

# VETT-in-a-Box

A compact, easy to install, low-head hydropower solution



# VETT-in-a-Box technology harnesses the potential of low-head hydropower through innovative, low cost, fish and environmentally-friendly design and improved reliability.

Hydropower represents the largest share of renewables worldwide and is increasingly recognised as the ideal partner for variable wind and solar power. Considerable installation potential remains undeveloped however, with low-head run-of-river installations using conventional technologies often regarded as uneconomical or environmentally harmful. Decentralised, low carbon electricity potential has therefore gone unharnessed.

VerdErg Renewable Energy's VETT-in-a-Box was designed to provide an economic solution for domestic and community scale hydropower projects.

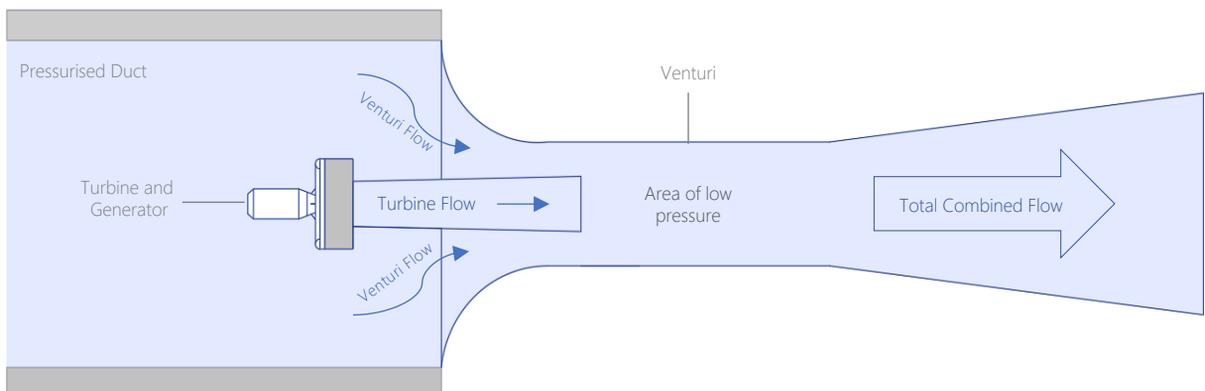
45% less investment costs and shorter payback periods

Designed for installation in 1-4 metres head, the patented design reduces investment risk by offering low per-kilowatt investment cost, shorter payback periods and improved project returns – typically 40% improved.

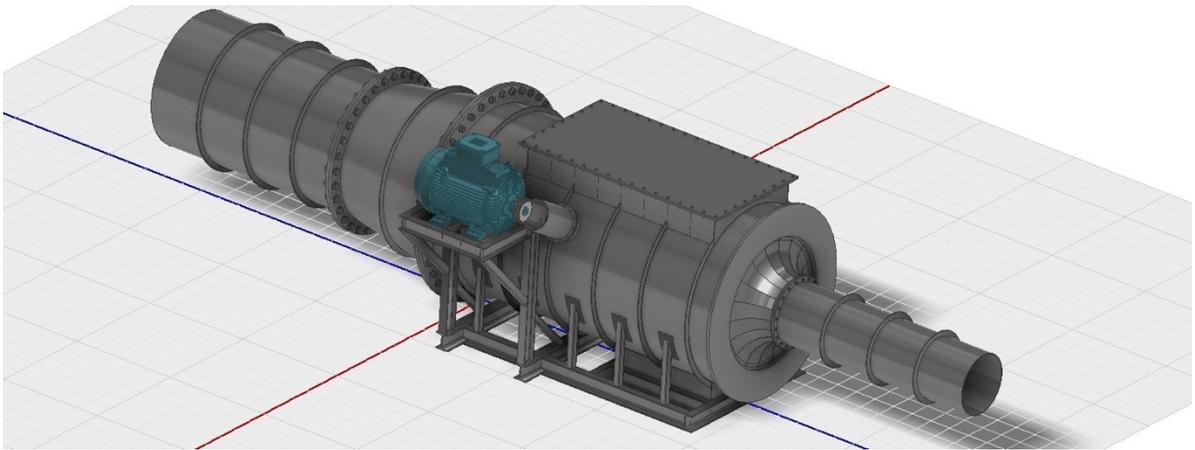
## Reducing cost by amplifying water head

VETT-in-a-Box's low cost design centres on its innovative and patented use of venturi principles. These act like a pressure amplifier and increase the pressure differential across a turbine.

Instead of providing the turbine with a large volume of water at low pressure, VETT-in-a-Box uses one part of the water in a venturi to achieve pressure amplification, providing the turbine with less water volume but at a higher pressure. The large venturi flow does not contain moving parts and is fish friendly.



