Chevron Technology Ventures

Fueling the Engines of Innovation

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The U.S. Patent Office receives some 650,000 new applications every year. Chevron scientists file their share, but by far the greatest sources of innovation are the legions of smaller companies—many of them startups—where a handful of clever people have come up with a good idea.

Chevron Technology Ventures was established in 1999 to nurture just such promising enterprise. Now after 22 years, CTV is the longest continuously operating corporate venture capital firm in the energy industry. Its mission is to identify and integrate externally developed technologies and new business solutions with the potential to enhance the way Chevron produces and delivers affordable, reliable and ever-cleaner energy now and into the future.

Chevron Technology Ventures operates by allocating funds to be invested in a targeted way. Its investment thesis describes the kinds of companies it will support, and the kinds of problems to be solved.

“Our first challenge is deciding where to invest,” says Barbara Burger, president of Chevron Technology Ventures and Chevron’s vice president of Innovation. “We get a wide range of opportunities from our global

Chevron Technology Ventures

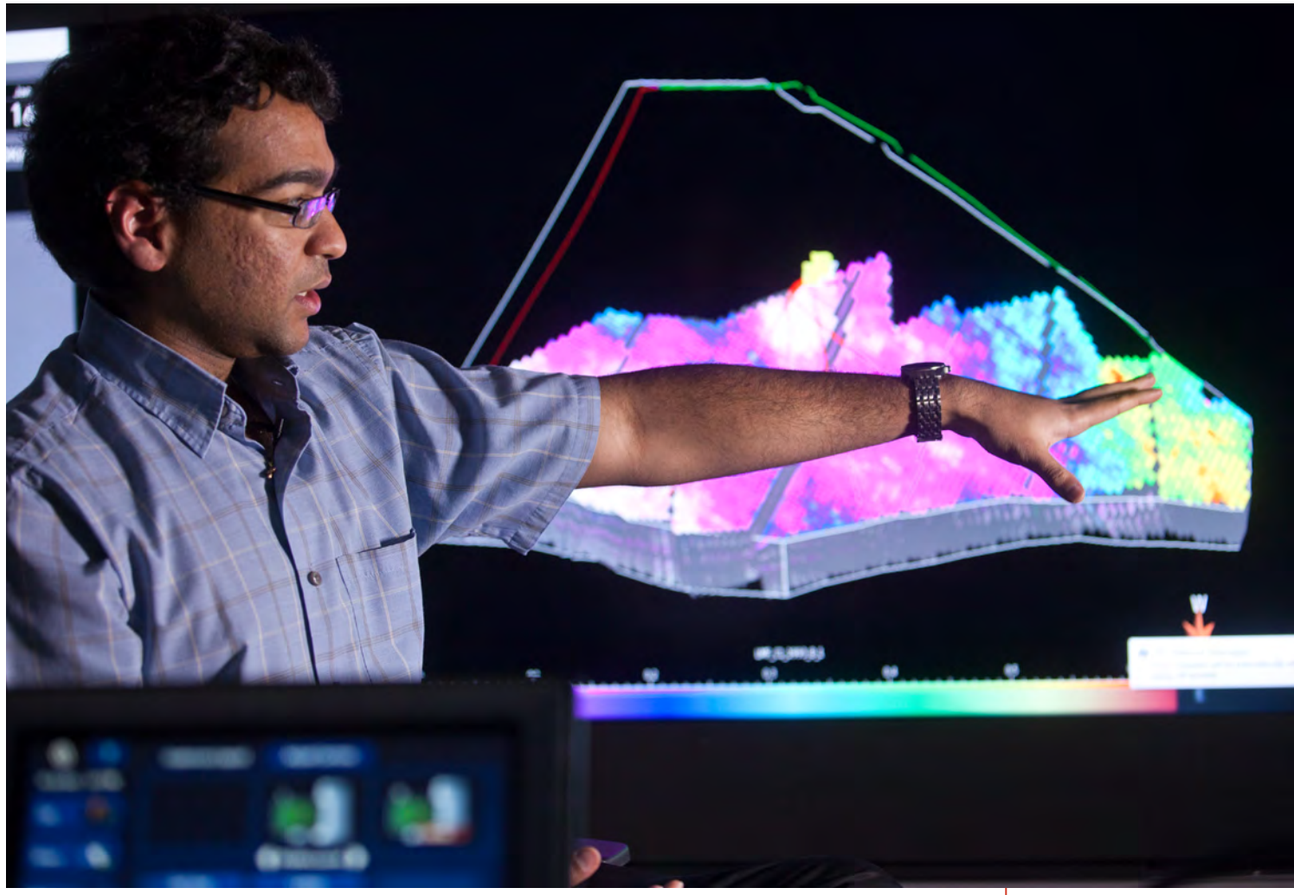
network of varied co-investors, from startup companies, from innovation incubators and accelerators, and suggestions from our own employees."

Most of the proposals that enter the widest part of the funnel are rejected early on, but a handful gain traction.

Barbara Burger, president of Chevron Technology Ventures and Chevron's vice president of Innovation

The investment funds to support them are administered under two broad categories: core ventures and future energy. Chevron Technology Venture's first Core Venture Fund was organized in 1999. As the name implies, Core Venture funds support innovation that has the potential to enhance Chevron's core business in the areas of operations, digitalization, and lowering its carbon intensity. Now in the sixth Core fund, CTV has invested in more than 100 companies.

The first Future Energy Fund was launched in 2018 with an initial commitment of $100 million to support innovation in areas such as carbon capture, emerging mobility and energy storage. The $300 million Future Energy Fund II, launched in early 2021, focuses on industrial decarbonization, emerging mobility, energy decentralization, sustainability, and the growing "circular" carbon economy. To date, CTV has invested in more than fifteen companies from its Future Funds.



More Than the Original Investment

Startup companies, no matter how good their technology, need cash. Beyond that, there are benefits to having companies like Chevron as an investor. One of the main hurdles for startups is getting a foot in the door with large clients. How does a fledgling enterprise approach a multinational company that is used to developing multibillion-dollar projects on an international scale?

Chevron Technology Ventures has a good track record for being able to trial most of the technology innovation it funds somewhere within the larger organization.

"That trial is good for them and good for us," Burger says. "For the young company, trials are part of their development. Trials are also good for us because we get to

Core Venture funds support innovation that has the potential to enhance Chevron's core business

put our hands on the technology, validate that it works, and see if it might help our operation. There is a lot of synergy between CTV and the companies we invest in.

