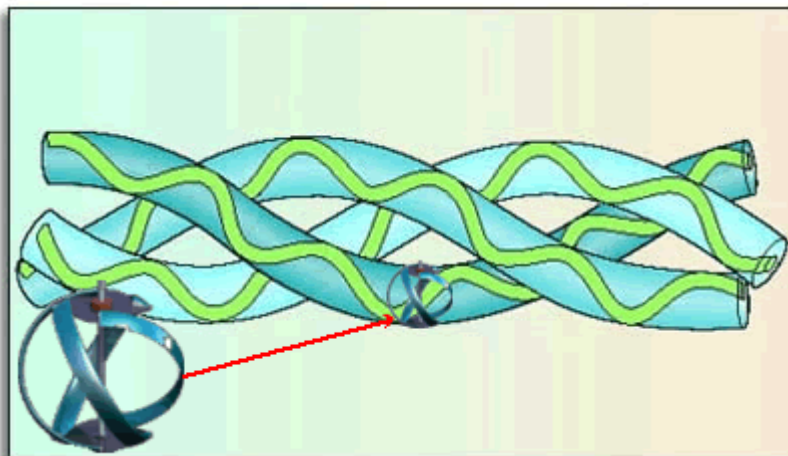


CONCEPT de turbine au fil de l'eau Audet

THE HUG SYSTEM (Le système HUG)

The installation of most of very low head sites is technically feasible, but civil works give rise to high costs, resulting to economically unviable projects. To solve this problem, one must design a new machine using a completely different philosophy to equip such sites.

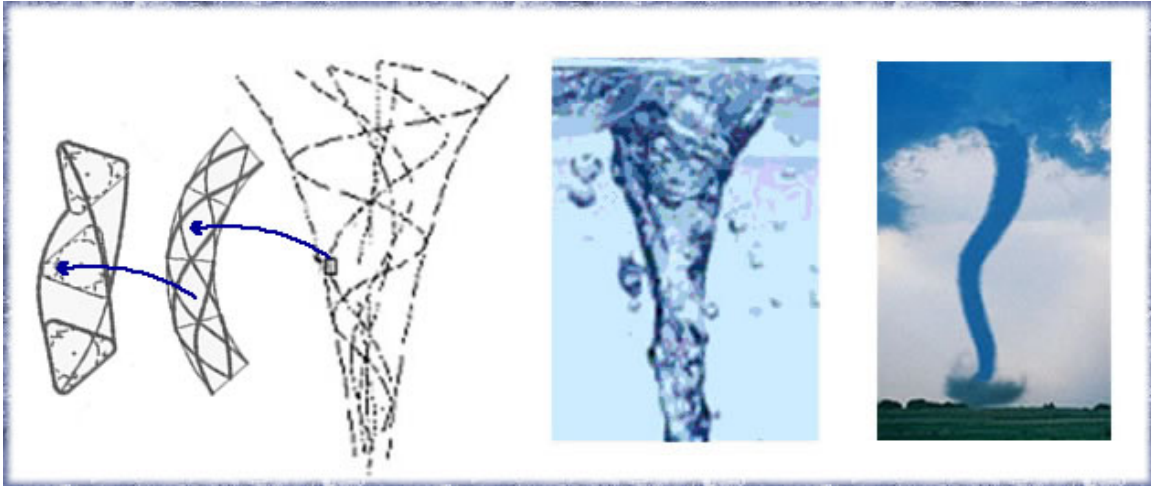
Most inventions are not usually new: this “new invention” is a combination of two inventions: the Gorlov helical turbine (1992), which is the child of the Darrieus turbine (1926), and vortex technology, developed by Schauberger (1929). A vortex pathway into which oval twin helical turbines are placed creates a marriage of these two inventions, the Helical Pathway System (Patent Pending).



The new dam less development of a submerged helical pathway is capable of extracting high energy from low head sites at very low cost because of a physics phenomenon, called repulsion energy, which speeds up the current at the extremity of the curves. This is an exciting breakthrough in green energy; it is modular and relatively easy to install.

