

Geophysical Surveying & Mapping Services

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NAICS CODES: 541360

SIC CODES: 1382, 8713

Industry Overview

Companies in this industry gather, interpret, and map geophysical data. Major companies include ION Geophysical, Global Geophysical Services, and NuTech Energy Alliance (all based in the US), as well as TGS-NOPEC and Petroleum Geo-Services (both based in Norway), WesternGeco (the UK), and Logan International (Canada).

Worldwide, oil and gas exploration drives demand for geophysical surveying and mapping services. To meet growing demand and make up for depletion of existing oil sources, new oil reserves must be discovered. The largest oil and gas producing areas of the world include Saudi Arabia, Russia, the US, Canada, and Iran, according to Rystad Energy.

The US geophysical survey and mapping services industry includes about 1,000 establishments (single-location companies and units of multi-location companies) with combined annual revenue of about \$3 billion.

Competitive Landscape

Demand is driven by oil and gas exploration activity. The profitability of individual companies depends on their ability to maintain a steady flow of contract work. Large companies enjoy economies of scale in purchasing and administration, as well as the ability to serve major clients from multiple locations. Small companies can compete by specializing in a specific geography or survey type. The industry is **highly concentrated**: the 50 largest companies account for about 90% of revenue.

Products, Operations & Technology

Major services include geophysical **data collection** (about 50% of industry revenue), geophysical data sales (about 20%), and integrated geophysical services (about 15%).

Establishments in this industry typically specialize in locating and measuring **subsurface resources** such as oil, gas, and minerals. They also conduct surveys for engineering purposes. Survey data is often used by oil and gas exploration and production companies to generate high-resolution **two-dimensional (2D)** and **three-dimensional (3D)** images of the earth's surface and subsurface. Major survey types include magnetic, gravity, seismic, electrical, and electromagnetic. Surveys are conducted outdoors and are subject to seasonality. Companies can move equipment and crews to different regions and countries to minimize the impact of poor weather conditions and seasons.

Employees are highly skilled and must operate equipment and provide technical services and support for clients. Equipment is highly technical and new technologies or product introductions often require companies to make large investments to upgrade or expand capabilities. While companies often own **fleets of survey vessels**, computers, and software, they also may rent certain pieces of equipment for specific projects.

Surveys can be conducted on land or in water. Land surveys are carried out by a crew of up to 100 people who are equipped with special measuring devices. For example, a typical land seismic survey will deploy a crew who buries **geophones** in the ground. Cables then connect the geophones to a fleet of hydraulic vibrator trucks. However, explosives also may be detonated in holes to create a vibration. Receivers then record signals reflected from subsurface strata. A typical land seismic survey team consists of at least one party manager, one instrument

operator, head linesmen and several crew members.

Marine surveys typically involve large ships that tow streamer arrays, which contain sensors used to gather data. Or in shallow water, cables are placed on the ocean floor and attached geophones and **hydrophones** are used to collect data.

Technology

Survey and mapping companies are typically technology-focused and provide sophisticated planning and processing services and software. Significant advances in seismic data technologies have allowed survey companies to improve efficiency and data acquisition. As a result, oil exploration and production has increased.

Most recently, **four-dimensional (4D) imaging technology**, also known as **time lapse seismic**, has helped advance the industry. 4D seismic data incorporates traditional 3D seismic surveys taken over a period of time. The data can help measure the flow of hydrocarbons and the composition of fluids in a particular reservoir. 4D seismic data also can help geologists determine how a reservoir will react if gas is injected or if water flooding can help locate untapped pockets of oil or gas.

Sales & Marketing

Typical customers are **oil and gas** exploration and production companies. Many companies rely on a small number of significant clients. Also, a large portion of revenues can come from a single, large project.

Major types of marketing include trade publications, trade shows, customer visits, and advertising. Companies typically sell their services and products through a **direct sales force** of employees and sometimes hire third-party sales representatives to focus on international markets.

