A guide to the new hydropower technology of the Kouris Centri-Turbine (KCT)

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How revolutionary is it, really?

Revolutionary enough to change hydropower as we know it

Anyone familiar with small-scale hydropower knows that technology options have been rather limited and more often than not dictated by site conditions and output considerations – that is, until now.

A rare “eureka” moment resulted in an understanding of how earth’s rotational force can be combined with fluid dynamics to create a new type of hydropower technology, the Kouris Centri- Turbine (KCT).

As a result of the revolutionary dynamics involved in this new technology, the characteristics of the KCT differ in numerous ways.

This guide examines these characteristics and explains how KCT works, how it compares to traditional technologies, and the flexible requirements for considering such an installation.

“There is nothing more powerful than an idea whose time has come"

Thomas Edison

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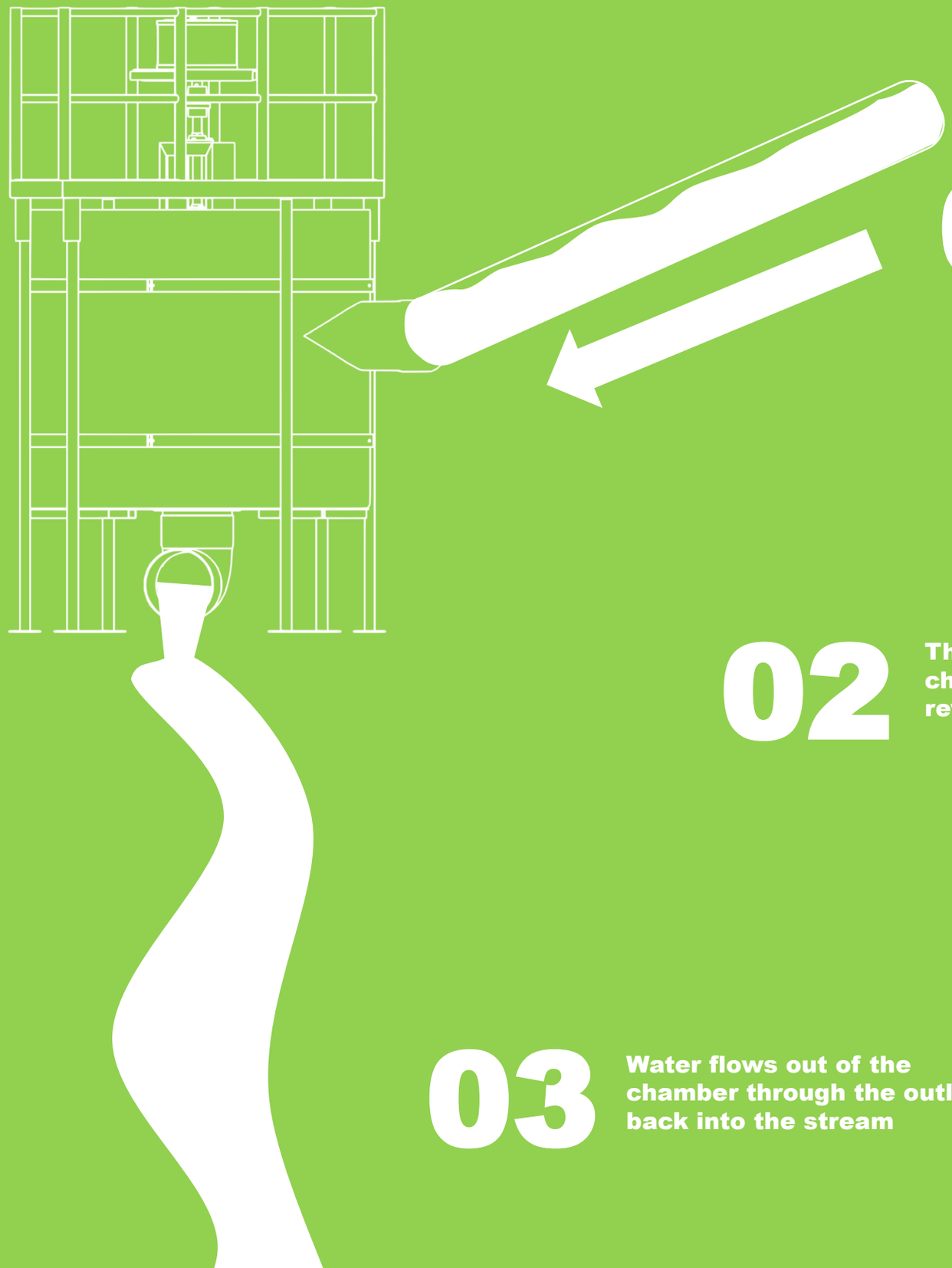
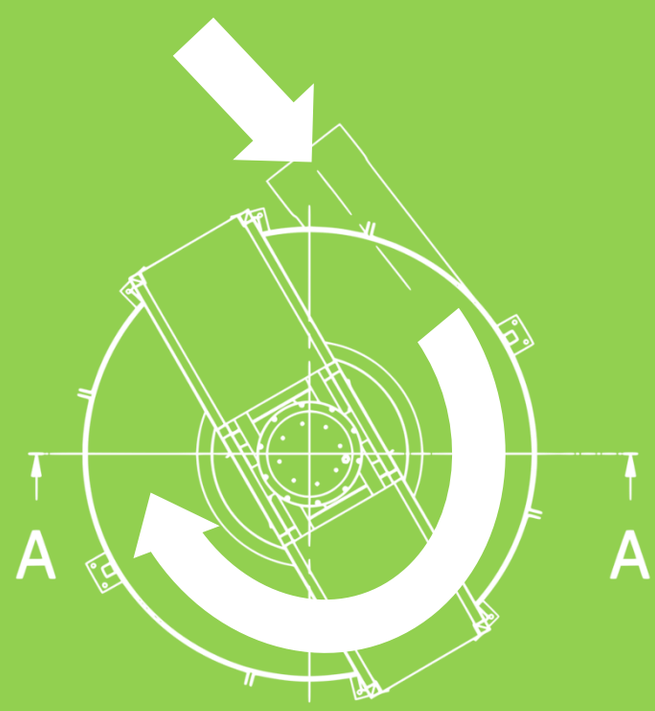
How the technology works

