

## Mission Statement

*To proliferate use of our proprietary, high-efficiency, industrial scale controlled cavitation technology to address the deepening global environmental and economic crises of water and energy scarcity.*

## Introduction

History has shown that whenever humanity captures and controls a force of nature once thought of only as destructive – fire, wind, electricity, nuclear energy – a burst of technological advancement invariably follows.

Cavitation, the curious formation and collapse of powerful micro-bubbles that occurs in liquids, has long been the bane of engineers and scientists because of its power to destroy mechanical devices.

In a scientific first that will usher in a new age of industrial and commercial possibilities, Mitton Valve Technology Inc. has discovered a way to, capture and direct the powerful, highly localized force of cavitation to drive chemical reactions in fluids using only nominal energy input.

And while Mitton's wastewater remediation systems represent a flagship enterprise to suitably mark the dawn of The Cavitation Age of industrial waste treatment innovation, it by no means suggests the limits of this technology's potential. Beyond wastewater remediation in food processing, oil and gas production, black water remediation, and across the entire spectrum of industry, cavitation also offers incredible promise for everything from harvesting algal and cellulose bio fuels to creating designer chemicals for pharmaceuticals.

Just as the Dutch did with wind, the British did with coal and the Americans did with electricity and oil, Canada is poised to lead the world into a technological revolution – this time a *clean* tech revolution – that will be driven by the power of tiny bubbles and Canadian ingenuity.

## Size Growth and Market Attractiveness

Mitton is experiencing the perfect storm of innovation and opportunity, which just happens to be at the intersection of water and energy.

From a Toronto Globe & Mail article (August 12, 2012), **An Investment Theme Awash with Opportunity:**

*Over all, there's going to be more spending on water infrastructure over the next 20 years than on any other segment of the economy, including power production, said Khurram Malik, an analyst at Jacob Securities Inc. in Toronto. That spending - up to \$1-trillion (U.S.) a year - will create huge opportunities for companies in the water business, and their investors.*

*"If you look at the fundamentals of water over a long period of time, it's a great place to be," Mr. Malik said. "Compared to any other sector in the global economy, you're going to be hard pressed to find something with better macro fundamentals."*

The following points underscore the importance of addressing water scarcity – and the opportunity that accompanies the challenge:

- Only 1% of all the water resources on earth are available for human use
- In the 20<sup>th</sup> Century the world's population increased three-fold and water use increased six-fold and there is no NEW water
- 70% of our water is used for agriculture, 20% is used for business and 10% is for personal use
- 46% of all the people on Earth do not have water piped to their homes
- Within 15 years 1.8 billion people will live in danger zones of severe water scarcity

- Canadians and Americans use about 300 liters (80-100 gallons) of water a day
- One gram of PCBs can make one billion liters of water unsuitable for freshwater aquatic life
- One drop of oil can render 25 litres of water unfit for drinking

**Our opportunity lies in the Mitton Cavitation Reactor's ability to reclaim our world's water from industrial processes in a way that is scalable, durable and energy efficient.**

Mitton's patent protection opens the floodgates everywhere on the planet. The technology is protected under WIPO and is available in countries that honour WIPO registration.

With the decline of easy-oil supply and the onset of synthetic production to cover the spread, our global economy is now hard-pressed to satisfy its 85-million barrel-a-day (and growing) habit. Synthetic – or *manufactured* – oil is thirsty work that is unfortunately also water-dirty. For this reason, providing the energy sector – and the economy – with the means to recover and reuse water offers the promise of energy independence to regions that have alternative oil resources such as oilsands and shale oil.

In the context of alternative sources of oil, water *is* energy. The Mitton reactor is being recognized as the opportunity to *have your cake and eat it too*. Water to liberate domestic oil resources – that can be reclaimed to irrigate a farmer's field is bigger than the sum of its parts. It is the long sought after prospect of domestic energy independence.

As a low-energy solution in what will be an increasingly low-energy world, the Mitton reactor is the high-volume, high-efficiency water treatment process the world has been waiting for.

Add to the mix, the Mitton Cavitation Reactor's applications for harvesting of bio-oil, accelerating methane generation, facilitating carbon capture and sequestration through liquid entrainment/augmentation, and it paints a pretty picture for a team of organizations that have positioned Mitton for success.

With the support of R&D and distribution partners like RealTech Inc., Affiliated Distributors, and Rechner Sensors, Mitton stands poised to deliver massive disruption in two of the economy's most significant sectors: water and energy.

## History of Mitton Valve Technology Inc.

The Mitton Cavitation Reactor was conceived as a much more efficient, low maintenance replacement for complex automobile valve assemblies, but the inventor quickly discovered that the system's ability to induce cavitation without being destroyed itself held the promise of incredible process efficiency evolution across the entire spectrum of industry.

Mitton Valve Technology Inc. incorporated in June 2004 and is a wholly owned Canadian corporation. Created as a vehicle for the purpose of developing and marketing new cavitation technologies.