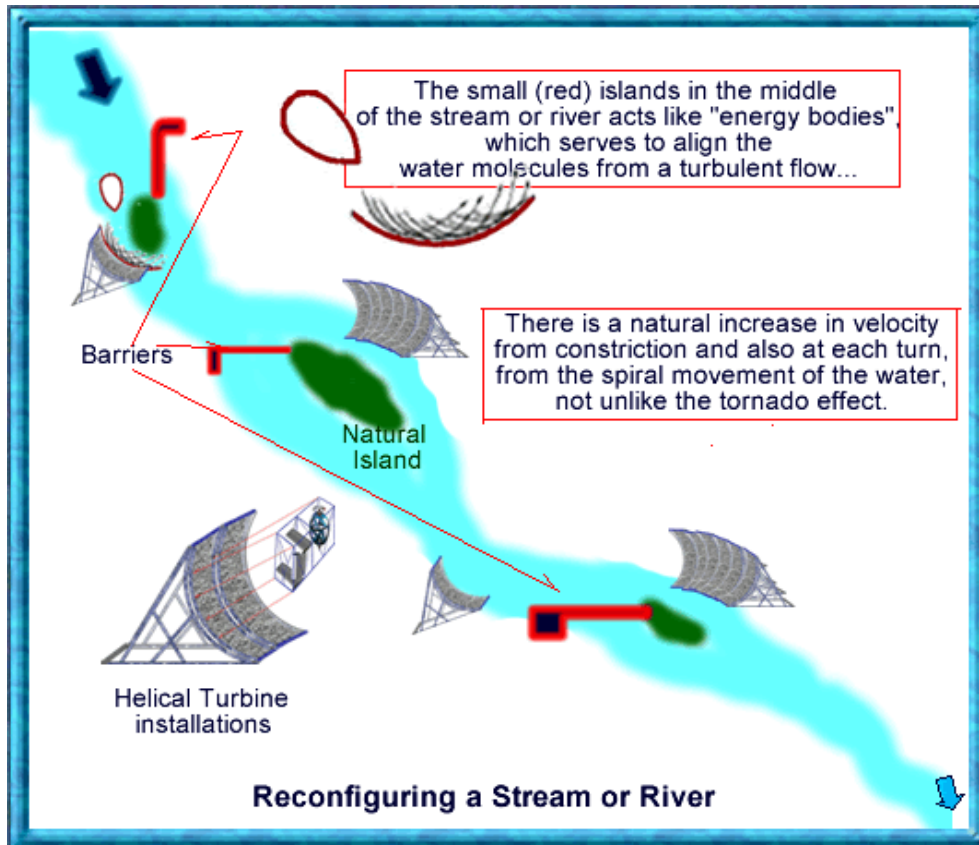
Water will always try to follow the path of least resistance. It reduces resistance by curving more and more inwards thereby avoiding the confrontational resistance of straight motion. Nature has no use for the straight line as illustrated from the following image.

Enter the **HUG (Helical Unique Generation)** system:



The structure of a whirlpool illustrates where its kinetic energy can be found: at the turn.

The **HUG** system is dependent entirely on the velocity of the flow, and is not dependent on a small dam enclosure, in which fish are confined. Instead the **HUG** is placed in the fastest part of the flow, where there is additional flow, which is fully accessible to fish traveling in both directions.



The natural flow of a river or stream continues, as it should.

The first 6.36 Mw prototype **HUG** system (Not illustrated) holds 28 twin oval helical turbines at a length of 31 m and a diameter of 9 m:

$$= 7 \times 4\text{m} \times (3.0 \text{ m}^2 \times 7.72 \text{ m/s}^*) \times .35 \text{ efficiency} = 227 \text{ kW/turbine} \times 28 \text{ Helical Oval Turbines} = 6.36 \text{ MW/ HUG}$$

Total Cost: 6.36 MW \$1020/kW (\$0.145/kWh) \$7,202,000

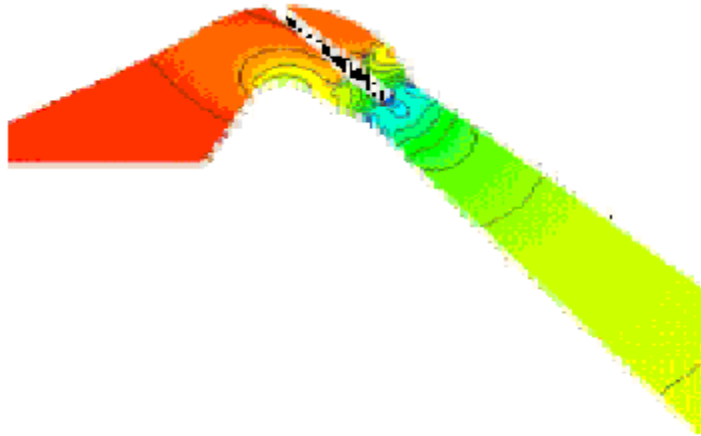
80% utilization: **44,600 Mwh***** [x \$79/MWh (Quebec)] **\$3,500,000: ROI =49%/yr.**

Return on Investment: (Ontario FIT) (x \$131/Mwh) = \$5,840,000 = 81%/yr.

