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Premium Growth Opportunity

Pursuing downstream growth through industry-leading technologies and smart investments.

The opportunity: burgeoning demand for higher-performance engines that meet new fuel economy and environmental standards. The solution: premium base oils. We're gearing up to become a leading manufacturer of these products, the building blocks of lubricants to keep the world's machines moving.

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Left: Pascagoula's new base oil manufacturing facility taking shape.





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Before we developed hydroprocessing, says Ashok Krishna, pictured, most base oils were produced by solvent processing, which limited the sources of the crude oil starting material.

Downstream & Chemicals is pressing forward with a strategy to get the most value out of our assets and capture new opportunities through our competitive advantages, in particular our technology leadership.

Lubricants is one of the downstream businesses that is spearheading this drive for growth. A high-return segment of our business, the lubricants market is growing rapidly to meet the needs of commercial, industrial, marine and retail customers. The demand is particularly brisk in Asia's growing economies.

"Chevron's Lubricants business is ideally positioned and fully integrated through technology, a manufacturing network, supply chain, and marketing and sales units," says Colleen Cervantes, president of Chevron Lubricants.

With increasing demand for premium base oils, our position is stronger than ever. Premium base oils, the building blocks used to manufacture high-performance lubricants, are projected to enjoy an 83 percent demand growth worldwide between 2010 and 2020.

"Premium base oils are in high demand as the main ingredient in the top-tier motor oils that help improve fuel economy, lower tailpipe emissions and extend the time between oil changes," Cary Knuth, general manager of Base Oils, explains.

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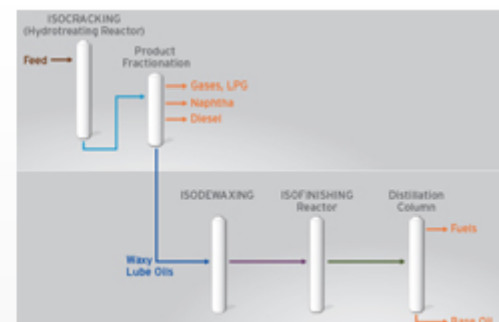
In addition to the automotive market, premium base oils are in growing demand in the manufacturing industry, particularly in the Asia-Pacific region.

"We're already leaders in premium base oil production, with facilities in Richmond, California, and Yeosu, South Korea," says Knuth. "And we expect to become the world's largest producer of premium base oils when a new base oil manufacturing facility at the Pascagoula, Mississippi, refinery starts up."

The \$1.4 billion project is projected to enable Pascagoula to manufacture 25,000 barrels per day of premium base oil, bringing Chevron's worldwide total to about 60,000 barrels per day. Concurrently, we are expanding lubricant blending capacity in the Americas and Asia by investing in supply-chain infrastructure with blending plants in China, Southeast Asia and Brazil.

The key to our strategic advantage in manufacturing lubricants is hydroprocessing, a core technology developed by Chevron in the 1960s to convert heavy oil into lighter products. Hydroprocessing works by cracking "bad" molecules (those with high sulfur and other impurities) into "good" ones, which can be used for producing gasoline, jet fuels and other high-quality products.

"By the 1980s the challenge was to apply hydroprocessing to the manufacture of base oils," says Ashok Krishna, vice president of Downstream Technology. "Until then, most base oils were produced by solvent processing, which inefficiently removed the poor-performing molecules and imposed limitations on the crude sources of the starting material."



Hydroprocessing: getting the best from bad molecules. [Click to Enlarge](#)