Clients typically request bids for proprietary surveys, and companies must complete a **competitive bidding process** to win contracts. Companies also may generate multi-client revenues by licensing "on-the-shelf" survey data, also known as **data libraries**. Access to this data is granted to clients on a non-exclusive basis.

Finance & Regulation

Geophysical surveying and mapping companies rely on the spending patterns of oil and gas exploration companies, which depend on oil and natural gas prices. Demand for survey company services increases when **commodity prices** are high. Low commodity prices lead to lower demand for survey work, and that impacts financial condition and cash flow. The volatile nature of the business makes it difficult to predict working capital needs. The timing of projects and clients' ability to make payments can at times create the need to obtain additional financing.

Working Capital Turnover by Company Size

The working capital turnover ratio, also known as working capital to sales, is a measure of how efficiently a company uses its capital to generate sales. Companies should be compared to others in their industry.



Regulation

The industry is not directly regulated, but operations are subject to various federal, state, and local laws pertaining to **environmental protection** and hazardous waste disposal. Seismic survey companies that use explosives in the data collection process also are subject to laws and regulations by the Bureau of Alcohol, Tobacco, Firearms and Explosives (BATFE).

Regulations inhibiting the use of **hydraulic fracturing**, or fracking, have been tied up in legal proceedings. Fracking is the fracturing of rock by pressurized liquid in the well drilling process. Employed in shale formations, fracking in recent years has enabled companies to produce significant amounts of oil and gas that previous drilling in the same fields had not recovered. However, fracking also has been criticized for contaminating water sources. Restrictions on fracking could impact demand for survey companies.

International Insights

Worldwide demand for geophysical surveying and mapping services is driven by oil and gas exploration and production activity. To meet growing demand and make up for depletion of existing oil sources, new oil reserves must be discovered. Exploration and production companies must continue to access reservoirs in previously undiscovered or hard-to-reach areas. Geophysical survey companies can use newer, high-resolution technology to increase production and identify new reserves and drilling sites.

Top geophysical survey and mapping companies based outside the US include TGS-NOPEC and Petroleum Geo-Services (both of Norway), WesternGeco (the UK), and Logan International (Canada). Many US-based companies have international operations and derive a significant amount of revenue from international sales.

The largest oil and gas producing areas of the world include Saudi Arabia, Russia, the US, Canada, and Iran, according to Rystad Energy. However, survey companies often find the most opportunities in emerging markets, where there may be reserves waiting to be discovered. Overall, the world has about 2 trillion barrels of undiscovered oil.

Regional Highlights

Geophysical surveying and mapping companies are typically concentrated in areas where oil and gas exploration is most active. In the US, industry operations are concentrated in [Texas](#), [Oklahoma](#), [Colorado](#), [California](#), and [Florida](#).

Technical advances in horizontal drilling also have opened up the ability to produce and explore in areas of the US with unconventional resource plays such as shales. Major shale plays are located across Texas, Pennsylvania, Oklahoma, Wyoming, Colorado, North Dakota, and Nebraska.

Human Resources

Large geophysical survey and mapping companies often work as general contractors on projects and often hire many subcontractors to carry out specific duties. Competition for skilled contractors is usually intense.

Geophysical surveyors must work outdoors in many types of terrain to mark sites for subsurface exploration. Marine or hydrographic surveyors work on ships to survey harbors, rivers, and oceans. They help determine topography and water depth, or identify hazardous features along the water bottom and shoreline.