How it works



01 Water flows from the canal into the KCT inlet

02 The water is funneled into the chamber forcing the prop to revolve, generating power



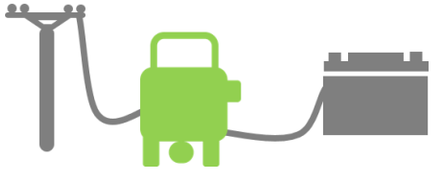
03 Water flows out of the chamber through the outlet back into the stream

02

Customization & Flexibility:

Modular options

Flexible, Modular & Scalable



On and off grid
You can provide power to the grid or operate KCT off-grid in combination with power storage, or both.

Standalone or hybrid sources
KCT is modular in design and works great alongside other sources such as solar installations or diesel generators.

Above-ground or In-ground
You can install KCT above ground, or in the ground, depending on the site and other project requirements.

Supplement existing hydro
KCT can be retro-fitted to existing installations of various types in order to economically increase a site's output.

Multiple placement options
Multiple KCT installations can be installed either in parallel at one junction or in a series along the canal.

Offsite, on bank, in waterway
An installation can be located practically anywhere: on a diverted canal, on a bankside or inside the waterway.

On Site Assembly in 12h
For a prepared site it takes 12 hours to assemble for a KCT assembly, not including any optional concrete work.

Portable and mobile
KCT can be transported on the back of a truck and lifted into place easily. This enables access to hard-to-reach sites.

