New Hydropower Technology for Renewable Energy

Burt Hamner, CEO
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Billions of people live near water channels, yet over a billion have no electricity.

Fast water currents have lots of renewable hydrokinetic energy.

Hydrokinetic energy is overlooked and untapped.
The Solution

Effective
- Patent-pending “Flipwing” turbine
- Generates renewable energy from water currents

Economical
- Costs less than other renewables
- Typical 5-year payback

Efficient
- Easy installation: no dams or construction
- Installed in artificial canals, requiring few or no permits

See video at www.youtube.com/hydrovolts
Background

Company Milestones
2007: Founded
2010: First funded
2010 (late): First sale
2011 (late): Shipping turbines
8 full time employees
3 prototypes demonstrated
1 utility patent filed, more coming
$1.3M raised from “angels” and corporations

Traction
Strong partnerships:
- University of Washington
- Woods Hole Oceanographic Institution
- Raytheon
- Harvard
3-time “Best Investment Opportunity” Winner
Sales inquiries from 18 countries
<table>
<thead>
<tr>
<th>Position</th>
<th>Name</th>
<th>Expertise</th>
<th>Highlights</th>
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<tbody>
<tr>
<td>CEO</td>
<td>Burt Hamner</td>
<td>30 years in marine, Cleantech &amp; Int’l Development</td>
<td>USAID; UN; WorldBank</td>
</tr>
<tr>
<td>CFO</td>
<td>Michel Goffin</td>
<td>20 years in banking &amp; finance</td>
<td>Atlas Accelerator</td>
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<tr>
<td>COO</td>
<td>Mike Layton</td>
<td>15 years in manufacturing and bus. development</td>
<td>Practicing attorney</td>
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<tr>
<td>Chief Engineer</td>
<td>Dr. Paul Curtis</td>
<td>25 years in designing &amp; manufacturing industrial systems</td>
<td>Founder and Principal of Kil-tel Systems</td>
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<tr>
<td>Engineer</td>
<td>Jim Snyder</td>
<td>20 years in engineering design</td>
<td>General Dynamics; Aerojet; REI</td>
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<tr>
<td>Business Development</td>
<td>Brian Williams</td>
<td>26 years in US Navy</td>
<td>SAIC; US Navy</td>
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</table>
Our Product

Floating turbine can generate 50W - 10 kW

- Compact
- Modular
- Scalable
- Simple

- Generator attached to turbine unit
- Floats with adjustable buoyancy in optimal flow

Anchor Cables

Power to local load or net metering

Rotor
Patent-Pending Innovation

- Submerged or surface
- Floats in place
- Operates in slow currents
- Easy to make, install, repair
- Range of sizes, blades
- Submerged generators are “secret sauce”

See video at www.youtube.com/hydrovolts
“Switchblade” Turbine

High-speed channels

Spillways and waterfalls

Slow steady channels

All channels and speeds
Class I Turbine – 100 to 1500W

“Class 1” switchblade turbine for portable micro-hydropower

US Navy Goal
- 100 watts
- 80 lb unit
- Man portable

June 2011: Produced 20 to 30 watts in canal tests
Class II Turbine – 1.5 to 9 kW

July 2010 Big Turbine Canal Demo: installed in five hours
Class III Turbine – 5 to 10 kW
Waterfall Turbine

- Pending sale Aug 2011 to West Sound Utility District Wastewater Treatment Plant in Port Orchard, WA

- $12,000 custom turbine produces 1 kW/hr @ 80% capacity

- Local energy utility providing significant rebate

- Other wastewater plants with 10x flow have asked for quotes: scalable solution
Customer Profile

Engineering entities that move water
  • No fish
  • Little debris
  • Few permits
  • Predictable water flow
  • Transmission line proximity
  • Multiple units per canal

Value Proposition
  • Can sell power – more revenue
  • Offset existing energy costs
  • Predictable clean energy
  • Source of remote power
# Value to Customer