"Our investment and subsequent trial gets them in," Burger adds. "But what startups really need is purchase orders. Part of CTV's job is to expose the rest of Chevron to the potential of these game-changing technologies. That is the ultimate opportunity for a new company. They may have the finest new technology, but until somebody buys it, the innovation may go nowhere."

In January 2021, CTV signed a letter of intent with Blue Planet, one of its Future Energy Fund portfolio companies to collaborate on pilot projects and the commercial development of a new manufacturing process that makes a form of carbonate rock from captured carbon dioxide (CO_2). The carbonate rock can be used as a construction material in place of quarried limestone. Carbon capture, utilization and storage is essential to achieving the global net-zero ambition of the Paris Agreement on Climate Change.

Another carbon capture venture, Carbon Clean, drew CTV's backing from its first Future Fund in 2020. The company is focused on low-cost decarbonization technology for industrial and gas treating applications. The company's patented APBS technology reduces the costs of CO_2 separation when compared to existing techniques. CCSL was awarded a "Technology Pioneer" award by the World Economic Forum in 2015. The technology has been proven at demonstration scale in more than 10 locations, including the UK, U.S., Germany, India, Norway and the Netherlands.

"Our investment is helping commercialize and scale next-generation carbon capture utilization and storage," Burger says. "This is a key part of delivering on our commitment. Demonstrating this technology in the field is an important step in advancing a technology towards commercialization and scale."

A Fresh Look at Geothermal

Funding from CTV and its co-investors is fueling renewed interest in geothermal energy. The concept is simple: Recover heat from deep in the earth to generate steam and electricity at the surface. The prime example is Iceland, which gets some 20 percent of its electricity from geothermal. Historically, though, geothermal has been limited to regions with accessible volcanic activity. Two of CTV's Core Fund investments, Baseload and Eavor, announced in early 2021, aim to change that.

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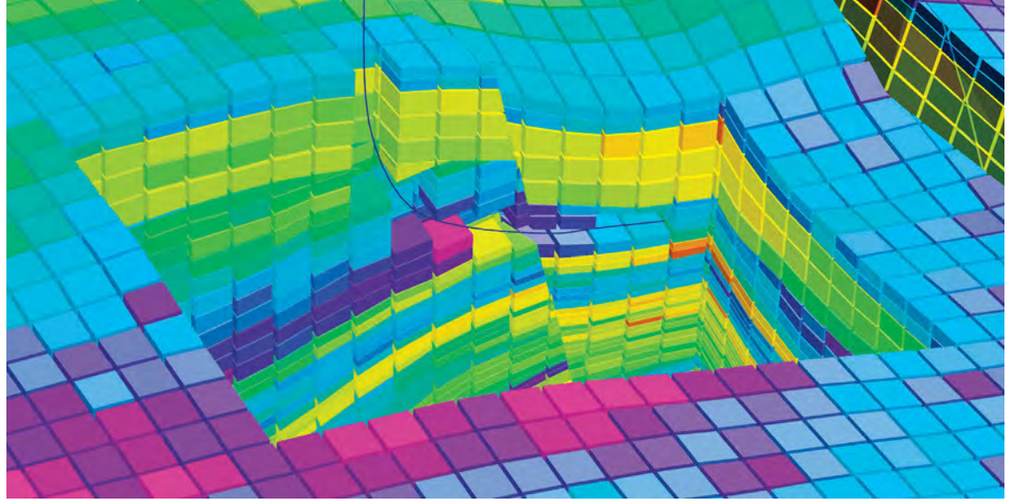


Baseload Capital is a Swedish-based private investment company that focuses on low-temperature geothermal and heat power assets. Heat power is an affordable form of renewable energy that can be harnessed from either geothermal resources or waste heat.

A geothermal energy company based in Calgary, Alberta, Eavor is extracting heat from deep in the earth by circulating fluid through closed-loop series of horizontal wells, somewhat like an underground heat exchanger. A pilot system was completed to demonstrate the technology in February 2020. According to a 2021 Marketwatch article, the concept is especially appealing because it costs a fraction of a traditional geothermal plant, generates no greenhouse gasses, poses no threat to the groundwater, is completely scalable and can be built almost anywhere there is a market for the energy it produces.

Diverse Solutions

A striking feature of Chevron Technology Ventures is its wide range of investments. One Core Fund company, INGU, has developed free-floating sensors smaller than tennis balls that can be deployed by the operator to quickly assess pipeline integrity. Another, ClarkeValve, has engineered a line of compact, low-torque control valves that require less steel to build and less energy to operate than the valves they replace. Other CTV companies are developing advanced cyber security systems and improved data analytics.

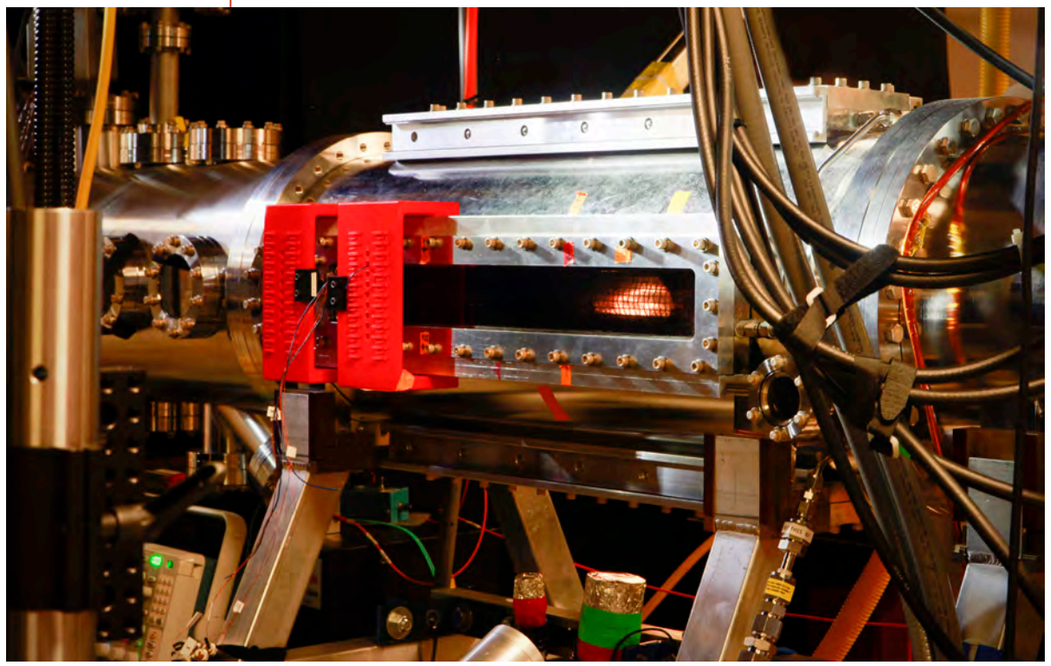
The interests of CTV's Future Energy Fund companies are as diverse as fusion, CCUS, micro electric grids, onsite power generation, carbon offsets, hydrogen generation, highly efficient electric motors, personal mobility, driverless vehicles and energy storage. Technology is a key enabler to delivery of

Zap, founded in 2017, has a new concept for producing a sustained fusion reaction, an elusive goal within the nuclear energy world.

reliable, affordable and ever-cleaner energy. Navigating the energy transition, Burger says, will require a variety of potential solutions, which CTV's investments support.

