SDTC SUCCESS STORY

COMPANY NAME: **HIFI ENGINEERING INC.**
PROJECT NAME: **PIPELINE MONITORING USING HIGH FIDELITY FIBER OPTIC SENSORS**

SUSTAINABLE DEVELOPMENT TECHNOLOGY CANADA

CELEBRATING 15 YEARS

Company Location:	Calgary, Alberta
Key Products/Services:	Preventative pipeline leak detection
Operating Since:	2007
SDTC Support:	2014 - present
Vision:	To become the world-class standard for intelligent monitoring of pipelines supporting the achievement of 100 per cent safety in the industry.
Consortium Partners:	General Electric Enbridge Inc.
SDTC Funding:	$2,000,000
Leveraged Funding:	$3,926,220
Total Project Value:	$5,926,220
For more information:	**www.hifieng.com**

"We feel the support that SDTC and the Government of Canada have provided us has absolutely accelerated Hifi's ability to develop and commercialize our HDS technology. This next-generation platform sensitivity and fidelity is going to enhance the energy industry's future and achieve the goal of 100 per cent safety."

Steven Koles
President & CEO
Hifi Engineering

HIFI ENGINEERING'S PIPELINE MONITORING PROJECT USING HIGH FIDELITY FIBER OPTIC SENSORS:

At a Glance

Building off its success developing periodic-monitoring technology for oil and gas wellbores, Hifi Engineering is developing a continuous monitoring system for oil and gas pipelines that will quickly identify and characterize low-level leaks in new and existing pipe. Using specially designed fiber optic cables installed beside or even within pipelines, Hifi is able to monitor up to 100 kilometres of pipeline at a time with a single system on a continuous basis and is focusing initial market rollout of its technology to environmentally sensitive or densely populated areas.

At Sustainable Development Technology Canada (SDTC), we fund Canadian cleantech projects and coach the companies that lead them as they move their ground-breaking technologies to market.

SDTC builds Canada's economy by investing in its entrepreneurs and enabling the development of clean technologies. Our funding supports the development and pre-commercial demonstration of clean technology innovations.

Funded by the Government of Canada | Canada

KEY FACTS

Between 2002 and 2013, Canadian Energy Pipeline Association member companies transported oil and natural gas with a

99.999%

SAFETY RECORD.

Hifi's sensing technology has been deployed in over

1,000

WELLS IN NORTH AMERICA.

OVER

800,000

KILOMETRES

of pipeline comprise the Canada-wide network of natural gas, crude oil and natural gas liquids pipelines.

Sensitivity increase using Hifi's HDS technology is

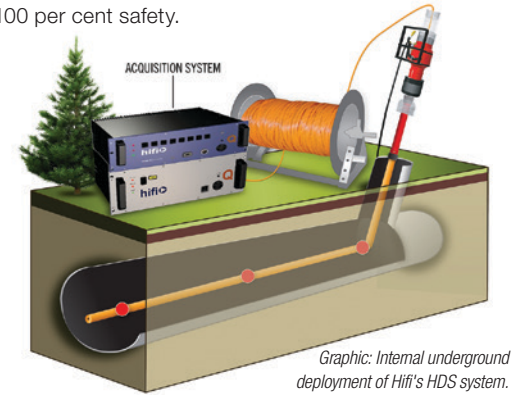
200

TIMES GREATER

than using conventional monitoring technologies.

The Opportunity

Every day, a Canada-wide network of more than 800,000 kilometres of natural gas, crude oil and natural gas liquids pipelines—from big-inch transmission systems stretching from Alberta to Ontario and beyond, to smaller feeder pipelines connecting producing wells to regional and national pipeline grids—carry more than three million barrels of oil equivalent of crude oil, liquids and natural gas. The industry's leak record is unparalleled, with 99.999 per cent of the products moved arriving safely at their destination. The small minority of leak incidents, however, can cause major public relations headaches for pipeline companies, particularly if leaks go unnoticed for a period time. More robust pipeline monitoring and leak detection technologies could make such occurrences a thing of the past, and move the industry to its long-term target—100 per cent safety.



Graphic: Internal underground deployment of Hifi's HDS system.

Project Overview

Photo: Hifi's technology is presented at GE's demonstration space.

For a number of years, Calgary-based Hifi Engineering has been providing high fidelity dynamic sensing (HDS) on a one-time basis to oil and gas producers, enabling them to analyze conditions in oil and gas wellbores. With advances in optical technology development, Hifi's proprietary fiber optic cable is used as an actual sensor, with the ability to continuously measure parameters such as acoustic energy, temperature, strain and vibration along the fiber with very high precision. The capability of continuously and simultaneously gathering this parameter-based data over several kilometers of fiber is called distributed monitoring. By installing Hifi's fiber optic line directly along a pipeline, critical services such as leak detection and prevention, asset and perimeter security, and precise fluid-flow measurements are made possible.

The Technology

The HDS platform can monitor acoustic energy, temperature, strain and vibration along the full length of the line, and deliver real-time, continuous monitoring at the speed of light. In this respect, it represents a step-change improvement over traditional flow-meter monitoring, which has been in place for more than 25 years, but has significant limitations with respect to accuracy and timeliness. The challenge in distributed monitoring, however, has been making sense of the data captured by the fiber, ensuring it is, in fact, real-time data and guaranteeing its accuracy and results. To be effective and useful, the data needs to be strong and clear, and delivered with high fidelity.

Hifi's HDS system—estimated at 200 times more sensitive than conventional monitoring technologies—includes the Hifi fiber-optic-sensing cable, an optical computing platform that receives the data from the cable, and an intuitive, easy-to-use software dashboard that allows clients to understand, characterize, visualize and generate reports of all data, in real time.

Refining the Technology

In 2014, Hifi Engineering set out to refine its HDS system for permanent monitoring applications for underground pipelines. The process began with rigorous testing where Hifi's technology was tested against other competing platforms to monitor and detect leaks in various lab and field based tests. Hifi has achieved 100 per cent success in all these tests, which were undertaken by a number of pipeline operators.

Since the summer of 2015, Hifi Engineering has been rolling out its HDS system, in various pilot projects, commercial pilots and commercial installations, a number of which are now in place. While the goal of the system is to provide 100 per cent pipeline safety, Hifi's HDS monitoring system provides other benefits as well. Payback analysis suggests the system will pay for itself in less than a year by preventing incidents from evolving into leaks; while operational monitoring of flows, density changes, volumes of flow and the health of pumps provide advantages that are less about safety and more about operational efficiency.