The turbine discharges into a very low pressure region created by the venturi flow. The pressure differential across the turbine therefore increases as the turbine not only experiences the site head pressure but also the considerably lower venturi pressure downstream of the turbine.



The pre-fabricated VETT-in-a-Box allows for simplified installation and lower maintenance costs.

## Simplified Installation

VETT-in-a-Box houses all mechanical and electrical equipment in a pre-fabricated, pressurised duct rather than an open tank. This means excavation and other civil works are significantly reduced.

VETT-in-a-Box can be installed in shallow excavations, deep enough to ensure the outfall is submerged below the water level. Excavations can be further reduced by angling the installation from upstream to downstream.

All M&E equipment is delivered on a structural skid which is lifted into the M&E duct onto a pre-assembled frame. Offsite fabrication of the duct reduces time on-site and the risk of costly delays.

The M&E duct is easily accessible through a hatch which can be removed for quick access to all components, reducing maintenance and down time. The M&E duct is connected via standard pipe flanges, further simplifying the installation.

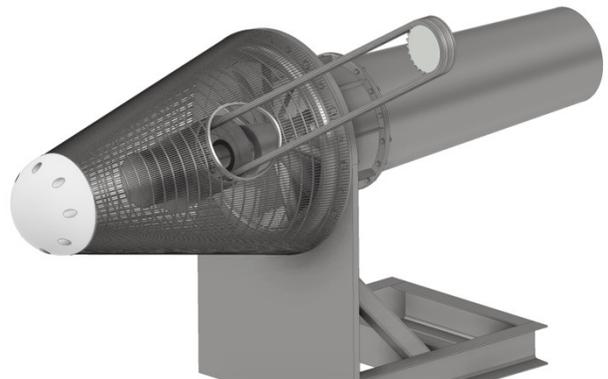
A dry generator positioned outside of the M&E duct reduces installation and maintenance costs further.

## Higher Reliability, Less Maintenance

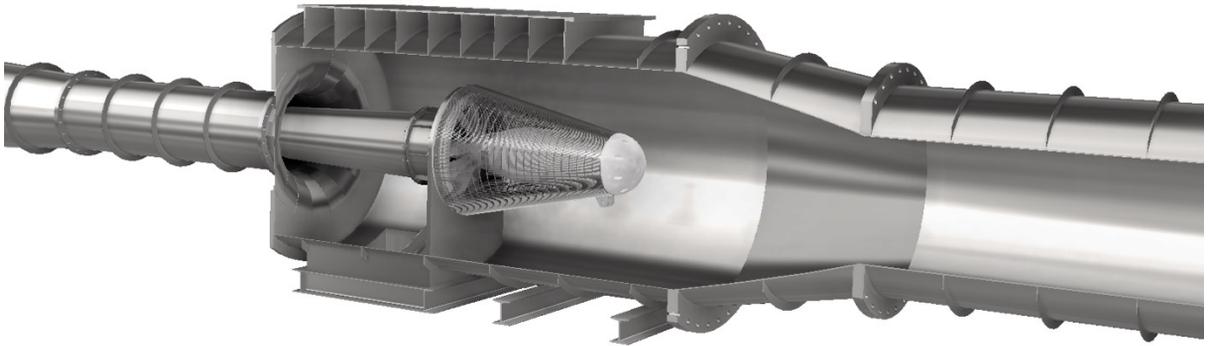
Moving parts are kept to a minimum for increased reliability, helped by smaller and lighter mechanical and electrical equipment. Design flexibility and the possibility to use any horizontal propeller turbine in combination with VETT technology allows the supply chain to be flexible.

## Remote, Intelligent Operation

The entire VETT-in-a-Box hydro scheme can be operated and monitored remotely without the need for site visits.



A typical skid mounted VETT-in-a-Box turbine-generator with conical fish screen and external power offtake.



A skid mounted turbine and generator allows for fast accurate installation, reducing installation time and cost.

## Simple, Robust Turbine

The VETT-in-a-Box turbine is 3-5x smaller and 4-15x faster than conventional turbines with no gearbox required, helping to reduce maintenance burden.

The simple, robust turbine has fixed blades with static guide vanes. Variable speed allows for optimum power output.

## Standardised Components

To reduce costs, VETT-in-a-Box is configured with standard pipe sizes and off-the-shelf components. This reduces design time and project development costs.

Various model sizes are available which cover a wide operating range.

