

**.2 MW @ 4 m/s**  
**Commercial Scale**  
**7 metre blade diameter**

**All-Energy '08**

**Innovations from Canada – Clean Current's Commercial Scale Tidal Turbine**

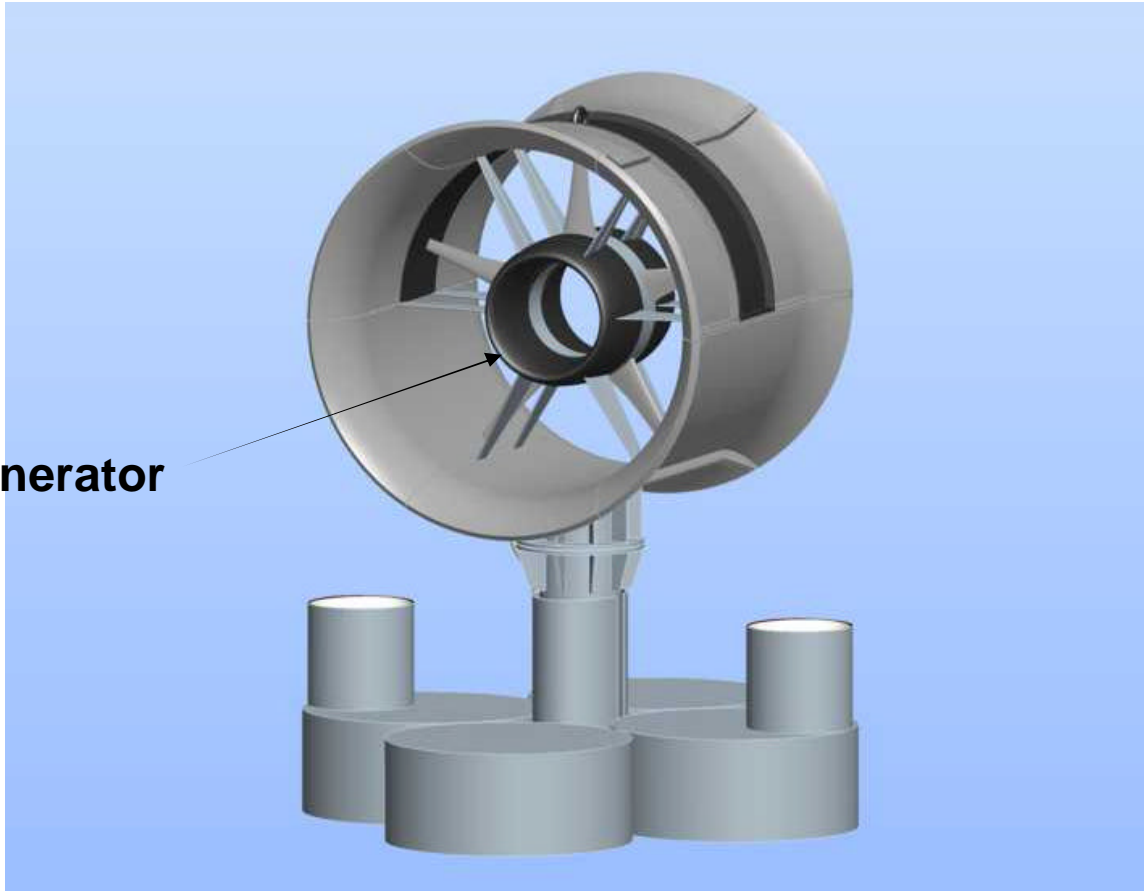
**Glenn Darou, President and CEO**

# Who/what is Clean Current?

- Disciplined technology developer with 2 product lines:
  - Tidal Turbines
  - Fault tolerant permanent magnet generators
- World's largest portfolio of granted patents for tidal energy
- Selected by Nova Scotia Energy to demonstrate commercial scale tidal turbine in Bay of Fundy