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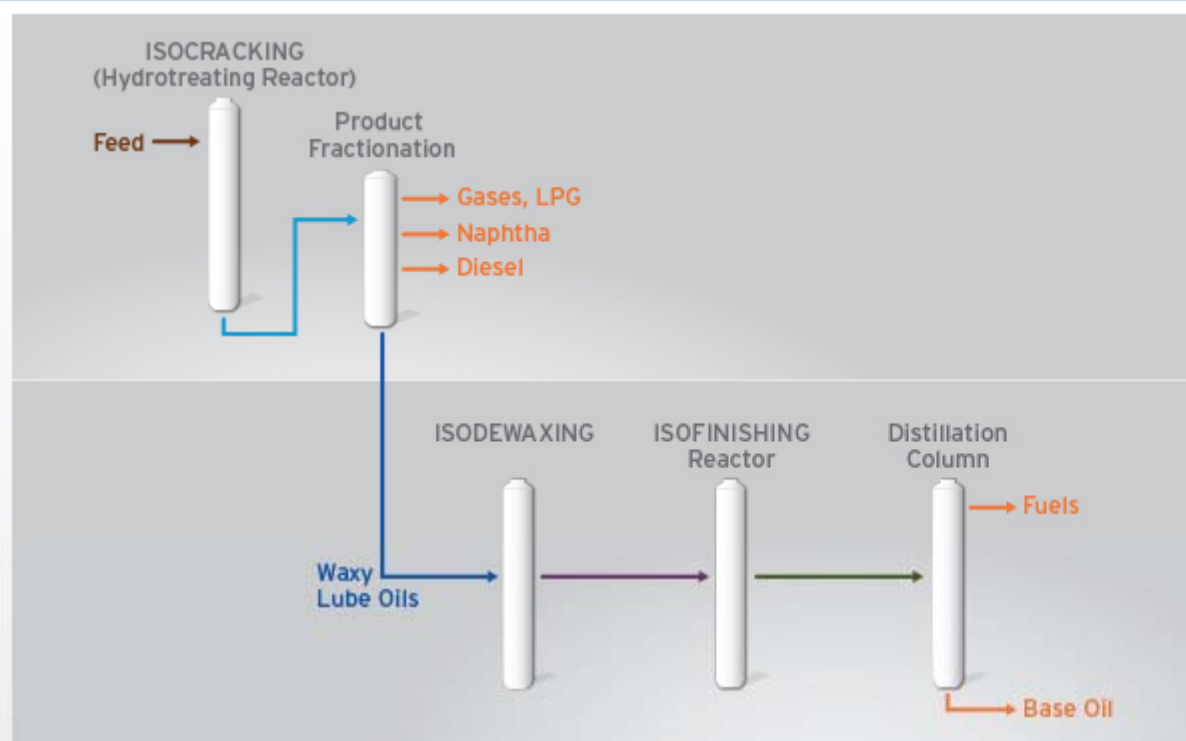
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Hydroprocessing - Getting the Best From 'Bad' Molecules

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In 1984, we became the first to adopt an all-hydroprocessing route for lube base oil manufacturing. This technology outperforms all other processes because it enables the removal of essentially all undesirable sulfur and nitrogen molecules and transforms the waxy molecules into high-quality base oil.

The three-step process involves ISOCRACKING to increase the viscosity index and improve the thermal stability, ISODEWAXING technology to reduce the pour point, and ISOFINISHING to improve the base oil's oxidation stability and color. The result: Our process significantly increases the yield of lubricant base oil over solvent dewaxing, the conventional method for base oil dewaxing at the time ISODEWAXING was invented.



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New finished-product tanks at the Pascagoula Refinery.

In 1984 we became the first company to combine three steps into base oil production – hydrocracking, catalytic dewaxing and hydrofinishing. Hydrocracking applies high temperatures to remove most of the sulfur and nitrogen (see diagram on previous page). Catalytic dewaxing removes wax molecules. And hydrofinishing uses sophisticated catalysts to convert the remaining impurities to stable base oil molecules. Combining these steps represented a breakthrough for Chevron, which became the first company to take an all-hydroprocessing route to make high-quality base oils in our Richmond plant.

The next key step came in 1993 when Chevron invented the ISODEWAXING technology that revolutionized the process of making base oils. This technology enables the removal of essentially all undesirable sulfur and nitrogen molecules and transforms the waxy molecules into high-quality base oil. It also reduces the pour point, the lowest temperature at which a lubricant can flow.

"This process gave us higher yield and a better quality lubricant than could be achieved with solvent processing," says Jay Rogers, technology business manager for Downstream Technology.

Still, one major decision remained: Should Chevron go it alone with ISODEWAXING or share its pioneering development with others in the industry?

"We decided to license the technology to broaden its acceptance and to build our own business at the same time," Rogers explains. The gamble has paid off in additional income and widespread acceptance of our process.

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Today, about two-thirds of the world's premium base oil is manufactured with Chevron's ISODEWAXING technology, and the proportion of base oils is expected to grow as new, all-hydroprocessing plants come on line. Chevron and its joint venture Chevron Lummus Global have licensed the technology to more than 20 base oil plants.

Hydroprocessing is paying additional benefits for Chevron at the upstream end too. It's proving to be a magic formula for upgrading low-value crudes into lighter products.

"We're now building facilities at upstream upgrader production sites that look more and more like refineries because the crudes are getting increasingly heavier and tougher to process," says Krishna. "Hydroprocessing is giving us the option to upgrade the crudes at the production site."