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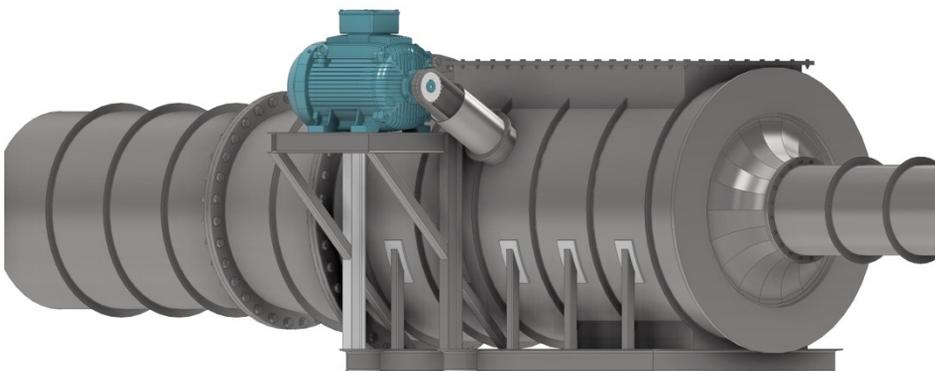
## Maximizing production, minimising cost

### Efficient Operation

- High speed turbine without gearbox
- Zero noise or visual pollution
- Remote operation and monitoring
- Reduced service complexity

### Reliable Design

- Standardised design and components
  - Reduced components list
  - Flexible supply chain
  - Proven off-the-shelf components
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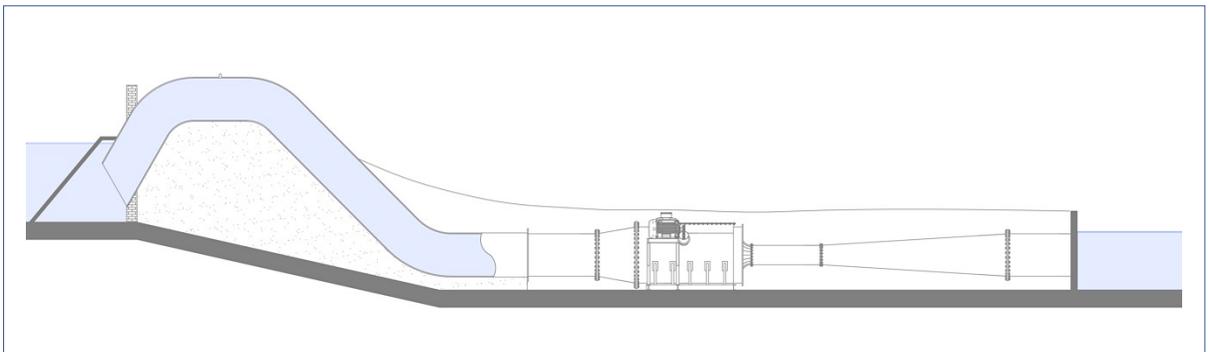
A standard air cooled generator further reduces costs and simplifies installation and maintenance.

## 'Plug & Play' installation options to meet your site needs

VETT-in-a-Box is a 'plug & play' system designed for easy installation. There are different ways to install the unit: positioned on a riverbank, or partially buried to reduce visual impact, with siphoned or gravity fed intake. Various options for water intake and discharge can be mixed according to the needs of the site.

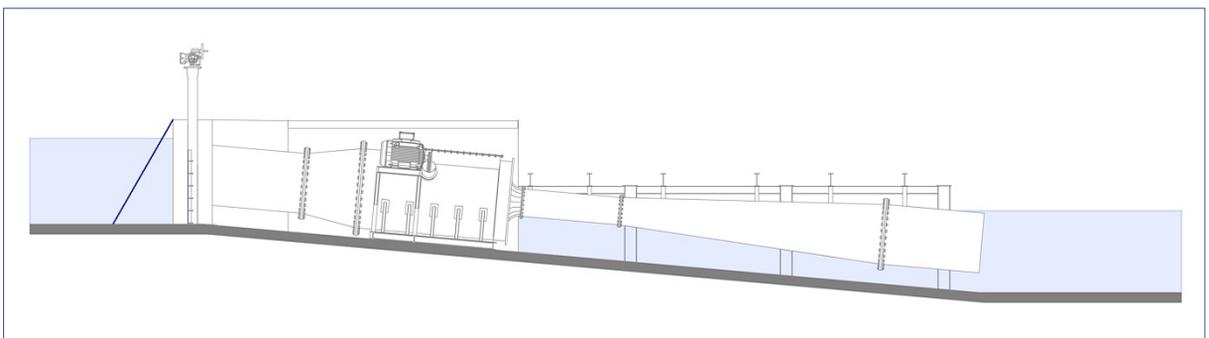
Temporary installation is also possible, making VETT-in-a-Box a suitable technology for providing power to disaster relief responses.