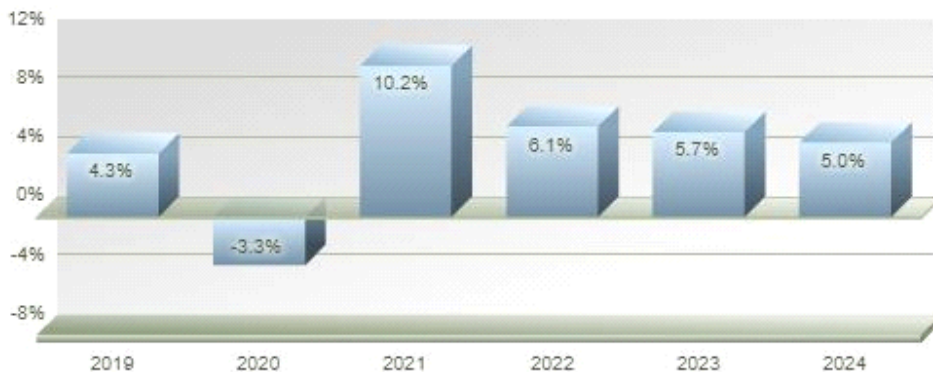
Many employees in the industry are highly trained and skilled, and average pay in the US is slightly higher than the national average. Most geophysical surveyors have bachelor's degrees. All states require that surveyors be licensed before they can certify legal documents. However, survey technicians are not required to be licensed. To receive a license, surveyors usually must pass exams and gain work experience under a licensed surveyor.



Demand: Depends on oil and gas activity
Need ability to win contracts
Risk: Competitive pressure

Industry Forecast

Domestic demand for architectural and engineering services, which includes geophysical surveying and mapping services, is forecast to grow at an annual compounded rate of 6% between 2020 and 2024. Data Published: July 2020



First Research forecasts are based on INFORUM forecasts that are licensed from the Interindustry Economic Research Fund, Inc. (IERF) in College Park, MD. INFORUM's "interindustry-macro" approach to modeling the economy captures the links between industries and the aggregate economy. [Forecast FAQs](#)

Industry Drivers

Changes in the economic environment that may positively or negatively affect industry growth.

Data provided by First Research analysts and reviewed annually



Construction Spending Change in the overall level of commercial and residential construction spending



Technology Innovation Advances in science and technology, including information technology

Critical Issues

Reliance on Oil and Gas Exploration - Many geophysical survey and mapping companies derive a significant portion of their revenues from oil and gas exploration and development companies. Volatility in oil and gas prices can impact demand for survey services. While increases in crude price levels typically increase demand, lower prices can mean oil and gas companies will cut spending and reduce exploration. Also, any increased regulations imposed on the oil and gas industry can impact demand for survey services. For example, following the explosion

and leak of the Deepwater Horizon drilling rig in the Gulf of Mexico, the US government implemented a six-month moratorium on offshore drilling activities.

Intense Competition - Competition among geophysical surveying companies is intense. Most contracts are awarded through a competitive bidding process. Competitive factors include price, crew experience, equipment availability, technological experience and resources, and reputation. Companies with superior financial resources, greater market share, and well established relationships can edge out competition.

Business Challenges

Rapid Technological Changes - The industry is characterized by quickly changing technology. New equipment and software updates can render companies obsolete or require companies to make costly investments to remain competitive. In addition to investing in equipment manufactured by third parties, companies also must invest in the development of their own technology.

Volatile International Markets - Many US-based companies earn a significant amount of revenues from international operations (up to 80%, in some cases). Those companies may face US export restrictions, which could impact their ability to complete sales. Also, certain international areas are subject to risks such as war, civil disturbances, or economic or legal sanctions. Sales and operations can be impacted if there is any disruption in oil and gas exploration activities.

Need for Highly Skilled Personnel - Geophysical survey companies depend on a small pool of highly-trained professionals that operate and provide technical services. High demand within the industry often creates a lack of available qualified workers. Companies rely on their abilities to attract and retain talented personnel to remain competitive within the industry.

Business Trends

Energy Demand - To meet the growing demand for oil, exploration and production companies are interested in accessing smaller, deeper, and generally harder-to-find hydrocarbon reservoirs. Technological advances in drilling techniques have allowed for the discovery of oil and natural gas in shale, tight gas, and oil sand formations. Existing fields that have been surveyed using older technologies can be "re-shot" with new high-resolution technology.

Advances in Technology - Seismic data technologies and processing capabilities have improved the efficiency of data acquisition and also improved the usefulness of the data. New technology such as cable-free nodal recording equipment is revolutionizing the industry by improving imaging and making survey work more automated. Higher density 3D and multicomponent seismic data also are advancing the industry. Additionally, new 4D time lapse technology that can help geologists visualize the flow, pressure, and saturation of a reservoir has expanded survey data from not just being an exploration tool, but also a production and monitoring system.