Secure and unobtrusive
KCT blends into the natural background and is very unobtrusive. In addition, it is easy to secure and monitor.

No footprint, fully recyclable
The entire KCT assembly is made of recyclable materials and its removal can leave no trace of existence at all.

Low Maintenance
KCT operates smoothly for a long product life with minimal maintenance. Distant monitoring & standard parts are available.

Long operating life
With a simple and rugged design, and very lengthy MTBF, KCT is supported by a 25 year warranty.

On site: Ano Poroia, Greece

Quick Installation, Small Footprint

See How

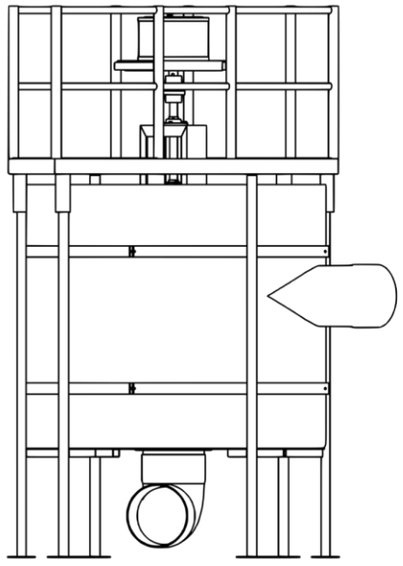
03

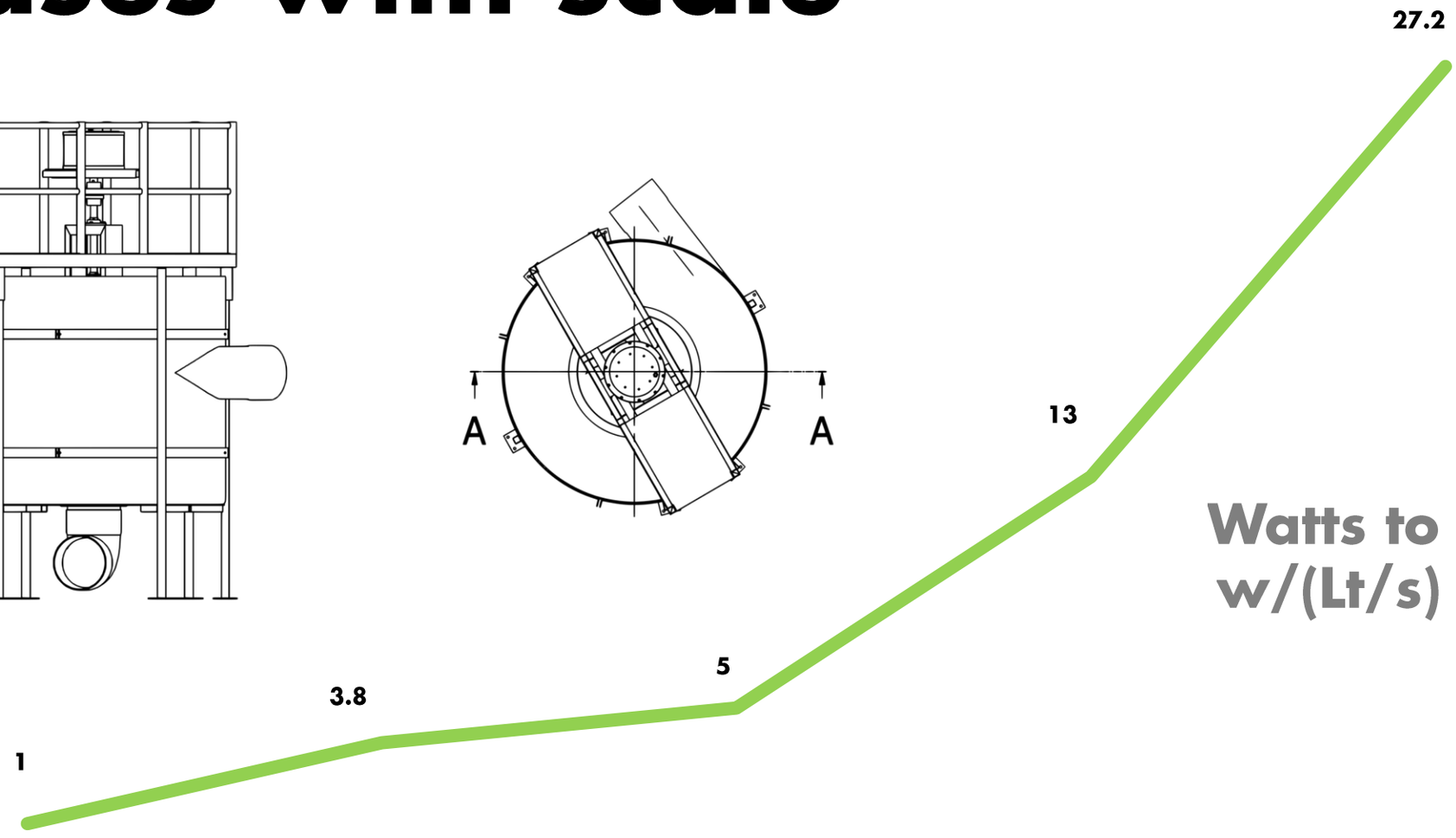
Key figures:

Output and financial performance

Output efficiency

increases with scale

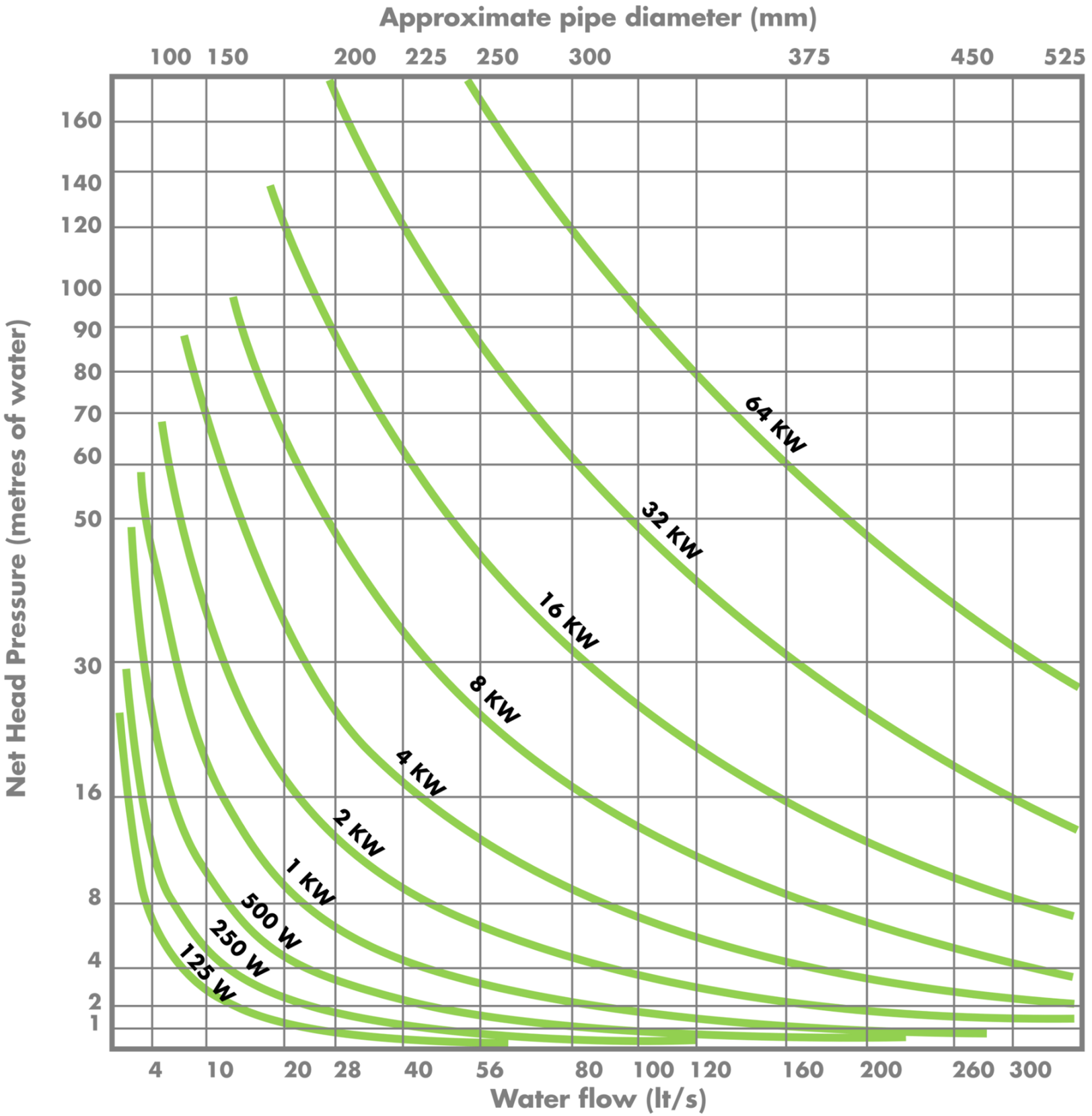




Project	Braeside	Kalorama	Marysville	Mulwala*	Macro Model*
Output	10w	183w	500w	20kw	300kw
Chamber Diam.	58cm	2.5m	2m	4.2m	30m
Flow	10 l/s	48 l/s	110 l/s	1,500 l/s	11,000 l/s
Fall	60cm	80cm	60cm	3m	3m

*Mulwala and Macro model figures are estimates.
For more information please refer to the Model Specifications section, or contact us for the latest figures

Site-determined
Nominal Power*



* Figures are estimates. Output is subject to site suitability and flow.

Multiple options

KCT Models

Model Name	Nominal Power*	Other Info	Chamber Dimensions	Total Dimensions	Suggested Flow Rate litres/Sec
KCT-005-S/H	500W	Single Phase	D:1.0m H:1.0m	TBC	<80
KCT-010-S/H	1kW	Single Phase	D:1.1m H:1.5m	TBC	<80
KCT-015-S/H	1.5kW	Single Phase	D:1.3m H:1.5m	TBC	<80
KCT-018-S/H	1.8kW	Single Phase	D:1.5m H:1.5m	TBC	<80
KCT-030-S/H	3kW	Single Phase	D:2.0m H:1.8m	TBC	<150
KCT-050-S/H	5kW	Single Phase	D:2.0m H:2.0m	TBC	<300
KCT-100T-S/H	10kW	3 Phase	D:2.9m H:2.0m	TBC	<300
KCT-150T-S/H	15kW	3 Phase	D:3.4m H:2.0m	TBC	<300
KCT-200T-S/H	20kW	3 Phase	D:4.2m H:2.0m	TBC	<300

* Figures are estimates. Output is subject to site suitability and flow.

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KCT is extremely clean:

- ✓ **Zero greenhouse gas emissions**
- ✓ **Zero interference with water flow**
- ✓ **Zero interference with water life**
- ✓ **Unobtrusive design blends into the landscape**
- ✓ **A small footprint means no major works on site**
- ✓ **100% recyclable materials**
- ✓ **Zero footprint after complete removal**

Site Environment:

Minimal Impact

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KCT vs traditional Kaplan / Francis

How it compares

How does KCT compare?