# Clean Current 2.2 MW Turbine

PM Generator

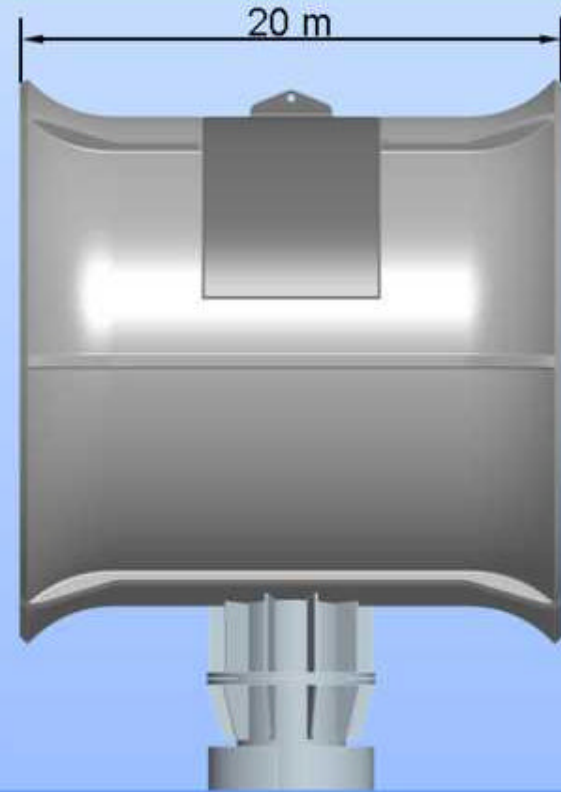
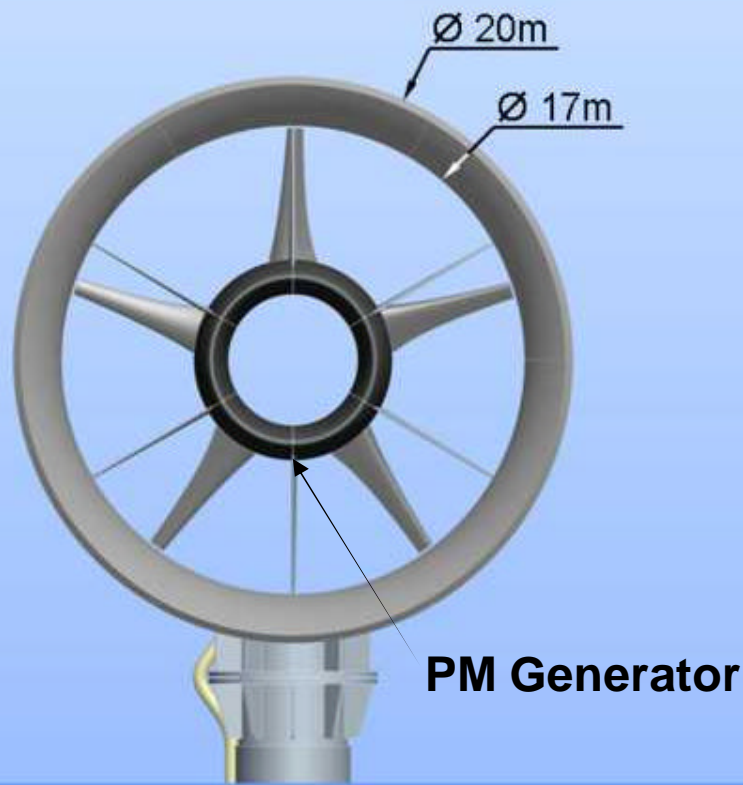