"Our Future Energy Fund investments provide us with strategic insight into power generation markets and the potentially disruptive impacts of innovative approaches, like fusion and geothermal on the conventional power value chain," Burger says. "Our investment in nuclear fusion is one example. It adds to Chevron's portfolio of companies we believe are likely to have a role in the energy transition."

One Future Energy Fund company, Zap, founded in 2017, has a new concept for producing a sustained fusion reaction, an elusive goal within the nuclear energy world. While conventional nuclear power generates long-lived radioactive waste, nuclear fusion releases substantial amounts of energy with no greenhouse gas emissions and potentially no long-lived nuclear waste. If successful, the benefits of fusion reactors could be game-changing for power generators and the environment.



Academic and Government Ties

Chevron Technology Ventures leverages its influence through collaboration with government entities, universities and international partners. In 2020, for example, Chevron Technology Ventures was awarded a project from the U.S. Department of Energy to test a system that captures carbon dioxide from post-combustion gas. In partnership with the DOE and the National Energy Technology Laboratory, Chevron will trial the carbon-capture technologies of Core Fund portfolio company Svante at Chevron's Kern River facility in California. The unit will be similar in design to the CTV company's demonstration plant in Saskatchewan, which can capture up to 10,000 metric tons of CO_2 per year.

Chevron will trial the carbon-capture technologies of Core Fund portfolio company Svante at Chevron's Kern River facility in California.

Cannon photos courtesy of the Abel Design Group

The Cannon's 17-acre campus is a beehive of entrepreneurial spirit.

Incubators, Accelerators and Innovation Hubs

Chevron Technology Ventures supports several organizations designed solely to help fledgling companies succeed. The Cannon is a CTV-supported innovation hub that has been operating since the fall of 2017. The original and largest of the Cannon's four Houston locations is a 17-acre campus that is a beehive of entrepreneurial spirit. The main campus, located in Houston's Energy Corridor, hosts events and classes, connects its members with industry experts, and fosters a collaborative ecosystem for entrepreneurs, freelancers, business professionals, and creative types of all kinds.

In August 2020, CTV became the first tenant of The Ion, a 266,000-square foot innovation hub opening in 2021. More than single building, The Ion is the centerpiece of a 16-acre Innovation District in downtown Houston. Its mission is to attract, connect and support a diverse group of innovators, entrepreneurs, businesses and investors.

Greentown Labs is another CTV-supported innovation hub. Headquartered in Boston, Greentown Labs' first expansion opened in Houston in 2021, with longtime partner Chevron as a founding sponsor. Also located in Houston's Innovation District, Greentown Labs fosters a collaborative ecosystem for climate tech-focused startups.

"Our industry is undergoing a dramatic change," Burger says. "To meet these goals, we need innovation from everyone."

Greentown Labs fosters a collaborative ecosystem for climate tech-focused startups

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Revolutionary technology to achieve net zero

Concentrations of CO_2 in the atmosphere are higher than they have been over the past two million years, according to the recently published IPCC sixth assessment report. This has further pushed the need for global carbon emission reductions into the spotlight. To achieve these reductions, governments and companies must consider new technologies that are scalable and affordable along with innovative business models. Carbon Clean is a global leader in cost-effective CO_2 capture technology. The company's patented technology has removed nearly one million metric tonnes of carbon dioxide from across 38 + installations globally since 2009.

Currently, the International Energy Agency (IEA) predicts that the Carbon Capture, Utilisation, and Storage (CCUS) market will exceed $1 trillion and it is expected that first movers in the CCUS sector will reap the biggest rewards.

Proven breakthrough technology solutions

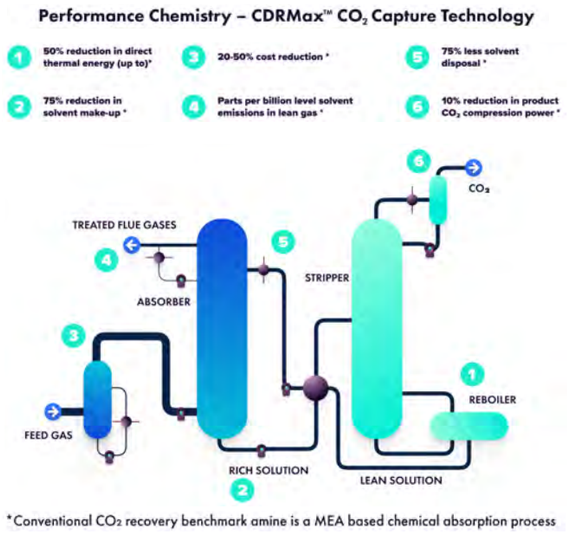
Carbon Clean's semi-modular and modular technology, as well as its patented solvents, are designed for maximum carbon capture at the most competitive cost. The technology allows industry to scale its carbon capture capacity whilst meeting stringent environmental and HSE regulations.

CycloneCC — this modular technology enables scalable cost-effective carbon capture for heavy industries by reducing equipment size and CapEx and OpEx by up to 50%. This breakthrough combination of rotating packed beds (RPBs) and amine-promoted buffer salt (APBS-CDRMax®) solvent is disrupting the carbon capture sector. CycloneCC's fully engineered designs facilitate scalability with its 10x smaller equipment size.

APBS-CDRMax® — this solvent is formulated for industrial flue gases or off-gases and can be used as a drop-in replacement solvent in existing systems for immediate cost savings — offering the lowest corrosion and degradation rates, reduced foaming and resulting in longer solvent life. When combined with the unique CDRMax™ chemical absorption process, operational costs can be reduced by up to 50% compared to conventional options.

Transforming the oil and gas sector

Legislation is already imposing costly penalties on the oil and gas sector to discourage CO_2 emissions, and further regulation is expected. Carbon Clean collaborates with oil and gas operators to ensure that they gain first mover advantages from CCUS technology — and avoid paying the price of further emissions.