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|-------------|---|
| <b>2004</b> | Reactor originally engineered for automotive applications   |
| <b>2005</b> | Unique harmonic characteristics discovered  |
| <b>2006</b> | Experimentation with water, air and vacuum begins   |
| <b>2007</b> | Discovery of controlled cavitation process leads to focus shift from automotive sector to water remediation applications  |
| <b>2008</b> | Interest growing from leaders in oil and gas and industrial wastewater sectors  |
| <b>2012</b> | Secure two licensed manufacturer/distributors in waste water applications   |
| <b>2013</b> | Two license agreements (for industrial wastewater remediation applications) in 2013 – Winner of the prestigious <b>Deloitte Fast 50: Green 15 Technology™ Award</b> |

## Business Model

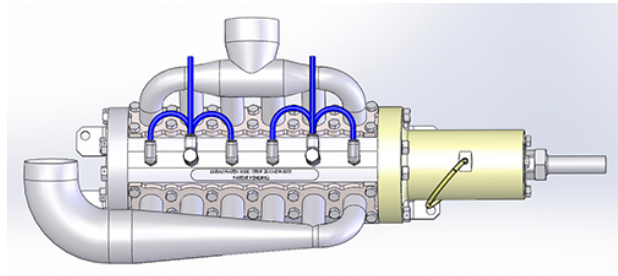
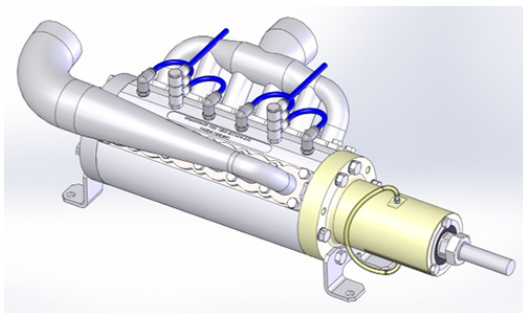
At present, Mitton Valve Technology and its partners have discovered 84 vertical markets of interest. Current focus is on applications for treatment of food waste effluent, rooftop chiller remediation, bitumen recovery from oilsands tailings, fractured shale oil flowback remediation and municipal black water remediation.

Mitton Valve Technology Inc. licenses its national, international and WIPO patent-protected technology through a 20-year licensing and minimum royalty guarantee model that empowers secure, sustainable, and profitable growth.

Through an innovative adoption model, Mitton empowers prospective license holders to use, test, and validate its technology on their own terms within the context of their own industrial processes. Then, all results are third-party assessed by an independent lab of the customer's choosing.

## The Technology

Cavitation, the formation of vapour bubbles of a flowing liquid in a region where the pressure of the liquid falls below its vapour pressure is a powerful force that has troubled scientists because of the damage it causes to mechanical devices operating in liquids.



The Mitton Cavitation Reactor has solved this problem to offer a simple, robust chemical reactor that requires very little energy to combine and separate

materials on a massive industrial scale. It can induce cavitation both under pressure and under a vacuum and can accommodate coarse, heterogeneous slurries that would present problems for most mechanical devices.

### Benefits Summary

- Resistant to the effects of the cavitation it generates
- Low energy use – treatment of 1000 Gallons with just 1 kW of energy
- Standard connections, easy portability and minimal footprint enable easy integration into existing processes
- Endemic Rechner sensor array and automation system optimizes and correlates variables such as motor speed, pressure/vacuum, acoustic frequency and flow rate while reporting them in real time to selected web interfaces
- Stackable design makes it upwardly scalable
- Easily processes sludges and slurries that would bog down other systems
- Can operate under both positive and negative pressure
- Can entrain gases into – or extract gases out of – suspension in liquids
- Intense molecular pressure, heat and shear enables emulsion breaking, cell lyses, hydroxyl radical generation and radical chemical design processes

### Specific Applications

The ability to induce and apply cavitation has lead to development of a number of applications including:

### Low-Energy Gas Extraction

Cavitation can be used to efficiently draw gases out of liquids.

- CO<sub>2</sub> extraction for sequestration and commercial repurposing
- Methane extraction for commercial repurposing
- Extraction of nitrogen, sulfur dioxide and any suspended gas as well as specific dissolved gases

### Low-Energy Gas Entrainment

Cavitation can be used to efficiently and homogeneously introduce gases into liquids at the molecular level.

- Dissolved Air Floatation
- Cavitation accelerated biodigestion
- Oil and gas augmentation by adding methane
- CO<sub>2</sub> and methane sequestration and commercial repurposing
- Introduction of gases in food, beverage and nutraceutical products
- Cavitated CO<sub>2</sub>/brine food preservation

### Low-Energy, High-Efficiency Cell Lysis

The intense forces generated by micro-bubble collapse and the resultant pressure differentials explodes (lyses) organic material at the cellular level.

- Algal lysis for biodiesel production
- Bacterial lysis for methane separation
- Bacterial lysis for sterilization
- Cell lyses for esters harvesting
- Emulsification of diesel fuel for more complete clean power development

### **Cavitation-Induced Emulsion Breaking (Shock Stratification)**

Even very fine and tightly bonded materials suspended in liquids rapidly separate into layers after passing through a Mitton Cavitation Reactor's harnessed cavitation field.

This presents various industrial opportunities:

- Emulsion breaking
- Recovery of bitumen from oil sands processing
- Recovery of ethanol from ethanol production waste
- Separation of oil from water in spill or crisis situations
- Harvesting of oil from spent coffee grounds, used cooking oil and other materials
- Breaking of long chain hydrocarbons for upgrading and cold-cracking

### **Designer Chemical Synthesis**

Harnessed cavitation can facilitate instantaneous, complete molecular bonding without snap-back for creation of unique chemicals in a broad range of industries including pharmaceutical.