**950 kW at 3 m/s**

**2.2 MW at 4 m/s**

***Clean Current***

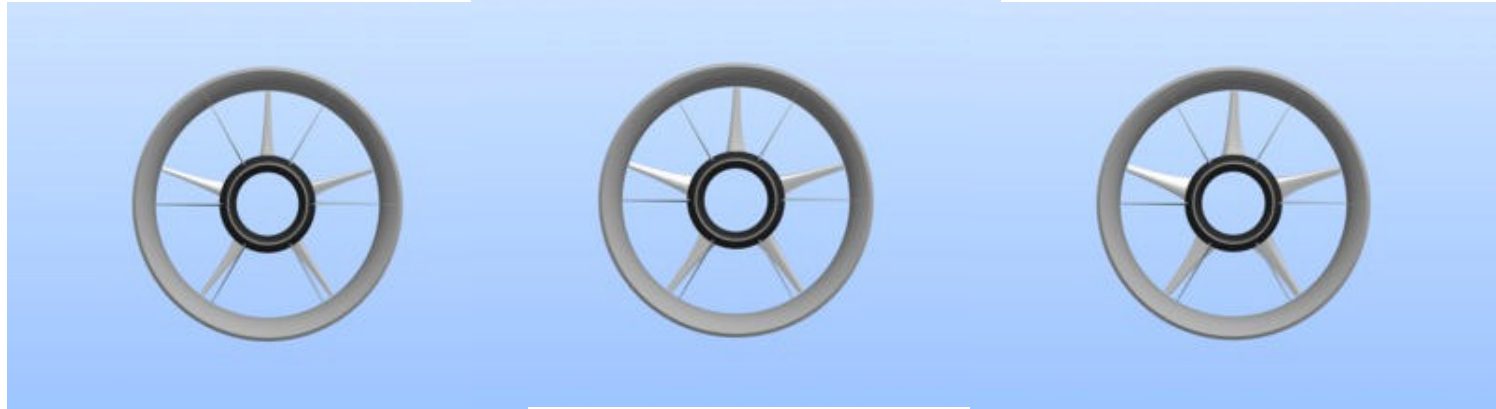
# Clean Current Turbine



**950 kW at 3 m/s**

**2.2 MW at 4 m/s**

# Clean Current Product Line



**Clean Current 1.0 MW**

**Clean Current 1.5 MW**

**Clean Current 2.2 MW**

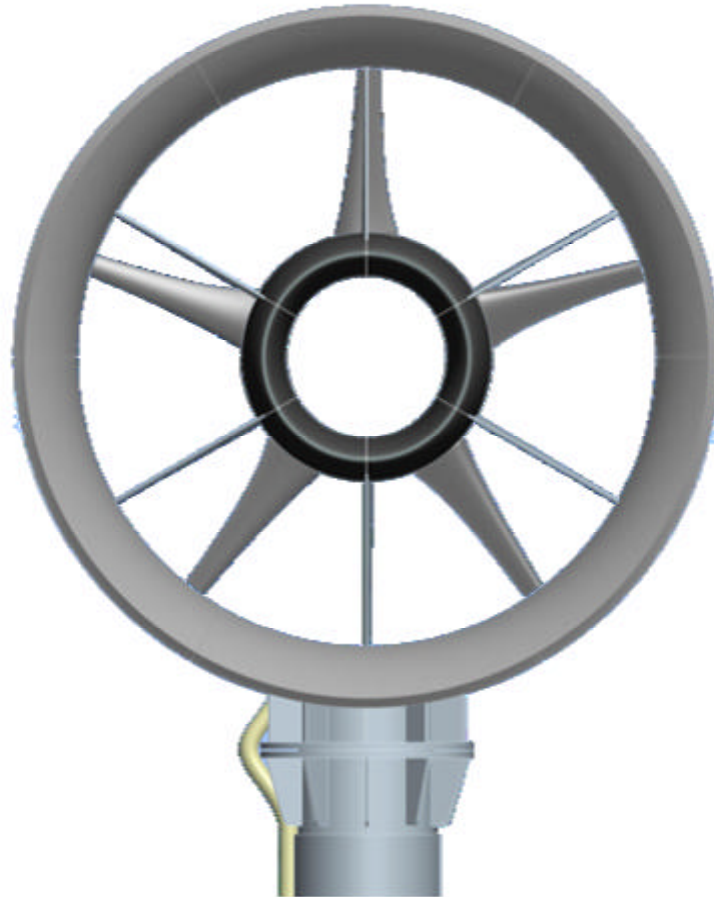
<b>Max. Output MW</b>	<b>1.0</b>	<b>1.5</b>	<b>2.2</b>
<b>Design velocity m/s</b>	<b>2.60</b>	<b>3.25</b>	<b>4.0</b>
<b>Blade diameter m</b>	<b>17</b>	<b>17</b>	<b>17</b>
<b>Augmenter diameter m</b>	<b>20</b>	<b>20</b>	<b>20</b>