### Siphoned intake

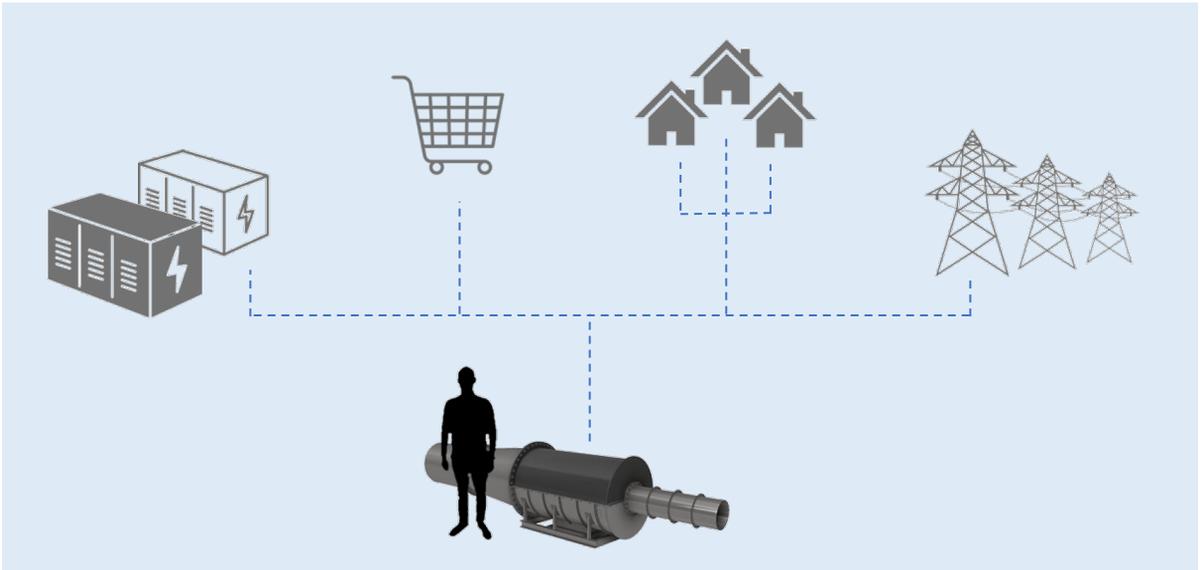


This visual shows a VETT-in-a-Box with siphoned intake and simple debris screen. The intake goes over an pre-existing structure such as a weir or river bank, with no need to break into it, reducing excavation costs. An air pump creates a natural siphon to draw water into the system.

### Angled downstream



VETT-in-a-Box can be installed directly on a bank, at an angle, with the downstream system lower than the upstream water level and turbine. The main duct is above the water when shut down. The unit shown here has an upstream sluice gate. The whole unit can also be built into an excavation to avoid visual pollution.



Electricity produced by a VETT-in-a-Box can be consumed off-grid, through mini-grids or it can operate grid connected.

## Powering off-grids, mini-grids, or the National Grid.

VETT-in-a-Box produced energy can be consumed directly off-grid such as by battery storage units, or it can be connected to consumers like domestic homes, enterprises or farms. It can power whole communities through decentralised mini grids, or VETT-in-a-Box can operate grid connected.

The technology allows for a locally distributed energy supply model to be realised, reducing transmission losses and the impact of local grid failures. Its predictable, reliable operation makes it an ideal partner for grids connected to variable wind or solar power. VETT-in-a-Box technology can help build sustainable economies by offering economic support through low-cost reliable energy with an operational life of 120 years.



The unobtrusive power kiosk at a VETT installation in Eaton Socon, UK. It is located by a restaurant's outdoor seating area.