<p>| | | |</p>
<table>
<thead>
<tr>
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<tbody>
<tr>
<td><strong>Purchase Price</strong></td>
<td>$40,000</td>
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<tr>
<td><strong>Turbine</strong></td>
<td>10 kW</td>
<td></td>
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<tr>
<td><strong>x Capacity</strong></td>
<td>80%</td>
<td></td>
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<tr>
<td><strong>= Output</strong></td>
<td>8.00 kW</td>
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Payback higher where alternatives cost more

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<tr>
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<th>Year 1</th>
<th>2...</th>
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<tr>
<td><strong>Hourly output</strong></td>
<td>8.00</td>
<td>8.00</td>
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<tr>
<td><strong>x Hours/yr</strong></td>
<td>8,760</td>
<td>8,760</td>
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<tr>
<td><strong>= Annual output</strong></td>
<td>70,080</td>
<td>70,080</td>
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<tr>
<td><strong>x Rate ($/kWh)</strong></td>
<td>$0.11</td>
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<tr>
<td><strong>Revenue/hr</strong></td>
<td>$7,709</td>
<td>$7,709</td>
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<tr>
<td>- <strong>Annual O&amp;M</strong></td>
<td>($1,000)</td>
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<tr>
<td><strong>= Annual Profit</strong></td>
<td>$6,709</td>
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Payback Period: 5.96 years

15 year lifetime

US Avg Rate (EIA)

Very conservative:
Does not include any financing measures (carbon credits; grants; incentives; etc)
Cheap, Dependable Power

Compare Electricity Cost / kWh:
- CA & NE > 16 cents
- UK renewables > 30 cents
- Global average: 17 cents
- Remote sites > 80 cents

Hydrovolts turbines achieve payback in less than 6 years around the world.
Our First Customer

When: Sept 2010
Who: $100M USA-based engineering firm operating hydropower and canals in India
What:
• $250K for 3 10kW turbines
• LOI for 400 more (10MW) after validation
• 400 @ $50k each = $20M
**Primary Market**

**Irrigation Districts in Western US**

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<tr>
<th>Description</th>
<th>Value</th>
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<tr>
<td>Districts (BUREC min)</td>
<td>400</td>
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<tr>
<td>Usable canal miles</td>
<td>20</td>
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<tr>
<td>Turbine spacing (/mi)</td>
<td>10</td>
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</table>

- Total turbines = \(80,000\)
- Avg turbine price = $20,000

\[\text{Market size} = \text{Total turbines} \times \text{Avg turbine price} \]

\[\text{Market size} = 80,000 \times 20,000 = 1.6 \text{ Billion}\]

Eastern US and International markets even larger
Expansion Markets

- Canals in Europe, India, SE Asia
- Thermal Power Cooling Water
- Wastewater Discharges
- Water purification
- Mining
- Military
- Pipelines
### Competition: Other Energy

<table>
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<tr>
<th></th>
<th>Cost</th>
<th>Ease</th>
<th>Reliability</th>
<th>Cleanliness</th>
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Hydrovolts’ micro-hydropower is the only renewable energy source that is inexpensive, *reliable*, clean, safe and easy.
Hydrovolts has the only cost-effective turbine solution specifically designed for man-made waterways.
What About Florida?

- Tidal channels should be ignored
  - Not enough useful power
  - Extreme permitting and stakeholder challenges

- Artificial water channels
  - Canal structures and concrete-lined channels
  - Large cooling water or wastewater discharges

- Offshore buoys and sensors
  - Use small turbines to power valuable sensors
  - Small turbines can have very high value
    - Good R&D and design application
| **Product**       | • New renewable energy tech powered by water  
|                  | • Drop in to millions of sites |
| **Customers**    | • Canal / system owners and operators  
|                  | • Everyone else near fast water |
| **Value**        | • Use power locally  
|                  | • Sell excess power to the grid  
|                  | • Make electricity and/or pump water  
|                  | • Create new local economies and jobs |
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