# 2006 – Race Rocks Demonstration



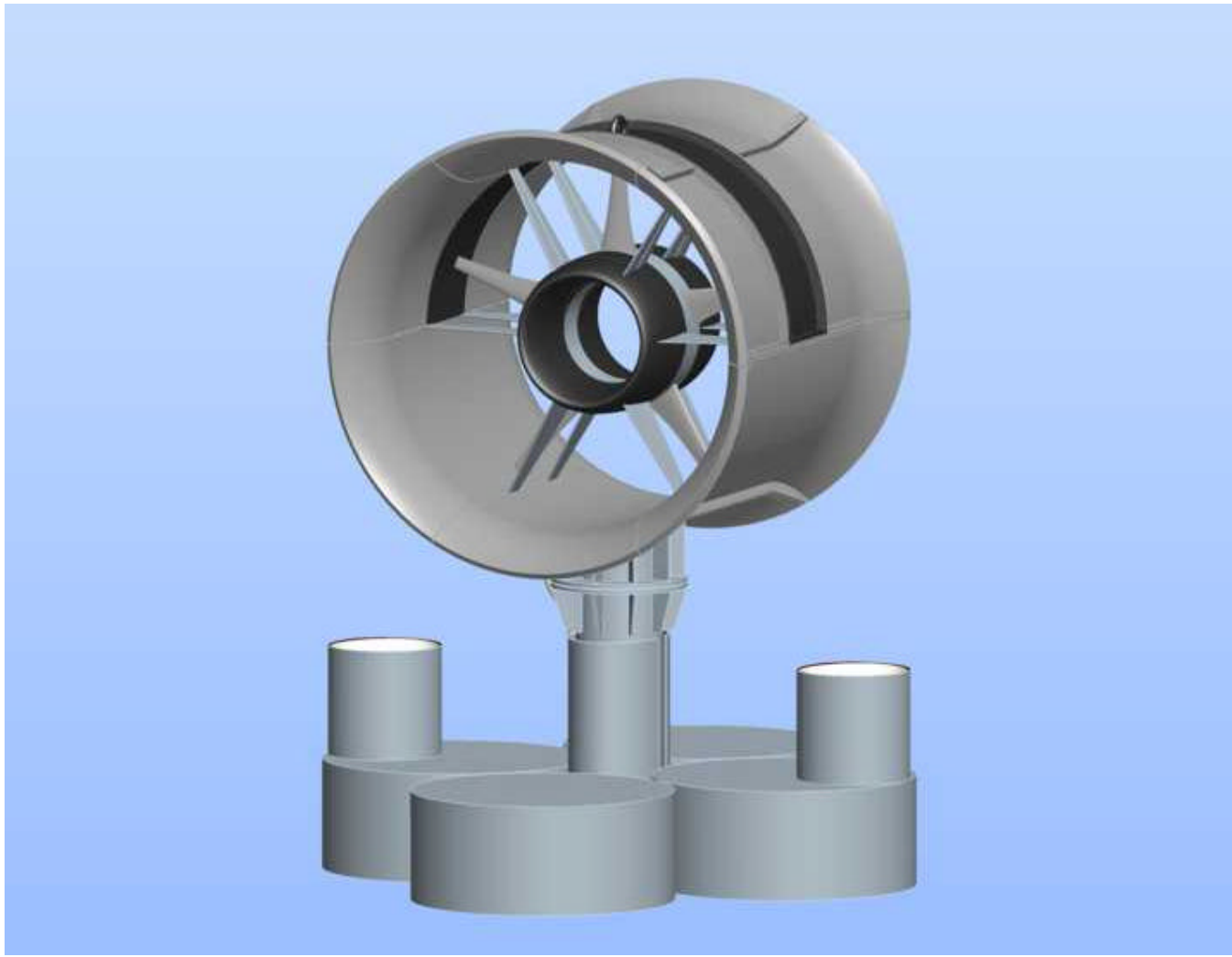


# 2008 – Scale of things to come



***Clean Current***

# Maintenance Module Operation

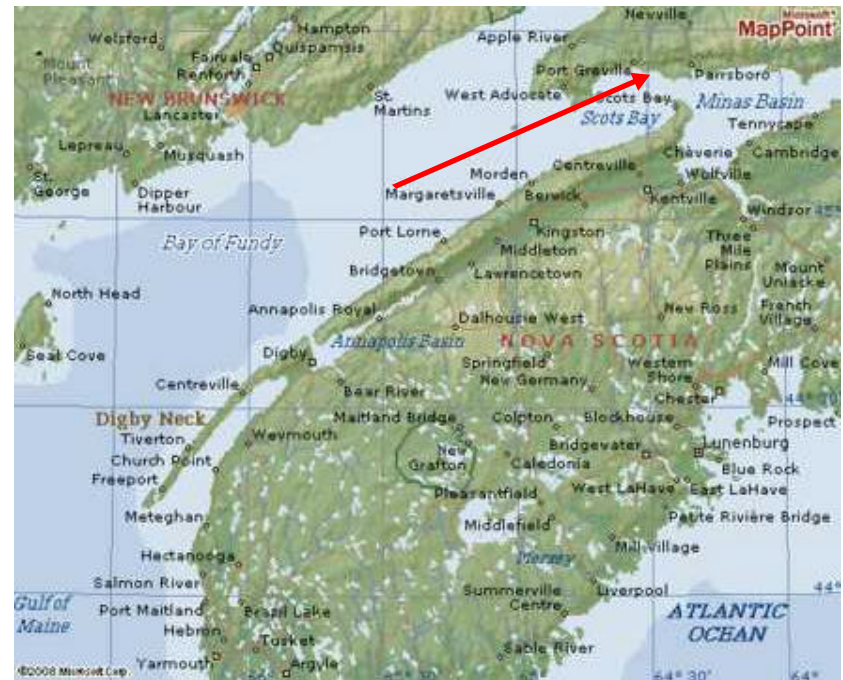




# Bay of Fundy Project (2009)

- One of best tidal sites in the world
  - Deep water, high velocity, > 300 MW commercial farm potential
- Government of Nova Scotia has selected three tidal technologies
  - Clean Current, OpenHydro, UEK
- Clean Current will demonstrate the largest and most powerful tidal turbine generator in the world
- Estimated tidal farm production rates as low as \$0.12 - \$0.13 kWh in Minas Passage
  - Before carbon credits