*Conventional CO_2 recovery benchmark amine is a MEA based chemical absorption process

Taking the first step toward net zero today

Oil and gas major Chevron is among the early investors in Carbon Clean through Chevron Technology Ventures. "With CCUS recognised as an essential technology in the race to achieve net zero targets, we are seeing enormous growth in demand for our cost-effective and modular solutions," notes Aniruddha Sharma, CEO of Carbon Clean. "There is an opportunity for the oil and gas industry to act on carbon emissions and play a significant part in mitigating climate change."

"Chevron is committed to producing affordable, reliable, and ever-cleaner energy. We invest in breakthrough technologies that both lower emissions in oil and gas and are integral to low carbon value chains. Our investment in Carbon Clean aims to help commercialize and scale carbon capture utilization and storage technologies, a key part of delivering on our commitment."

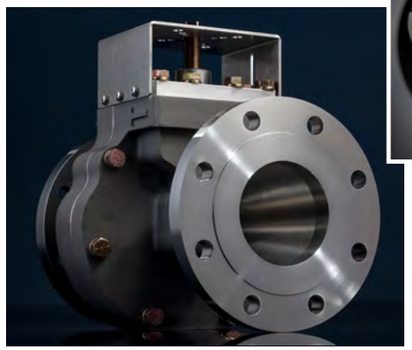
BARBARA BURGER,
President of Chevron Technology Ventures

carbon clean
TECHNOLOGY TO ACHIEVE 'NET ZERO'
carbonclean.com

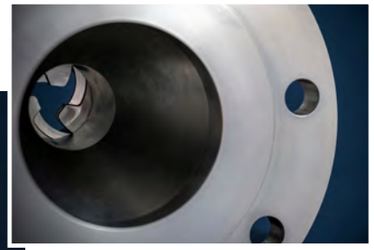
Dilating Disk™ Valve: Next-generation precision control valve

The Dilating Disk™ Valve from Clarke Valve features a unique, patented design, which provides precise flow control through the use of a three-petal mechanism. The globe valve replacement holds many key certifications and conforms to industry-required control valve specifications, including, ANSI/FCI 70-2 leakage specifications, PED 2014/68/EU, CRN, SIL 3, ISA 75.05.01, IEC 60534-1. This control valve type also features ultra-low seat and operational torque, resulting in a significant reduction in actuator size, which leads to an easy transition to electric automation.

Precision testing and digital twinning ensure reliable valve service in the field.



The Dilating Disk™ Valves are machined and assembled to the industry's highest quality standards.



The unique petal design provides precise control and reduced emissions despite rigorous service conditions.

Aerospace origin

Clarke Valve was founded in 2011 by Kyle Daniels, who developed the technology behind the Dilating Disk™ Valve during his career as an aerospace engineer. The novel mechanism was designed as a solution for critical operational issues commonly found in aircraft valves. The last two decades have seen hundreds of design improvements, through millions of hours of testing and field experience, which have transformed it into an efficient and compact valve.

Low fugitive emissions

Due to its best-in-class sealing system, the Dilating Disk™ Valve is the first and only control valve to be both API 641 and ISO 15848-1:2015 certified to reduce fugitive emissions by 98%.

Diverse applications

When operating high yield assets, it is important to protect them with highly reliable products to avoid catastrophic failures or unplanned downtime. The application opportunities for the Dilating Disk™ Valve in the oil and gas industry range from gas lift, VRU, separators, compressor stations, refinery and petrochemical valves, and storage tanks — wherever there is a need for precision fluid control, operational reliability, and low environmental emissions.

Digital Twinning for optimal performance

Clarke Valve uses Digital Twinning to ensure optimal operational performance and reliability for a process application before each unit is completed and ready for installation. Digital twinning involves the use of computational fluid dynamics (CFD) to create the virtual replica of a product and the process conditions under which it will operate. This capability enables valve engineers to analyze the test data and optimize the product before it is placed in service.

Seeking solutions under rigorous conditions

One of our customers is using Clarke Valve's Dilating Disk™ Valve for controlling the flow of recycled water and injection water for a production facility in North America. Due to vibrations and high fluid velocities (up to 17,000 BPD @ 500 psi), the Dilating Disk™ Valve was mounted with a remote mount automation package. The pump recycle application is known for severe conditions and a high turnover rate. The valve will be modulating and providing controllability in an erosive service. The benefits of using the Dilating Disk™ Valve include reduced weight (145 lb vs. 160 lb for conventional valve), 98+% reduction in fugitive emissions to 2 ppm, 38% less torque for operations, and conformance with API, ASME, IEC, ISA, and ISO standards.

ClarkeValve™
World's Most Compact & Efficient Control Valve

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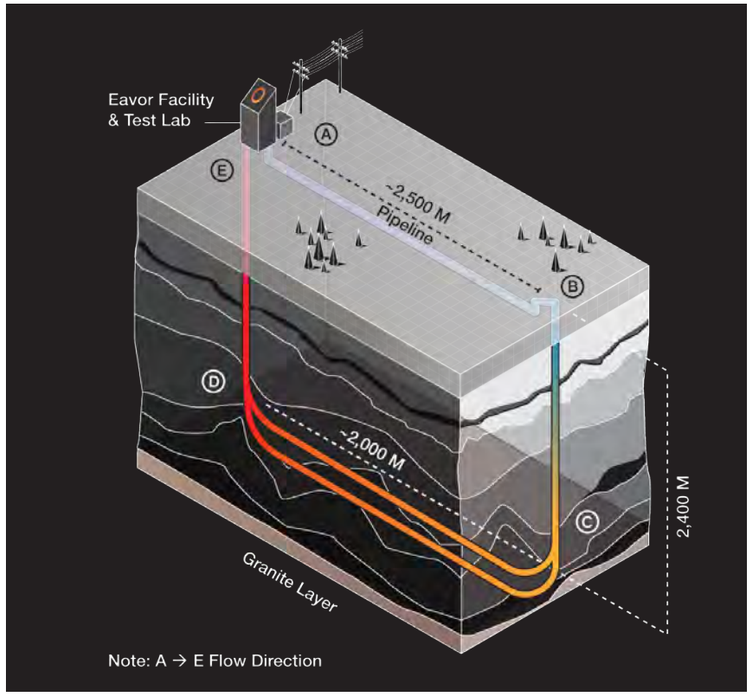
Eavor-Loop™: World's first truly scalable source of zero-carbon operation baseload and dispatchable energy

The world is moving relentlessly on the path to zero-carbon operation energy. However, the holy grail of zero-carbon operation, baseload, and dispatchable power that is also scalable has been out of reach. Trying to get there with two of the current leading sources of zero-carbon operation energy—wind and solar—suffers from intermittency—the wind isn't always blowing or the sun shining. But there is hope on the horizon: the world's first scalable source of zero-carbon operation baseload and dispatchable energy is now available. Eavor-Loop™ from Eavor Technologies Inc. is a geothermally-based closed-loop fluid system that takes advantage of the temperature gradient between the surface and the subsurface to provide an on-demand energy source that produces energy without generating emissions. An Eavor-Loop™ also has a relatively small surface footprint and may be scaled up to the desired energy demand.