At the Athabasca Oil Sands Project in Alberta, Canada, we're using our technology to upgrade bitumen from tar sands. At Petropiar, our joint-venture affiliate in Venezuela's Orinoco Belt, our technology is enabling us to refine extra-heavy crude into a high-quality synthetic oil. And at the Escravos Gas-to-Liquids plant in Nigeria, we're converting gas into a waxy liquid and then using our ISOCRACKING technology to convert it into gasoline and diesel fuel.

Krishna concludes, "Hydroprocessing technology isn't new: we invented it decades ago. We license it to others to ensure we remain globally competitive, and we keep funding our technology research - but it's worth more to us now than ever."

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Aerial view of the new berth constructed for the Pascagoula Base Oil Project.

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Ready to Respond

We can't always prevent incidents, so we continually strive to improve our preparedness for the worst.

Three years after the U.S. Gulf of Mexico's worst oil spill, we're much better prepared for deepwater incidents worldwide. But with new projects, a wired world, high stakeholder expectations and constant training needs, emergency response remains a constant challenge.



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Left: A response team at work during a recent exercise in Italy.



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This well-capping stack was recently unveiled in Norway as part of the Subsea Well Response Project, formed by Chevron and eight other companies.

To arrest any future well blowouts in the deep Gulf, a new 100-ton "capping stack" today stands ready, the centerpiece of a \$1 billion-plus response package assembled by the Marine Well Containment Company formed by Chevron and major competitors after BP's 2010 Macondo incident. Meanwhile, another industry cooperative is placing similar systems close to offshore oil and gas areas of the United Kingdom, Brazil, South Africa, Norway and Singapore.

But new hardware is only part of emergency response (ER) readiness. Behind Chevron stands a reserve army of responders from every organization, says Jeff Patry, ER manager for corporate Health, Environment and Safety (HES). Some are full-time, others frequently engaged and all are on call in a see-through ER world.

High Expectations

"Post Macondo, public expectations for ER are much higher," says Patry. The Internet and social media "put a premium on both a nimble response and greater transparency," notes Sean Comey, team leader, Emergency Response Functional Team, for Policy, Government and Public Affairs (PGPA). Plus our ER profile affects our partnership vision, notes Craig Ginnett, ER team lead for Upstream Capability: "To be a preferred business partner, we have to demonstrate the right level of preparedness."

Our ER professionals believe we're very good at response. But they harbor a constant concern, especially in locations where we haven't had a recent incident, about losing the sense of vulnerability that energizes ER culture. So we work constantly to get better. For example:

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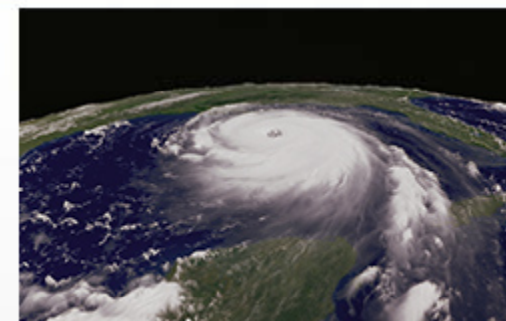
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- Chevron Shipping coordinates a conference every two years on new cleanup technology.
- Corporate HES launched a new program to raise ER organizational capability by certifying up to 250 key Chevron responders, such as incident commanders and legal officers.
- Upstream Capability provided a Spill Response Planning guide to business units and is piloting a "Resources at Risk" project to pinpoint socioeconomic and environmental risks near facilities.
- After Macondo's hard lessons, corporate PGPA added a new Rapid Deployment Team, a 60-member PGPA Auxiliary Team and a PGPA ER tool kit. And the PGPA team supporting North America upstream has doubled its annual drills.

Ironically, the real incidents we work hard to prevent provide the best training experiences to help us stay sharp, says Patry. But the next best approach is a comprehensive drill. So throughout the company we conduct "tabletop" run-throughs, big facility scenarios and full-scale exercises. Earlier this year, for example, some 75 people gathered in Trieste, Italy, to practice a tanker spill cleanup in a harbor where last year we delivered more than 150 cargos of crude from Kazakhstan.

"If we don't drill, we lose our skills," says Dale Shupe, ER manager for Chevron Shipping, which will conduct nine drills in 2013.

To prevent incidents, we have a world-class Operational Excellence Management System, a vigorous safety culture and much more.



Hurricane Katrina, viewed from space. Chevron has well-practiced hurricane evacuation procedures in areas such as the U.S. Gulf of Mexico.



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Emergency response exercises like the one recently held in Trieste provide the opportunity to test new technologies, such as this unmanned surveillance aircraft.