A brief comparison of features

	KCT Vortex Power Plant	Hydro-power plant (Kaplan / Francis turbine)
Minimum falling height	0.6m	3m
Efficiency at low heights	High	Low
Vortex Regulation	Self-regulating	Expensive by design
Water quality	Pure, aerated	High Pressure – Poor
Environmental impact	Minimal	Dams – High Impact
Ability to decentralize	Excellent	Poor
Hydro-plant augmentation	Excellent scalability	Finite upgradability
Overflow issues, flow imposition	None	Both
Low-load efficiency	High	Low
Flow restrictions	None	Regulated
Increased power under load	Yes	No, flow is restricted

FAQ

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Frequently Asked Questions

What are the minimum site requirements to be able to install a KCT unit?

At the absolute minimum, KCT needs at the very least a height differential of 0.6m depending on the flow rate. We are currently conducting further research and testing its ability to produce power using the least available height and flow rate available.

How can more than one units be installed?

Multiple units can be installed in parallel in larger sites, or in conjunction with existing hydroelectric installations. KCT units can also be installed in a series along a bank following the descent of the stream. KCT is very flexible and we're constantly experimenting with placement options so please get in touch if you want to find out more.

What are the maintenance requirements for a KCT unit?

The maintenance requirements for a KCT installation are most likely the lowest in the industry. As the KCT turbine moves in a circular motion with the spiralling water, unlike impulse turbines, the metal fatigue is dramatically reduced. Coupled with a long life expectancy of 40-50 years, KCT is probably the most attractive option for practically maintenance-free production making it a superb option for very remote sites.

What impact does KCT have on the environment?

Initial findings show that not only KCT does not harm the environment in any way, but it also seems to bring certain benefits to it. Besides having zero emissions, pollutants or demanding maintenance, KCT also appears to introduce oxygenated particles into the water. As opposed to dams and other alternatives where the high pressure depletes oxygen from the water, the KCT vortex aerates the water with tiny bubbles of air which has a beneficial impact on water quality and water life. Finally, KCT's rotating blades are harmless to any fish travelling downstream.

Is KCT for on-grid or off-grid installations?

Both. KCT can work on the grid and completely independently / off the grid.

Can KCT be installed or retro-fitted along existing installations?

Yes, it can in most instances. KCT can be installed along existing installations augmenting production without requiring major modifications to existing sites. Get in touch to find out more.

What output is typical of a KCT installation?

The output is a function of the site's properties, namely the fall height and the water flow. Currently KapaLamda produces KCT units for 0.5kW, 1kW, 1.5kW, 1.8kW, 3kW, 5kW, 10kW, 15kW, and 20kW output. Refer to the nominal power chart and models for more information.

What makes KCT such an easy / fast / flexible implementation?

KCT can be installed at sites with small fall heights where other alternatives would fail to operate efficiently. In addition, the units can be installed on their own or in multiples, in series or in parallel, in-line or on the bank. KCT can also be installed in conjunction with existing installations to increase efficiency. We have already implemented KCT both in waterways and in fishery sites and the units can also operate in greywater sites too. The units are not constructed in-situ but offsite and placed on-site, allowing for future mobility and upgrades. KCT can be used off-grid, on-grid or both. Finally, KCT units are produced in various configurations and sizes allowing tailored productivity and future modular upgrades.

How much does a KCT implementation cost? What kind of return on investment is typical?

KCT produces a very competitive return on investment. Please get in touch with us for an estimate of costs and output for your site.

Manufacture Site:

Fully Managed Production

European production is currently located in Greece and adheres to ISO9001:2008 standards.

Each KCT is built using extremely rugged materials resistant to corrosion. It is then transported to the installation site where it can be assembled and installed quickly.

The first operational KCT project built in Europe is the KapaLamda Ano Poroia installation in Northern Greece. For a factory or site tour, please get in touch with us.

ISO 9001:2008

GR Made in Greece

Media Coverage

KCT in the press

"Revolutionary Hydroelectric generator unveiled at Thessaloniki International Fair"

"Innovative hydroelectric generator by a Greek ex-pat inventor"

"Revolutionary hydroelectric generator made in Greece opens new horizons in hydro energy use"