Eavor-Loop™ is a closed-loop fluid system that extracts heat from the natural geothermal gradient of the Earth with minimal environmental risks. The natural heat is suitable for heating, cooling, and electrical power generation. Pictured here, Eavor's Demonstration facility built near Rocky Mountain House, Alberta: Eavor-Lite™.

Innovative zero-carbon operation technology

The Eavor-Loop™ technology creates an entirely closed fluid loop by joining two vertical wells both on the surface and at the ends of several multilateral wellbores at depth (see adjacent illustration). The wellbores and multilaterals provide direct conductive access to the hot rock at depth, acting like pipes or conduits of heat rather than as wells producing fluid from the earth. Eavor's proprietary water-based working fluid is circulated throughout the system to harvest geothermal heat for electrical power generation or commercial heating/cooling applications. There is no fluid produced from the subsurface. At Eavor's demonstration facility (named Eavor-Lite™), the closed-loop consists of two 20-cm-diameter vertical wellbores (BC and DE in Figure 1) that are run through sedimentary rock at about 2,400-m depth before making 90° turns and running horizontally (CD, Figure 1) for about 2,000 m. The multilaterals are connected precisely using magnetic ranging technology commonly used in oilfield drilling. The vertical portions are cased down to the turn to horizontal, and the multilaterals are completed using a Rock-Pipe™ chemical sealant at a cost lower than casing. Each multilateral is completely isolated from the surrounding rock and each other.

Remarkably, the working fluid circulates naturally without requiring a parasitic pump load due to the thermosiphon effect of a cool fluid being heavier and falling naturally in the inlet well and lighter hot fluid rising naturally in the outlet well. This, along with the cost-saving associated with the use of Rock-Pipe™ in place of casing in the horizontal sections, substantially lowers the capital and operating costs, making the Eavor-Loop™ technology financially viable. The flow rate is adjusted, depending upon the application or dispatchable demand. For a heat network, the flow rate is typically faster than if the application is power generation. Pumping is required only for the initial start-up.

Unlike traditional geothermal wells, and given the complete isolation from the surrounding rock, Eavor-Loops are not burdened with exploratory risk or limited to niche geographies that contain highly permeable aquifers at volcanic-like temperatures. Of course, the economics are better in areas of higher thermal gradients. Additionally, Eavor-Loop™ has the advantage of no fracking and no induced seismicity, no GHG or CO_2 emissions, no ongoing water use, no produced brine or solids requiring treatment, and no aquifer contamination.

Truly scalable technology

A single Eavor-Loop™ installation generates industrial-scale electricity for ~2,000 homes or produces sufficient heat for ~16,000 homes. It is possible to increase the heat generation capacity of the system by adding up to 12-14 multilateral legs. Just as shale wells, multiple Eavor-Loops can be manufactured on one pad to scale up the project to the desired heat or power output.

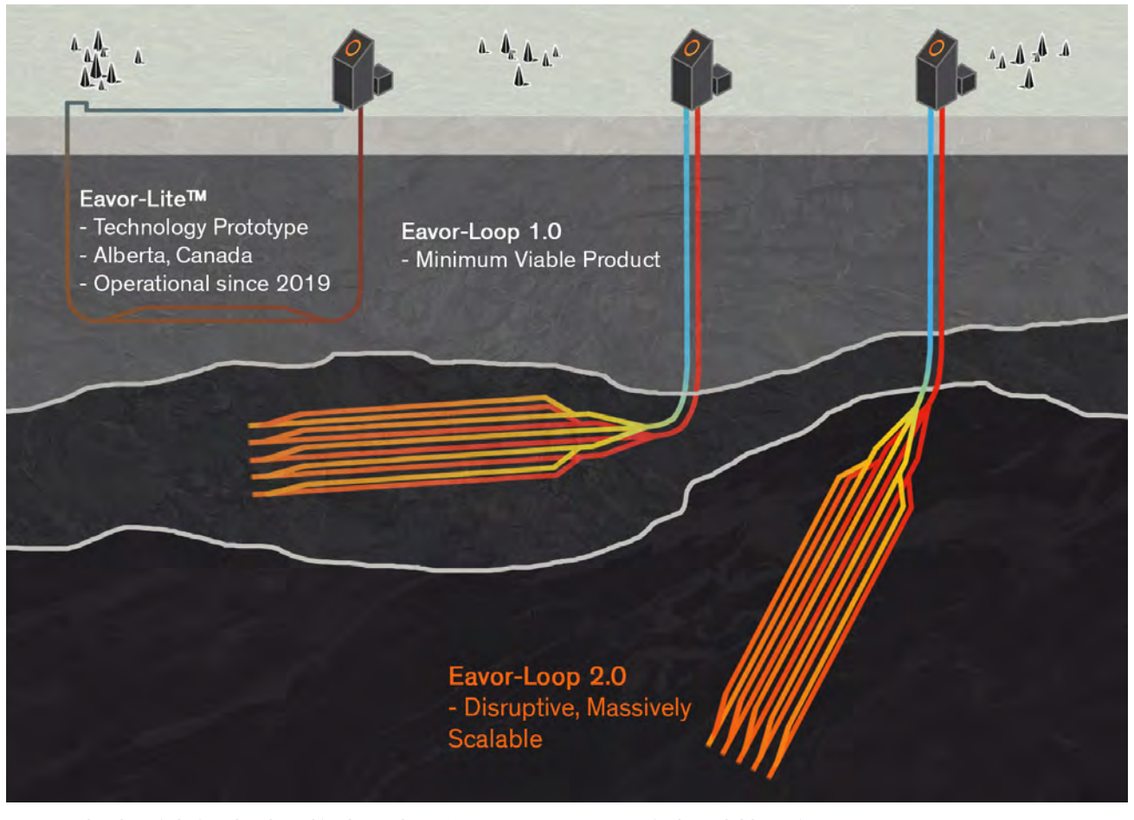
Advantages

Eavor technology offers several distinct advantages over other forms of energy:

1. Dispatchable power. An Eavor-Loop™ can soak up extra heat during low demand and discharge it during high demand. As such, this system can continuously adapt to match end-user requirements and provide grid stability as needed. Therefore, it pairs nicely with the intermittent energy sources (and can share their transmission infrastructure).
2. Black-start capable. Eavor-Loop™ can restart electric power generation without relying on an external electric power transmission network to recover from a total or partial shutdown.
3. 3mall footprint. An Eavor-Loop™ has a small footprint that makes it suitable for installation in urban settings or proximity to transmission networks. For the same surface land use, an Eavor-Loop™ can generate 35x more energy than solar and roughly 300x more than wind. Eavor can utilize abandoned well sites or repurpose abandoned industrial sites. At this time, Eavor is focusing on abandoned or failed traditional geothermal projects or shut-in oil and gas sites.
4. Reliable baseload power. Eavor's capacity factor is 98% when generating baseload power compared to ~40% for wind and ~30% for solar.
5. Predictable results. It is possible to model the Eavor-Loop™ on paper and predict the exact amount of thermal output to execute 20-year plus power purchase agreements. Because of the complete isolation from the subsurface and the reliance on conduction, the system is not subject to the vagaries of the highly variable subsurface with concerns about an unexpected thermal breakthrough or sudden loss of porosity/permeability.
6. Factory production. A traditional geothermal project requires 8-10 years for development; an Eavor-Loop™ can be built within 18 months.

Technology roadmap

Eavor's technology consists of several patent-pending innovations. The technology is being developed in several progressive phases. **Eavor-Lite™** was a



Eavor technology is being developed in three phases from prototype to massively scalable projects.

The Eavor-Lite™ demonstration project has been operating uninterrupted at Rocky Mountain House in Alberta, Canada since December 3, 2019.

full-scale demonstration facility with two multilaterals that has been operating uninterrupted in Alberta, Canada, since it's commissioning on December 3, 2019, with help from Shell New Energies Research. At the facility, the Rock-Pipe™ completion was thoroughly tested, and the thermodynamics was validated for six months. Next up for development is **Eavor-Loop™ 1.0**, where the inlet and outlet wells are drilled from one surface location and horizontal multilaterals into a sedimentary rock. In the **Eavor-Loop™ 2.0** design, the multilaterals are pointed downward to access higher downhole temperatures. This design yields a disruptive, massively scalable configuration.

Lab, bench, and field demonstrations related to technology development are ongoing in Alberta, Ontario, Oklahoma, Norway, and France.

Equity investment

Eavor Technologies Inc. was formed in 2017 with majority ownership by management and directors (including key angel investors such as Doug Beach and Ross McCurdy). Eavor then received Canadian government grants for its Eavor-Lite project from four different agencies totaling CAD$8.9 million. In 2021, Eavor conducted a CAD$56 million round of funding from several venture capital funds, including international oil and gas operators Chevron Technology Ventures and bp ventures. Other venture capital investors included Temasek, BDC Capital, and Vickers Venture Partners. In total, including all the recent rounds and funding grants, Eavor has raised close to CAD$100 million.

Interest from the major oil & gas operators helps Eavor in multiple ways. "Both Chevron and bp performed rigorous due diligence before investing in our company," explained John Redfern, President + CEO + Ringmaster of Eavor Technologies. "Such thorough vetting helps inspire confidence in other venture capital investors. These investments, and the partnerships formed around them, are critical to the commercialization of the technology and to help Eavor scale up its already extensive project pipeline."

Eavor is also a beneficiary from the operators of best practices in drilling vertical and multilateral wellbores and in making precise subsurface connections. In addition, the operators' extensive global presence aids Eavor in developing relationships with energy and utility companies and regulatory agencies throughout the world.

Eavor also plans to set up an independent CAD$1-billion-plus fund to help finance multiple Eavor-Loop™ facilities worldwide.

Diverse applications

Eavor Technologies is currently pursuing more than 200 energy projects at various stages of development. These diverse applications include direct heating, cooling via air chillers, baseload electrical power generation, and a continuous, dispatchable electricity source, which are well paired with existing intermittent sources such as wind and solar. Geographically, these projects are located throughout Europe, North America, Asia, the Caribbean, and the South Pacific. "We even have a lead in Bhutan for a heat project … and in Antarctica at one of the research stations," Redfern explained to *Recharge News*.

Robert Winsloe, Eavor's Executive Vice President of Business Development, is currently based in Germany, where heating and cooling are commonly delivered via district networks. Heating or cooling is provided from a central source to customers through a distribution system of insulated pipes. With Germany aiming to become GHG neutral by 2050, Eavor has found a favorable commercial market.

In Germany, dispatchable geothermal energy receives more than €251 per MWh under the country's Renewable Energy Sources Act. Eavor has already lined up about 50 potential projects in the country. Sites with dry (failed due to absence of the specialized geology required) geothermal wells, where developers had already received permission to build facilities, are prime sites for Eavor. Eavor's first commercial plant (the "loop" of which is to be completed in 2022) is an 8-MWe/65 MWth project in Geretsried, Germany, at the site of a dry geothermal well using Eavor-Loop™ 1.0 technology. There are provisions for both power generation and district heat sales. The project will reduce GHGs at the rate of 40,000 tonnes of CO_2e/year. During 2022-29, the project will be scaled up to 200 MW by drilling several Eavor-Loop™ 2.0s.

Eavor-Lite virtual tour

During the Covid-19 pandemic, it became difficult for potential investors and customers to visit Eavor's demonstration facility in Rocky Mountain House, Alberta, Canada. To solve this problem, Eavor partnered with Business On Camera and their team, to create a 3D virtual tour of the demonstration facility.

Using virtual reality technology such as the Oculus Quest, potential clients, investors and anyone else looking to learn about Eavor, will be transported to the facility virtually. They will journey through an immersive 3D reconstruction of the Eavor-Lite™ demonstration facility, where they can move around and interact with as their new mobile app, which can be downloaded now from mobile app stores for free. However, if you are interested in trying out the full experience in a pair of Oculus Quest virtual reality goggles, please contact Eavor.

Winsloe says another ideal application is industrial cooling at computer data centers, where operators place a premium on cooling continuity and reliability. The heat from an Eavor-Loop™ will be supplied to air chillers to provide a continuous source of cooling.

Market opportunity evolution

Eavor Technologies has mapped out its market opportunity evolution from a price point of $250/MWh in 2021 using its Eavor-Loop™ 1.0 technology for high tariff power markets in Europe and Japan to eventually $50/MWh by 2028 with the Eavor-Loop™ 2.0 technology for applications in the US, India, and rest of the world.

informational panels featuring Eavor's engineers to learn more about Eavor-Loop™ technology.

