

# Executive Summary

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## 1.0 EXECUTIVE SUMMARY

### 1.1 Introduction

**EnviroResolutions, Inc. (ENVI)** owns the exclusive worldwide rights to design manufacture and market the patented “ENVI-clean™” Scrubber System that provides a significant advancement in performance and cost-effectiveness for the treatment of industrial and commercial pollution. The Company’s ENVI-clean™ Scrubber System is designed to address varying profiles of pollutants and is scalable to service large and small pollutant streams.

The intellectual property central to all ENVI solutions is the ENVI-clean™ Scrubber. This device removes targeted gases and particulate matter from fluid streams. Unlike other wet scrubbers which use sprays and water droplets, ENVI’s technology mixes the hot exhaust gas and liquid into a highly turbulent mixing zone to produce a fine bubble distribution between the hot gas and the scrubbing liquid. This creates an unusually high surface area of contact between the exhaust gas and scrubbing fluid, which enhances transfer of particulate and targeted gaseous pollutants from the exhaust to the scrubbing fluid.

As a result of public pressure to save the environment, local and national governments in developed countries have responded with more restrictive air and water quality standards to which industry must respond. International initiatives, such as the Kyoto Accord, are also demanding improved environmental performance. The major obstacles confronting industry have been either the lack, or high cost, of technologies that will satisfactorily address the public’s desire for industry to reduce environmental pollution. The technology targets the reduction of sulphur dioxide (SO<sub>x</sub>), particulate matter emanating from combustion streams.

The ability of EnviroResolutions’ Scrubber to remove several of the major causes of air pollution has attracted global interest from key industry participants, associations, as well as various levels of government.

The market potential for ENVI’s technology is vast and varied. The Company is initially targeting three specific applications in its first 3 years of operation;

- **Diesel Emissions** – Applications for large displacement engines such as stationary generators, compressors, container handling, heavy construction and mining equipment.
- **Coal Fired Industrial Plants** – Removing particulate and sulphur emissions from the exhaust stream will improve air quality, human health and substantially reduce acid rain.
- **Large Scale Animal Farms** – ENVI’s technology targets the reduction of odor from hog farms and slaughter houses by removing sulphur and ammonia from barn air and animal waste in a closed system. It then processes the solid material to produce dry fertilizer pellets for crops or solid fuel for commercial burners producing heat or electricity.

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The ENVI-clean™ Scrubber System has been designed for the following reasons:

- There are large markets in all industrialized nations;
- The cost of the Scrubber is competitively inexpensive to operate;
- The Scrubber is very energy efficient;
- Potential competitors are not able to remove SO<sub>x</sub>;
- The Scrubber design can be adapted to many industrial applications;
- The Scrubber is scalable, which allows ENVI to service large industrial exhaust streams.

## **1.2 Market Opportunities**

### **1.2.1 Diesel Emission**

Diesel engines are the workhorses of industry and commerce. They power trucks, buses, ships, locomotives and a vast range of equipment including power generators, pumps and compressors. The fuel burned by diesel engines determines the polluting contaminants contained in the exhaust. In North America, the EU, Japan and Korea the environmental regulations require the use of low or ultra low sulphur fuels in diesel engines. In other populous areas including Mexico, China, India, Malaysia and Indonesia the sulphur content ranges up to 200 times greater which contributes to regional health issues and global greenhouse gas emissions.

ENVI's technology can virtually eliminate sulphur emissions (99% +) and decrease particulate matter by up to 85%. Targeted installations include large displacement diesels in applications such as stationary generators, natural gas compressors, mining equipment and container-handling equipment servicing port facilities. Through its website, ENVI has received requests for distributorships for many of these applications from interested parties around the world.

### **1.2.2 Coal Fired Industrial Plants**

This market is comprised mainly of plants that generate electricity or produce products such as steel and lime, while utilizing coal as a fuel source.

Electrical power is an essential component of modern life and is in short supply in developed nations. Costs are skyrocketing, brownouts are occurring and governments are following through with legislation to supply the demand in an environmentally acceptable manner. Nuclear power has disposal problems and is perceived as potentially dangerous. Hydroelectric power is clean but is devastating to fish and wreaks havoc on the environment. Oil and gas prices are increasing rapidly and reserves are volatile, uncertain and politically unreliable. Coal continues to be the world's major fuel source for the production of electricity and there are vast reserves of coal throughout the world. For example, 57% of U.S. electricity is produced using coal. In Alberta, Canada it is 75% and in China 80%. However, coal is considered a dirty fuel, producing particulate pollution and acid rain. As the price of oil continues to rise, the use of coal to produce electricity continues to increase.

ENVI's Scrubber is capable of being scaled to handle the largest coal combustion facilities. The removal

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of  $\text{SO}_x$  and particulate from exhaust streams will contribute immensely to cleaner air. The ENVI-clean™ Scrubber has significant application in emerging nations such as China and India where most of the power is generated using low grade (high sulphur) coal-fired power plants.