But hazards lurk everywhere. In 2009, an Alaskan volcano interrupted our nearby oil production. Last year, a leak caused a fire at our Richmond, California, refinery, and a seafloor oil seep shut down our Frade Field in Brazil. Increasingly, new upstream projects require complex production-processing plants, creating new ER readiness challenges, says Ginnett.

So our multilevel ER system emphasizes significant response capability at each facility, backed by regional and global response resources. We rank incidents from small to worst and respond accordingly. We train everyone in the Incident Command System (ICS), fast becoming the global standard for companies and governments alike, and use ICS in all our drills so business units can provide backup to each other. Participation in ICS also means Chevron can help other companies and they can help us.

We maintain a seasoned Worldwide Emergency Response Team, two Regional Response Teams and 11 Functional Teams (law, finance, environmental, etc.) whose members can temporarily leave their regular jobs. We keep suppliers, proven advisors, cleanup cooperatives and other resources under contract, ready to jump in.

Responding to Thieves

Still, Chevron's ER universe is a collection of separate worlds, thanks to geography and the imperative of local readiness. In Nigeria, for example, Tom Zapatka leads a 30-person cleanup unit kept busy by thieves who regularly damage oil pipelines: "Here, we have to be self-sufficient. We don't do many

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drills because we get all our experience constantly responding" He greatly appreciates, however, knowing that seasoned Chevron ER helpers are a phone call away if something big happens.

Also, beyond corporate resources, specialized ER teams promote constant improvement in specific business areas such as Upstream Capability and Manufacturing, each with unique challenges. Chevron Shipping, for example, runs 28 tankers and keeps approximately 200 more chartered. Says Shupe: "Unlike fixed assets, ours are constantly moving, so our area of responsibility is the whole world."

There's much more to our ER system, says Patry, but perhaps most important to know is we're ready for the worst. If it happens, a "virtual response company" will rapidly be stood up, with organization charts, stalwart leaders, proven processes, staff, backup - a businesslike ER machine with everything required to tackle a big incident for as long as it takes.

"A big incident will challenge any company," says Patry. "But when the bell rings for us, we'll know exactly what to do and how to do it."

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Testing in Trieste: The Italian port was chosen partly because cargos of Chevron crude pass through this location.

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Our partnership is bringing medicine – and medical skills – to where they're needed most.

We are taking the fight against often fatal diseases to a new level in three of our countries of operation. Chevron has teamed up with Baylor College of Medicine and Texas Children's Hospital to build sustainable self-sufficiency in the medical services in Angola, Liberia and Romania.

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Left: Dr. Patrick McGann (left) and Angolan colleague Arão Pedroto confer on sickle cell disease treatments.



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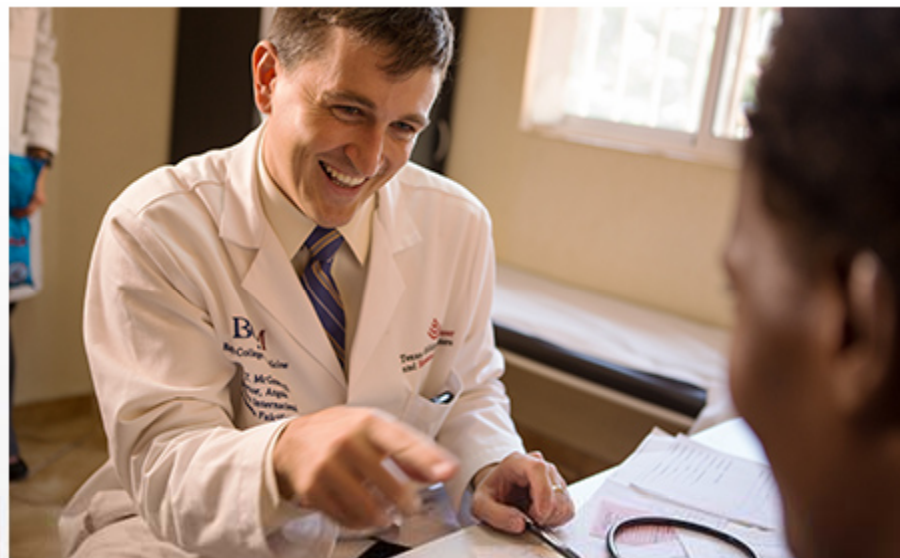
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Combating Sickle Cell Disease in Angola

In Angola, a baby with sickle cell disease is born every hour; most of them will die before they reach their fifth birthday. But this tragic disease, the most common genetic condition in the world, is treatable. Improved survival can result from early diagnosis and initiation of care by capable, committed medical professionals.