Guided by your friendly tour guide Jen, alongside Eavor's Lead Engineer, Bailey Schwarz, and Chief Technology Officer Matt Toews, the experience can last minutes or hours, allowing participants to gain an increased understanding of Eavor and their game-changing technology.

The tour is continuously being developed, with the newest update allowing you to travel underground to see the well-system in action. Eavor has also expanded the tour's availability and it is now available on Eavor's website as well

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Pipers® Inline Inspection as a Service: Complete, accurate and affordable data

Launched in 2016, INGU set out to improve the economics and performance of pipeline integrity programs — putting greater control in the hands of operators while eliminating downtime and conventional engineering costs.

Pipeline operators have relied on smart pigs since they were introduced in 1964 to stay on top of the pipeline condition and performance. As these solutions evolved over the decades, the accuracy of their data has been second to none. Unfortunately, deploying this technology is infrequent, operationally disruptive, costly, and only applicable to about 60% of the world's pipeline assets. This means smart pigs serve as an effective point solution, but provide limited value as a business decision-making tool. The industry's stop/start approach to inline inspection has left operators vulnerable and forced to act based on moments in time or calendar dates, rather than on insights gained through timely and complete access to their pipeline assets.

Operating system for pipeline integrity

Our work at INGU revolves around advanced data analytics from free-floating Pipers® to deliver optimal operational control and insight, while simultaneously reducing overall costs and downtime. In short, we are the operating system for pipeline integrity and management.

As the first in our industry to offer inline inspection as a service, on a subscription basis, we provide complete, timely, accurate and affordable data. In business terms it means operators have greater visibility across all pipeline assets, whenever and wherever they want, regardless of diameter, material, configuration, or condition at a 10x cost advantage. The result is improved planning, decision-making and overall financial control.

We can provide these benefits because of a unique, self-serve solution that uses free-floating, micro sensor technology designed to work under operational conditions. This approach translates into 100% uptime and the ability to act where and when it's required. There are no third parties required on-site — including INGU — and operators can deploy our solution on a moment's notice.

Critical insights in a single run

Pipers® data is highly repeatable, making it ideal for monitoring for changes in pipeline condition, keeping operators on top of leaks, deposits, wall condition, and damage or tampering to their pipelines. Equipped with a magnetometer, accelerometer, gyroscope, acoustic sensor, and pressure sensor on board, Pipers® can deliver critical insights in a single run.

Pipers® provides easy access to pipelines regardless of material, diameter, or configuration.

Leak monitoring: our client found the leak within inches where Pipers® data said it would be.

In gas pipelines, Pipers® are deployed through attachment to a cleaning pig.

Regular monitoring delivers greater program control, early detection, and lower costs.

INGU's data science team has the unique advantage of access to a growing library containing learnings from small, mid- and large-scale operators across four continents. This provides rich contextual analysis and continuous advancement of INGU's capabilities.

INGU and Chevron

In 2017, INGU was among the first companies selected by Chevron Technology Ventures' CTV Catalyst Program, an initiative to help early-stage companies promote technology to advance the oil and gas industry around the world. During the following year, Chevron continued to test Pipers® in a series of lab and field trials, proving the effectiveness of the technology and making a business case for further investment. In just 18 months, INGU progressed from trial to commercial release. In 2019, INGU was ready to scale and raised growth capital to expand its team, advance its data collection platform and analysis, and extend its global reach. As of 2020, Chevron deploys Pipers® technology across its business units around the globe.

"Economical, effective, and easy to use, it is a complete all-in-one tool."

— CHEVRON

Today, INGU works with over 90 clients, ranging from independent operators to many of the world's largest oil and gas companies, and nine agents, with projects spanning 15 countries and four continents. Pipers® are putting power and control into the hands of pipeline operators and ensuring integrity management programs are running as efficiently as possible with data that is complete, timely, accurate, and affordable.

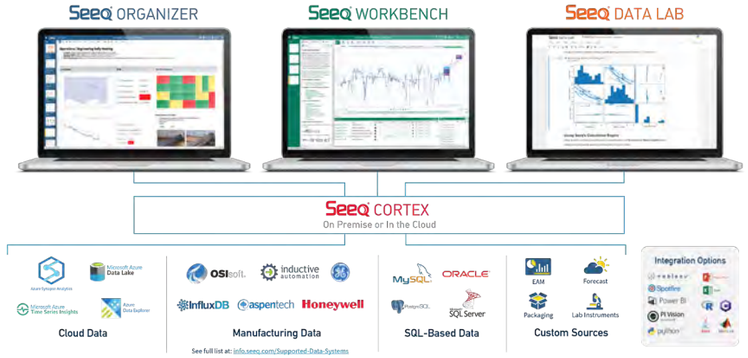
INGU

INGU.com

Seeq enables Chevron to streamline greenhouse gas emissions reporting

Seeq software applications are dedicated for processing data analytics and empowering subject matter experts (SMEs) to search, contextualize, cleanse, model, monitor, and operationalize advanced time-series data analytics in an easy-to-use interface. Wherever the data is stored—whether in process historians, SQL databases, or the cloud—Seeq can connect these without the need for data ETL (extract, transform, load), enabling end-user generated insights to improve operational performance in minutes.

At Chevron, Seeq is deployed as Software as a Service (SaaS) on Microsoft Azure. It is connected to Manufacturing, Oronite, and Upstream OSIsoft PI historians globally, in addition to Azure Time Series Insights. SMEs and data scientists around the world leverage Seeq's applications—Workbench (data contextualization and analytics), Organizer (reporting and live-updating dashboards), and Data Lab (data science python interface) — for a variety of production, sustainability, and reliability-oriented use cases, many of which help advance a lower-carbon future.

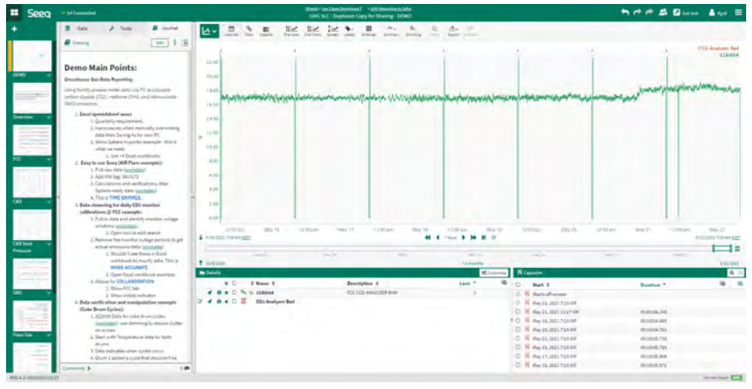


Seeq architecture deployed as Software as a Service on Microsoft Azure® cloud platform.