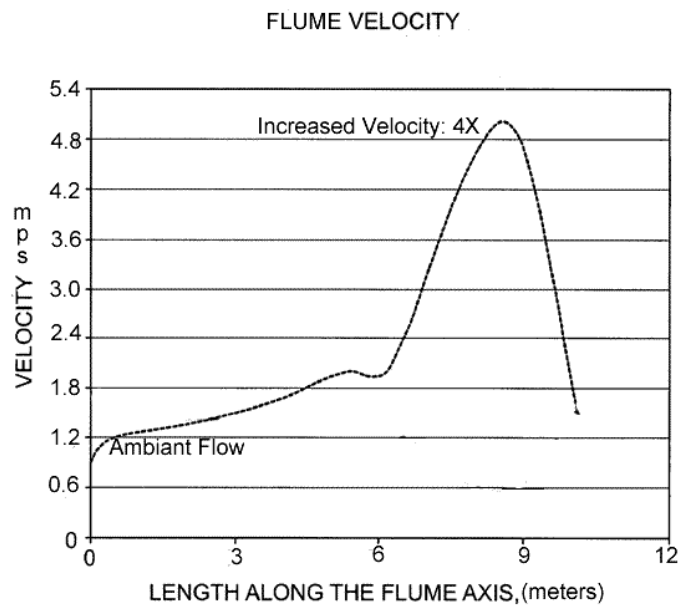
***44,600 MWh = 44,600,000 kWh can sustain 37,200 average households

annually @ 12,000 kilowatt-hours (kWh) for each household.

The reason that the flow is very fast is because of the whirlpool action of the flume in the **HUG**, which increases the velocity of the flow four times (red area).



There is a dramatic increase of velocity because of the vortex.





The greater the curve, the faster the water rounds the bend.

Undiscovered Hydro Generation

Canada is a global leader of Green Technology, yet, USA invested six times more per capita than Canada in clean energy through their stimulus package

In a recent report from the Conference Board of Canada, Canada gets a D in innovation, ranking the country 14th among 17 industrialized nations for its ability to turn knowledge into moneymaking products and services.

With a few exceptions, Canada does not successfully commercialize its scientific and technological discoveries into world-leading products and services.

Canada does have a successful innovation agenda: through NSERC and other bodies, Canada invests more than \$2-billion annually in technology R&D and other forms of knowledge creation. Government also invests through incentive programs like the widely acclaimed SR&ED tax credit, and other regional or industry-specific incentives to encourage knowledge clusters.

Ontario's new budget promises a \$150M to fund three-year industrial electricity rate for large northern businesses. Remote areas do not have access to expensive dams and so electricity is a northern company's biggest cost after labour. To qualify, the operations have to agree to improve their electricity efficiency.

Canada can still compete for the green jobs of tomorrow. But we need leadership now. For Canada to find real, sustainable growth, its governments and businesses need to figure out how to leverage growth opportunities in Canada in order to import our technology overseas in emerging markets, especially in green technology: hydropower systems that do not require the construction of new dams is the solution.

There are still \$19-billions of stimulus money available, which the government are unable to place, simply because private companies themselves invest in the most innovative ideas – leaving the government with few good solutions in green technology.

A Perfect Indigenous Initiative

We believe that the beginning of this process can come from the native communities, who have so many dam less hydroelectric potential sites within a short distance to their communities. In addition, Canada is committed to strengthen their economic foundations.

Under the \$250 million Aboriginal Loan Guarantee Program, Aboriginal communities will be eligible for loan guarantees that will allow them to take on equity participation in renewable generation and transmission projects. Indian and Northern Affairs Canada can provide assistance of up to 100% of total eligible costs for non-commercial projects: **HUG** qualifies as a non-commercial pilot project.

We are planning to visit several native communities in James Bay for a week starting on May 19 to explain the James Bay Helical Project as it applies to their community: Matagami, Waskaganish, Chisasibi, and Radisson.



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