GMV/Russia Oil Pipeline Monitoring

Proactive monitoring mitigates oil pipeline theft and spills

Russia is one of the world’s largest producers of oil, producing an average of 10 million barrels per day, 12 percent of the world’s total. It is one of the country’s largest and most lucrative industries, creating jobs and generating large profits through exports, primarily to Europe. The oil is transported via a network of more than one million miles of pipeline that is old and vulnerable to spills and theft.

Inadequate and vulnerable infrastructure

Strong economic growth in Russia has been driving demand for energy, particularly oil. However, the oil industry’s infrastructure is aging and in need of tremendous investment to keep pace. Currently, the system is strained and insufficiently monitored, resulting in unacceptable levels of spills and theft. The Interior Ministry recently reported that nearly $6.5 million of crude—15,000 metric tons—was stolen via the tapping of pipelines and storage tanks in the Kalmykia and Astrakhan regions. This is just one of a recent rash of large-scale thefts.

A proactive strategy

Satellite imagery and GIS have long been used to create environmental maps and digital relief models to determine ideal placement of potential pipeline routes. Given the recent rises in theft, however, primarily through illegal taps and spillage from aging pipelines, satellite imagery is now being deployed to proactively detect changes in pipeline characteristics that may signal future problems. It is an area that DigitalGlobe information partner GMV, a worldwide technology and engineering consultancy, is embracing.

“Satellite imagery and related technologies have long been used to help build and monitor pipelines from an economic and environment perspective,” says Maria Julia Yague Ballester, Project Manager for GMV. “But the problem of illegal taps and an aging pipeline infrastructure is causing the industry to better use technology to develop strategic plans to proactively respond to these growing problems.”

Company information

GMV, a DigitalGlobe information partner, is a worldwide technology and engineering consultancy offering solutions in aeronautics, banking and finance, oil and gas, space, defense and transportation.
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A comparative approach

The losses from illegal taps and minor spills are not easily detected, but can add up over time. GMV was tasked to pilot and develop an ongoing monitoring system for a 64-kilometer stretch of pipeline, a solution that could be replicated on a large scale.

“An unacceptable amount of oil is being lost,” Ballester says. “The ground along the pipelines is generally saturated with oil making change detection difficult. Additionally, the low temperatures frequently found in Russia lower evaporation rates, so small-scale flow changes can easily go undetected.

“DigitalGlobe WorldView-2 proved to offer an excellent solution due to the quality and availability of the imagery,” Ballester continues. “The down-to-earth level detail provides the operative insight to develop strategic plans to more proactively identify and respond to problems.”

A strategy with vast implications

Given the role oil plays in the world economy and the environmental impact and high cost of oil spills, a proactive strategy to consistently monitor existing pipeline that combines high-resolution satellite imagery with spectral information and that can be applied worldwide has broad implications for the industry.

“When looking at the overall cost of these events, not only from the loss of product and revenue, but from the perspective of insurance claims, legal matters and environmental damage, the implications of small-scale spills and theft are huge. Tools like the WorldView-2 imagery and its vast image archive, combined with best-practice use of spectral data, could become a model with worldwide application.”

MARIA JULIA YAGUE BALLESTER, PROJECT MANAGER
PAYLOAD DATA PROCESSING AND APPLICATIONS BUSINESS UNIT, GMV

Challenge

To monitor a 64-kilometer stretch of aging oil pipeline in Russia, create a broad, repeatable methodology to monitor the smallest changes in flow to proactively detect illegal taps and small spills.

Solution

DigitalGlobe WorldView-2, with its readily available, cost-effective, high-resolution imagery and extensive image library, proved to be the ideal choice for DigitalGlobe Alliance partner GMV.

Results

The GMV solution combined high-resolution satellite imagery with best-practice use of spectral data to create a prototype solution that can be easily replicated on a large scale.

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