## **1.2.3 Large Scale Animal Farms**

There are approximately 70 million hogs, 100 million cattle and 1.4 billion chickens in North America generating approximately 160 million tons of liquid manure each year. In the U.S. there are 4,800 hog operations each with a minimum of 5,000 hogs and in Canada there are 500 operations holding over 3,000 hogs each.

Hog farms have the highest concentration of waste when compared to chicken and cattle farms. Nine companies operate the vast majority of large-scale hog farms in North America. This market is under intense government pressure to implement a solution to their pollution problem and is eager to find a viable alternative to open air lagoons. For example, the Attorney General's office of North Carolina has agreements with a number of companies operating large-scale hog farms, agreeing that they will adopt a solution to eliminate their "lagoons" as soon as an alternative exists. Other "hog farm" states have followed suit.

Currently hog farms pump their waste into a central "open air lagoon". This creates a number of problems. The air pollution problem, primarily ammonia and sulphur, causes land values to decrease and attracts negative and sometimes aggressive objections from neighboring communities regarding the foul odor. The solid and liquid waste, containing bacteria and other potential toxins, often seeps or overflows into the ground water causing significant health risks and further damage to the ground-water in the surrounding area. EnviroResolutions' ENVI-clean™ Scrubber will eliminate these lagoons and the damage and problems associated with them. We will create a hog farm facility with "clean" air, water and soil.

EnviroResolutions has designed a self-contained system for the factory animal industry, that:

- has an ammonia removal efficiency of over 96%;
- removes solids and nutrients from waste in the form of a dry fertilizer or fuel;
- returns water to the operation for reuse in the barn clean-up.

## **1.3 Field Trial Results of Core Technology**

The same technology that ENVI plans to commercially exploit has been successfully field-tested with excellent results. There was a six-week trial of the Scrubber on a diesel generator aboard the Canadian Coast Guard Icebreaker, Louis S. St. Laurent. The pilot test showed the following impressive results:

- Particulates - removal rate of 70 – 85%
- $\text{SO}_x$  – removal rate of more than 95%
- $\text{NO}_x$  – up to 20% reduction

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ENVI's technology has also been field-tested in a paper mill resulting in a reduction of the odor plume radius from 10 miles to only 1 mile.

## **1.4 Approach to Scrubber Commercialization**

### **1.4.1 Scrubber Testing**

The Company has tested its Scrubber design and constructed updated working models to be tested on its Cummins diesel generator. ENVI has hired a Research Director and continues to use the services of RWDI AIR Inc. consulting engineers to assist with development of test protocol.

The testing completed to date has provided information which will enable the ENVI to scale its Scrubber design to accommodate large displacement diesel engines and small coal plants. Ongoing testing has been developed to optimize the operating parameters and test each component for durability. As more information is gathered, design alterations can be considered which include the use of alternative materials such as plastics and resins, simplification of the components and improved flexibility to ease installation in confined spaces.

Electronic monitoring controls have also been developed and are operating during current tests. The process of testing and updating is ongoing. The present results are sufficient to allow the ENVI to look for field-tests with companies interested in purchasing multiple Scrubbers.

### **1.4.2 Field Tests**

Field-tests will be conducted with companies who have agreed to purchase a quantity of Scrubbers upon successful completion of performance testing, deliverables, and final price agreements. Candidates will be selected from unrelated industries to diversify the range of potential applications. For logistics reasons, the field-test candidate firms in North America will be given greatest consideration.

### **1.4.3 Approach to Product Marketing**

Following the placement of orders based on initial field trials, ENVI plans to pursue contacting other firms in the industry through a network of "Introductory Agents." The Company is currently dealing with highly qualified candidate companies around the world to fulfill this function. The use of regional agents and their relationships will provide the Company with immediate customer contacts.

At present the Company is pursuing opportunities with large displacement engines used on industrial equipment. Stationary diesels are used for primary and backup power generation, for compressors servicing natural gas pipelines, and for pumps on irrigation networks and dykes protecting low lying areas. These engines produce up to 3500 HP. The ENVI technology is capable of scaling its products to remove the particulate and sulphur compounds emitted by these engines.

Other large displacement diesel engines are used in non-road equipment such as cranes and lifts servicing container ports, heavy mining and construction machinery. EnviroResolutions is confident that its technology will meet the needs of these industry segments and provide a significant advancement in pollutant control.

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In addition to diesel engines, the Candidate Agents have been universal in their desire to represent ENVI's interests with owners of coal-fired power plants. ENVI therefore plans to implement product development of its ENVI-clean™ Scrubber System for coal-fired furnace exhaust systems following establishment of a customer base for its diesel engines.

#### **1.4.4 Approach to Manufacturing, Installation and Service**

ENVI plans to have the Scrubber components manufactured by the most qualified firms and delivered to an assembly facility. Initially the assembly will be done near ENVI headquarters to insure quality control. ENVI representatives will oversee the installation of the ENVI-clean™ Scrubber System with local fabricators.

As the volume of interest in diesel Scrubbers grows, ENVI plans to license the assembly to regional manufacturers. ENVI has expressions of interest to perform this function from several of the agency candidate firms. These firms will also carry parts, provide field service and ultimately conduct installations on behalf of ENVI.