

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Landustrie
Water Treatment Solutions

Landustrie is part of Noardling

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Our Water Cycle

From water intake systems to water cooling, from water management to wastewater treatment, hydropower, pumping installations, and award-winning innovations in the field of decentralised wastewater treatment, discover the water cycle here by scanning the QR-code.

Noardling
Futureproof Water Technology

The Noardling company is engaged in Futureproof Water Technology. With more than 250 years of experience in moving and treating of water.

Noardling brands:

Desah
Decentralised Wastewater Solutions

Hubert
Water Screening Solutions

Landustrie
Water Treatment Solutions