## Bay of Fundy Commercial Scale Testing (2009)



# Proprietary Fault-Tolerant Generator

- Significantly less weight than comparable size radial flux permanent magnet generators (40% or 90 tonnes lighter for 4-6 MW units)
  - Lower cost to manufacture – 90 tonnes of steel costs approximately \$2 million
- Higher voltage means lower transmission losses

---

## Operating Metrics

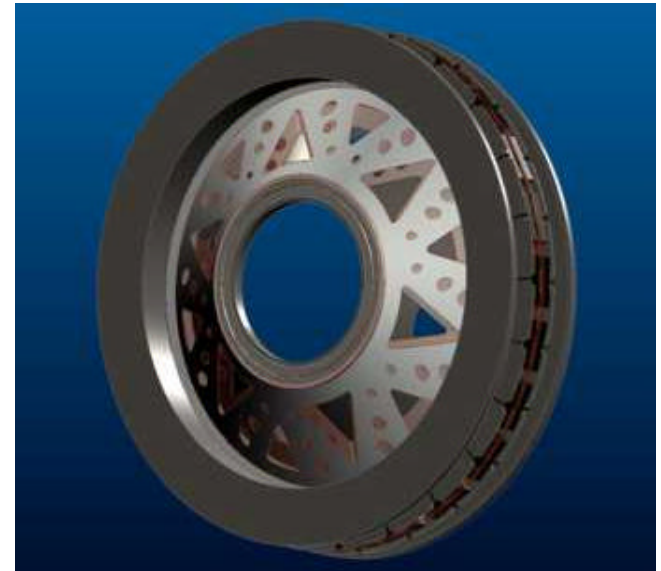
---

Power	4.5 MW – 6.0 MW
Diameter	10 m – 12 m
Total weight	< 130 tonnes
No. modules stator	> 90
Life	25 Years
Hub	Hollow rim, no hub
Voltage	3000 V to 6000 V
Fault tolerance	Materials + Segmentation
Efficiency	92 %