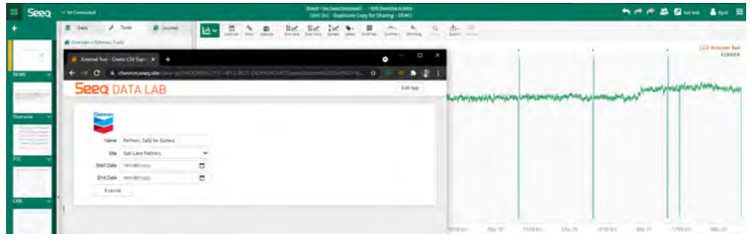
One such example is a greenhouse gas (GHG) report built in Seeq Workbench for Chevron's Salt Lake City refinery. The application accesses data from the refinery's PI system, and adds calculations and contextualization for quarterly regulatory emissions reporting.

Seeq's extensibility through Seeq Data Lab enabled the team to build a custom export tool to extract the final emissions data and format it for ingestion into Sphera (corporate GHG reporting software).

This use case highlights Chevron's interest in efficient reporting and how the use of Seeq enables faster time to insight. Previously, the report was developed in spreadsheets and would take days to compile. Now that the analysis runs in Seeq, it only takes a few hours because the data and calculations update in near real-time. Chevron plans to implement this solution at its other refineries to capture additional business value by leveraging the GHG report.



Analytics are applied to the data while visualized in trend view within Seeq Workbench; the steps captured in the analysis are captured in the Journal tab.



An external tool, leveraging Seeq Data Lab's Appmode, is launched from the Tools tab in Seeq Workbench to export the prepared data for ingestion into Sphera software.

Seeq®

Advanced Analytics for Process Manufacturing

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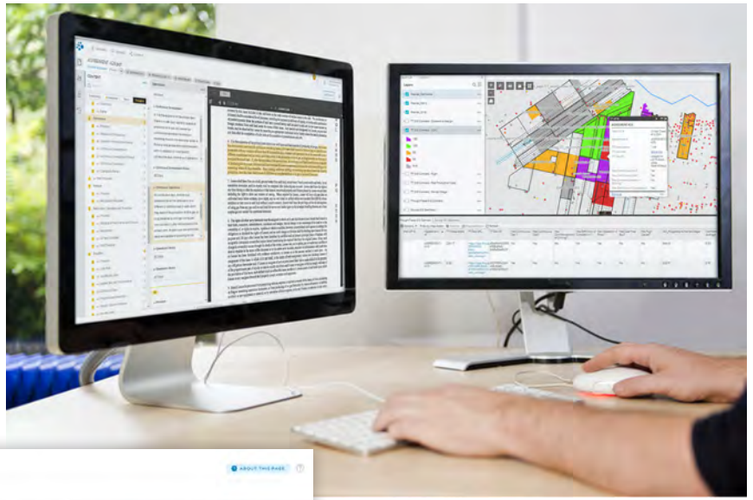
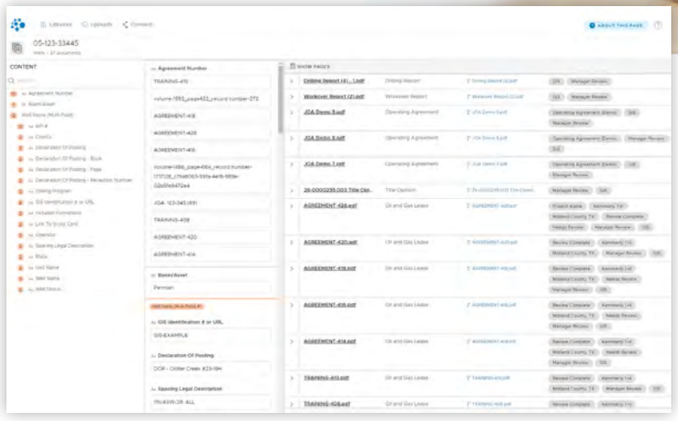
Azure is a registered trademark of Microsoft Corporation.

Chevron modernizes document-intensive workflows to accelerate information retrieval and review

ThoughtTrace is a Document Understanding & Contract Analytics platform that uses pre-trained artificial intelligence (AI) to help companies read, interpret, and act on powerful insights across a wide range of business documents. The ThoughtTrace platform transforms huge reading problems that take weeks or months to tackle into manageable work that can be accomplished in hours and minutes. Generating answers from unstructured data was a manual and complex challenge for Chevron. Today, by leveraging ThoughtTrace, Chevron has captured opportunity cost in having answers "today".





The Chevron team partnered with ThoughtTrace to improve their day-to-day work processes and collaboration needs by gaining next-level transparency into governing documents such as oil and gas leases, operating agreements, pipeline easements, JV agreements, and more. By using ThoughtTrace's automatic document processing and categorization capabilities, Chevron was able to move 15 MM files from their legacy Enterprise Content Management system to the new platform with unprecedented efficiency. In a matter of weeks, Chevron realized time-to-value with faster information retrieval and document review, empowering both tactical users and strategic decision makers to drive better decision-making by utilizing valuable information that was extremely difficult to uncover prior to ThoughtTrace.

Chevron has continued to expand their usage of the platform for deep, context-specific search and workflow automation. ThoughtTrace's pre-trained, use-case specific AI models helped the team achieve immense productivity gains in day-to-day operations by turning their documents into intelligent assets and empowering their employees to make use of the new information available to them. In doing so, the team is positioned to identify new economic opportunities, and make more informed decisions with accurate and accessible data.

Document-related business use cases play an important role that can make or break a business. ThoughtTrace's intelligent document management and contextual search capabilities allow users to discover critical facts in seconds, and advance from disorganized 'digital filing cabinets' to a flexible and accessible experience. This unique capability can save time, money, and mitigate risk for any sized organization across diverse teams from land to legal, procurement, finance, operations and beyond.

ThoughtTrace™

thoughttrace.com

it's only human to search for what lies ahead

We recognize that energy demand is growing, and the world needs lower carbon solutions to keep up. At Chevron, we're working to find new ways forward. Through our venture capital group, we're backing technologies such as electric vehicle charging, carbon capture, and even nuclear fusion. **Learn more at Chevron.com/LowerCarbon**

the human energy company™ Chevron