Customer Consolidation - During the past decade, traditional seismic contractor customers have been consolidating at a rapid pace. As a result, demand also has shrunk to an even smaller pool of potential clients. The merger, loss, or divestiture of any activity among oil and gas companies can impact results for a survey company.

Industry Opportunities

Mapping for Wind Projects - As the offshore wind energy market expands in North America, geophysical survey crews will be in demand. Hydrographic surveys must be conducted as part of the development process to properly map the ocean floor and determine where and if giant wind turbines can be placed. While many countries around the world have already developed large offshore wind farms, the US has been slower to enter the market.

Multiclient Services - In addition to proprietary services, survey companies may offer data acquisition services in a multiclient structure. Multiclient surveys are typically paid for by the survey companies up front and then clients are granted access to a "data library" for a fee. The survey data is licensed or sold on a nonexclusive basis. Some larger companies are focused on expanding their multiclient data libraries and including new surveys of oil and gas basins that their clients believe have the highest potential for development.

Assistance from Drones - As companies search for resources in harder-to-reach, far flung areas of the world,

survey companies are exploring new techniques to be able to collect data from hazardous terrains. One option is unmanned aircraft, or drones. For example gold prospectors can quickly map huge stretches of land using drones looking for mineral deposits. Drone use is typically less expensive and safer than deploying a ground crew. The process also can leave less of an environmental impact. Certain regulations initially slowed drone use. However, demand for small drone operations has risen as the Federal Aviation Administration's rules for unmanned aircrafts have grown more flexible.

Financial Information

COMPANY BENCHMARK TRENDS

Quick Ratio by Company Size

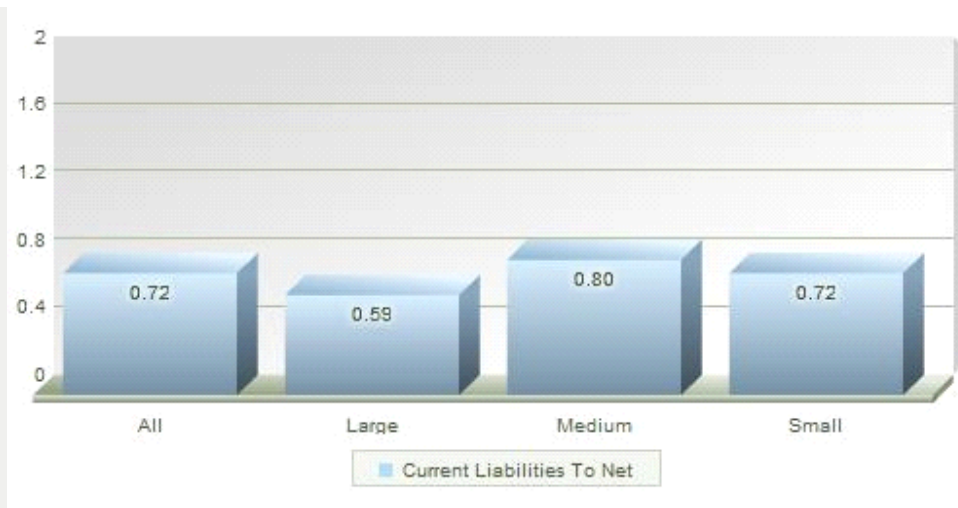
The quick ratio, also known as the acid test ratio, measures a company's ability to meet short-term obligations with liquid assets. The higher the ratio, the better; a number below 1 signals financial distress. Use the quick ratio to determine if companies in an industry are typically able to pay off their current liabilities.



Financial industry data provided by MicroBilt Corporation collected from 32 different data sources and represents financial performance of over 4.5 million privately held businesses and detailed industry financial benchmarks of companies in over 900 industries (SIC and NAICS). More data available at www.microbilt.com.