---

## Clean Current Generator

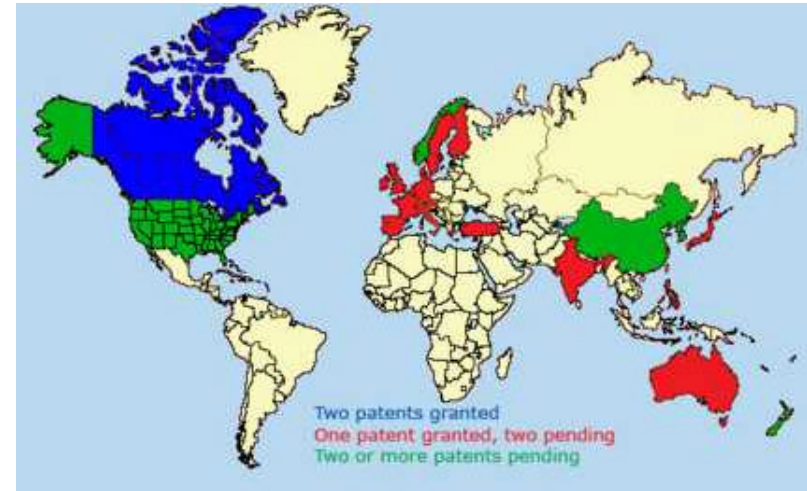
---



# Intellectual Property

- Clean Current established early patent claims on all key proprietary design elements

## Clean Current Worldwide Patent Protection



- Patents cover countries that account for approximately two thirds of worldwide electrical demand

2001

- Ducted turbine with guide vanes, bi-directional blades, central hole, flooded permanent magnet generator and removable maintenance module

2004

- Flow enhancement with augments duct and hole design

2006

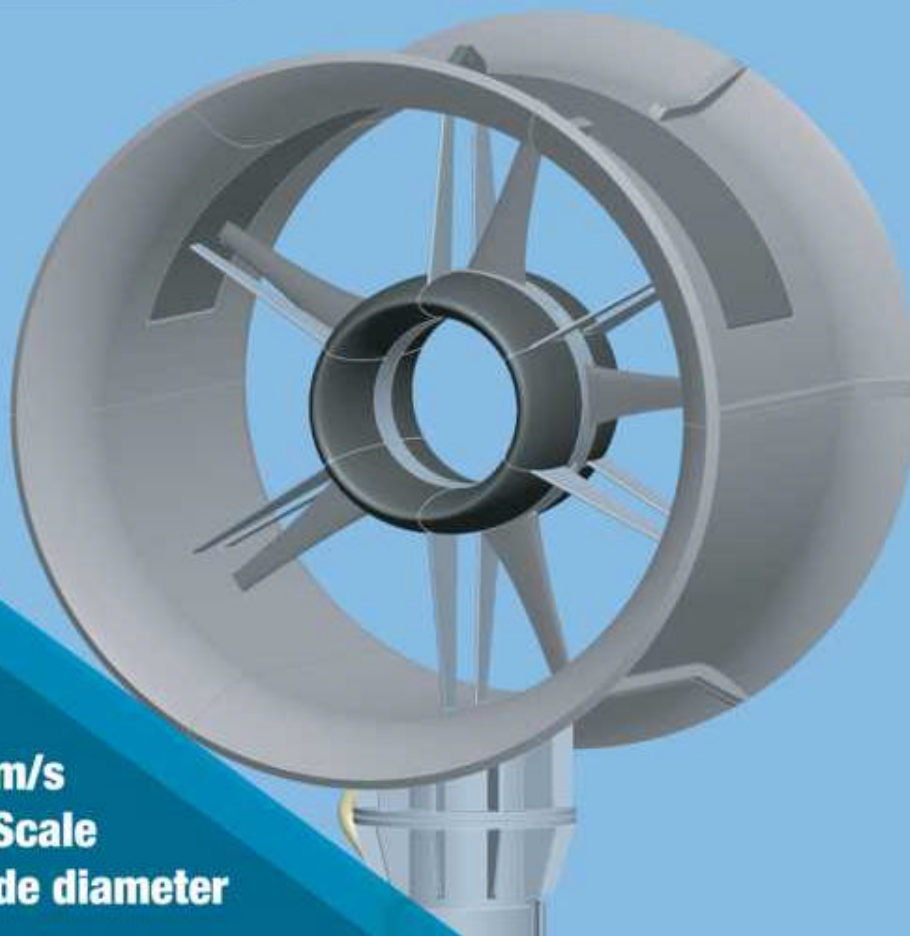
- Fault tolerant design for permanent magnet generator

2007

- Expanded application for permanent magnet generator

**Thank you**

**Thank you for this opportunity!**



**.2 MW @ 4 m/s**  
**Commercial Scale**  
**7 metre blade diameter**

**All-Energy '08**

**Innovations from Canada – Clean Current's Commercial Scale Tidal Turbine**

**Glenn Darou, President and CEO**