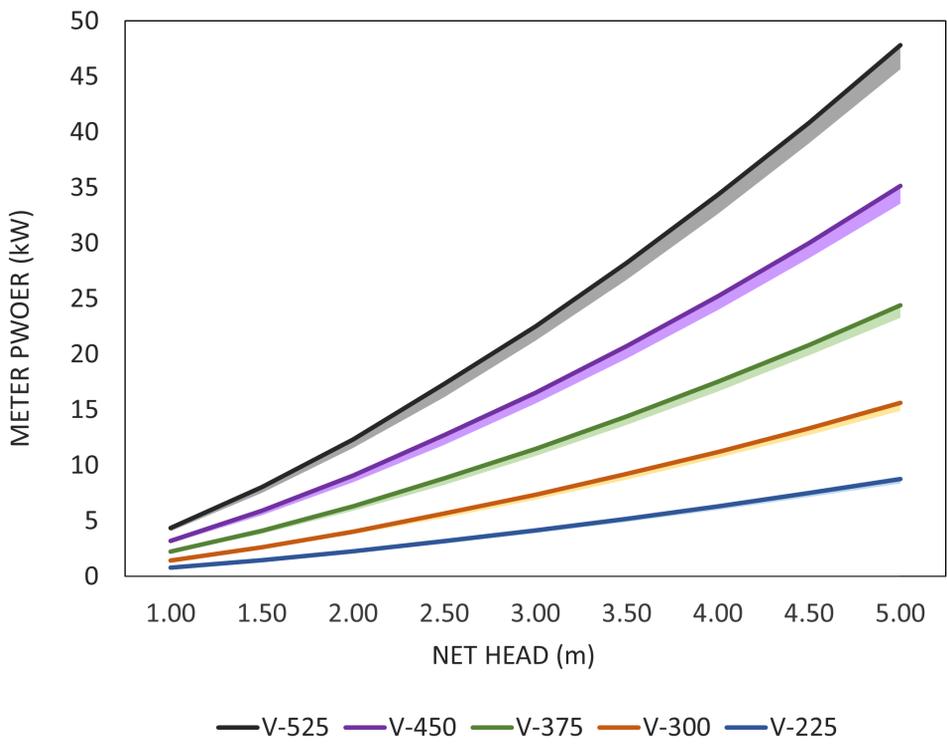
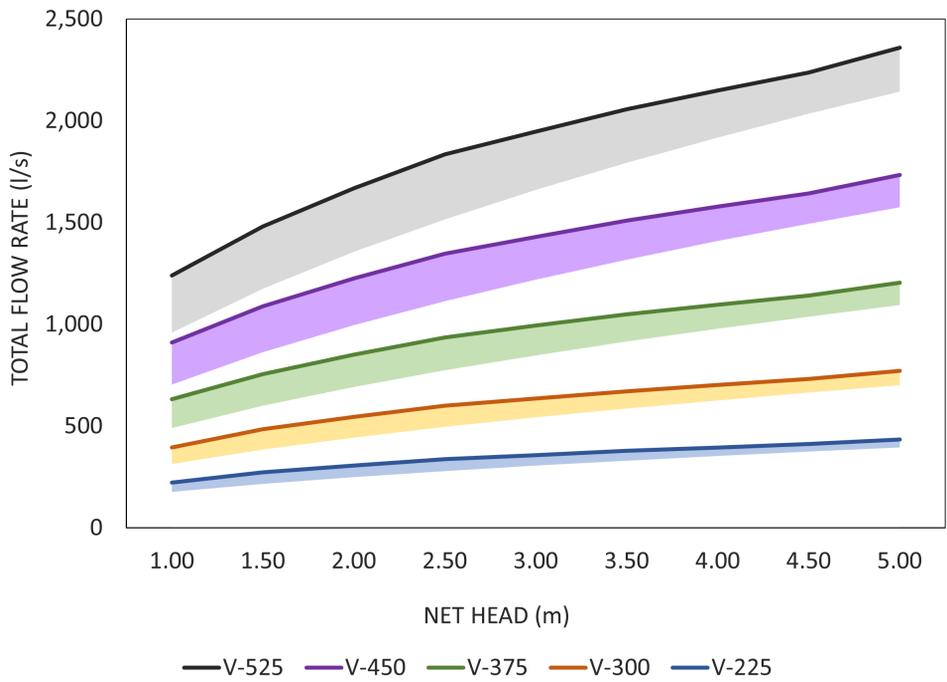
## Power Kiosk

The VETT-in-a-Box control system is housed within a small, standard issue kiosk. This can be positioned away from the hydropower installation according to the layout needs of the site.



Inside the standard issue power kiosk.

# Standard VETT-in-a-Box model sizes:



### VETT-in-a-Box Technical Specifications

- |                                     |   |
|-------------------------------------|---|
| • Run-of-river                      | • Up to 2000 l/s per unit                 |
| • 1.5 - 4.0 metres head differences | • Suits urban as well as remote locations |

### VETT-in-a-box Customer Benefits

- |                           |                                      |
|---------------------------|--------------------------------------|
| • Proven fish-friendly    | • Low maintenance                    |
| • Low cost infrastructure | • Easy integration into watercourses |
| • Fast, compact turbine   | • Pre-fabricated assembly            |
| • Zero visual impact      | • Zero noise impact                  |

Get in touch for more information:

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