Current Liabilities to Net Worth by Company Size

The ratio of current liabilities to net worth, also called current liabilities to equity, indicates the amount due creditors within a year as a percentage of stockholders' equity in a company. A high ratio (above 80 percent) can indicate trouble.



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COMPANY BENCHMARK INFORMATION

NAICS: 541360

Data Period: 2018

Last Update February 2020

Table Data Format

Mean

Company Size	All	Large	Medium	Small
Size by Revenue		Over \$50M	\$5M - \$50M	Under \$5M
Company Count	1497	1	14	1482

Income Statement

Net Sales	100%	100%	100%	100%
Gross Margin	40.4%	36.7%	36.2%	42.5%
Officer Compensation	4.1%	3.1%	3.2%	4.5%
Advertising & Sales	0.2%	0.1%	0.2%	0.2%
Other Operating Expenses	34.2%	31.6%	31.3%	35.7%
Operating Expenses	38.5%	34.8%	34.7%	40.4%
Operating Income	1.9%	1.9%	1.5%	2.1%
Net Income	0.9%	0.8%	0.7%	0.9%

Balance Sheet

Cash	19.1%	12.9%	19.5%	20.4%
Accounts Receivable	11.3%	15.6%	14.5%	9.1%
Inventory	2.2%	2.2%	2.5%	2.0%

Total Current Assets	41.7%	41.5%	46.0%	40.1%
Property, Plant & Equipment	34.4%	30.3%	31.1%	36.6%
Other Non-Current Assets	23.9%	28.2%	22.9%	23.4%
Total Assets	100.0%	100.0%	100.0%	100.0%
Accounts Payable	12.7%	9.6%	13.0%	13.3%
Total Current Liabilities	30.2%	27.5%	32.7%	29.8%
Total Long Term Liabilities	27.6%	23.1%	26.0%	29.2%
Net Worth	42.3%	49.5%	41.3%	41.0%

Financial Ratios

(Click on any ratio for comprehensive definitions)

Quick Ratio	1.02	1.04	1.05	1.01
Current Ratio	1.38	1.51	1.41	1.34
Current Liabilities to Net Worth	71.4%	55.5%	79.2%	72.7%
Current Liabilities to Inventory	x13.84	x12.72	x12.88	x14.61
Total Debt to Net Worth	x1.37	x1.02	x1.42	x1.44
Fixed Assets to Net Worth	x0.81	x0.61	x0.75	x0.89
Days Accounts Receivable	14	26	19	11
Inventory Turnover	x78.25	x64.37	x70.36	x85.62
Total Assets to Sales	35.0%	45.4%	35.8%	33.0%
Working Capital to Sales	4.0%	6.4%	4.8%	3.4%
Accounts Payable to Sales	4.4%	4.3%	4.6%	4.3%
Pre-Tax Return on Sales	1.4%	1.3%	1.1%	1.5%
Pre-Tax Return on Assets	4.0%	2.8%	3.2%	4.6%
Pre-Tax Return on Net Worth	9.5%	5.7%	7.8%	11.2%
Interest Coverage	x2.26	x1.08	x0.96	x4.60
EBITDA to Sales	2.0%	1.9%	1.6%	2.1%
Capital Expenditures to Sales	0.7%	0.8%	0.7%	0.7%

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VALUATION MULTIPLES

No valuation multiples available for this industry.

Industry Websites

American Geophysical Union (AGU)

Member organization of geophysical scientists.

Canadian Association of Geophysical Contractors

Canadian trade association, news, trends.

International Association of Geophysical Contractors

International trade association, news, trends.

Oil & Gas Journal

Oil and gas exploration news.

RigZone

Oil and gas exploration news.

Sea Technology Magazine

News and information about marine business, science and engineering.

The American Surveyor

News and jobs about survey industry in America.

United States Geological Survey

Government organization

xyHt

A group of publications on geospatial topics, including land surveying.

Glossary of Acronyms

BATFE - Bureau of Alcohol, Tobacco, Firearms and Explosives

E&P - exploration and production

US DOE - US Department of Energy