Dr. Patrick McGann (pictured here), a pediatric hematologist at Baylor College of Medicine and Texas Children's Hospital in Houston is one of those people. Dr. McGann is director of the nation's first comprehensive sickle cell initiative – a program involving the Angola government, Baylor and Chevron that began in early 2011.

During the program's first two years, he has already seen results. "Nearly all of the babies we have screened and brought to care are surviving," he says proudly. "Without this important initiative, there is no doubt that a majority of these babies would have already died."

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Bringing Hope and Saving Lives

To help its children, the Angolan government reached out to Chevron, which has operated in the country for more than 50 years. Chevron, in turn, teamed up with the Baylor International Pediatrics AIDS Initiative (BIPAI) at Texas Children's, which runs the world's largest HIV/AIDS treatment program.

"With Chevron's support, we can provide the human capacity to deliver care and train Angolan medical professionals to handle the long-term challenge of combating sickle cell disease," says Dr. Mark Kline, founder and president of BIPAI, physician-in-chief of Texas Children's and chair of the Department of Pediatrics at Baylor.

In Angola, the Chevron/Baylor program brings hope and saves lives. "We're seeing a dramatic improvement among the children with this disease – 98 percent are alive through inexpensive measures like penicillin injections," says Dr. David Poplack, head of the Hematology and Oncology section of Baylor.

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A Doctor for Every 3,000 Children

In December 2011, we agreed to commit \$6 million over five years to expand Texas Children's Global Health Corps (GHC) program, which provides life-saving pediatric health care, treatment and training to the most medically underserved populations in Africa. Our first GHC doctors already are working in Angola and Liberia.

"Every doctor we put on the ground takes care of approximately 3,000 children," says Dr. Kline. He is pictured fourth from left with Ali Moshiri, president of Chevron Africa and Latin America Exploration and Production Co. to his left, and Africa-bound colleagues in a 2012 photo.

"We value the opportunity to support remarkable doctors who provide critical day-to-day pediatric and maternal health care," says Moshiri, "while they train in-country caregivers to help build a legacy of greater health expertise."

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Improving Maternal Health in Liberia

A native of Liberia, Dr. Yvonne Butler grew up in the United States and worked in several international locations. "I'd always dreamed of working in Liberia and contributing to my place of birth," she says. She got that opportunity as one of the first two GHC doctors assigned to Liberia.

A country recovering from 14 years of civil war, Liberia poses formidable challenges. "I've channeled the sadness and heartbreak I feel into energy and hope of creating a healthier Liberia. I've been trained to treat all patients as if they were my sister or mother, and I feel honored by the opportunity to teach and train them."

One of her most rewarding moments came when she delivered a baby to a woman who had previously had two miscarriages. The woman insisted on naming the child Doctor Butler, explaining that "she wanted her child to be just like me."

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Supporting Remarkable Doctors

Dr. Butler is excited about the chance to counter Liberia's increasing mortality rate among women and children. Soon Baylor and Texas Children's will assign additional GHC doctors to Liberia and other countries with urgent medical needs.

Their presence is a first step stresses Dr. Billy Johnson, chief medical officer at the John F. Kennedy Medical Center in Monrovia. "The magnitude of the pediatric health programs in Liberia is severe due to the shortage of specialized physicians and lack of diagnostic facilities, which includes laboratories and equipment. But the GHC program already has had a positive impact on the delivery of health care, especially in the areas of clinical evaluation and teaching."

In the photo, Dr. Butler is pictured fourth from left with Her Excellency Ellen Johnson Sirleaf, president of Liberia; Dr. Wvanne Scott-McDonald, general administrator and CEO of John F. Kennedy Medical Center; fellow GHC doctor Josephine Reece; and Nadeem Anwar, Chevron's social investment lead in Liberia.

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Mobile Medical Services for Romania

In Romania, one in ten people is infected with hepatitis B or C, and the number infected with HIV also is continuing to rise. Until now, health screening services have been inaccessible, leaving many people vulnerable to infectious diseases and often unaware of their risks. But Chevron Romania is helping to provide medical treatment and community awareness through a 2013 grant to Baylor-Romania, part of Texas Children's BIPAI program.

The grant will support a mobile laboratory that offers critical testing to the local community. Additional testing will be available at a number of strategically located Baylor centers.

"Chevron's partnership with Baylor-Romania will provide care for and help prevent the spread of infectious diseases," says Tom Holst, Chevron Romania general manager. "This free and confidential service will improve access to medical care and treatment, strengthening the region's public health system."

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