

TECHNOLOGY

Oil industry is starting to fund research again

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The University of Houston saw its research and development partnerships sink during the oil price crash.
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Second in a series. Read the first part [here](#).

An innovation-crazy oil and gas industry is again putting its money where its mouth is, re-emerging as a key source of research funding.

While it's far from a full rebound, universities are reporting stabilizing support from oil and gas for academic research into new energy technologies. An industry-supported institution says it's launching an ambitious new oil field research project. And companies that do business with upstream oil and gas partners say interest in new groundbreaking research and development projects is rising.

By the end of this year, a new state-of-the-art facility should be up and running in Cincinnati to test the degree of industry enthusiasm for R&D spending.

Newly folded under the wings of the technology conglomerate General Electric Co., Baker Hughes, a GE Company (BHGE), recently celebrated the groundbreaking of its forthcoming Inspection Technology Customer Solutions Center. The company says the new center will be a hub for collaborative R&D.

Holger Laubenthal, CEO of BHGE's inspection technologies unit, says his company's forays into advanced sensors and equipment scanning devices are gaining a following from the energy industry. He said he believes energy companies will seize the opportunity to use the new Cincinnati facility to share in Baker Hughes' R&D efforts, or to pursue their own initiatives.

"It really makes us collaborate with customers, and that's part of our DNA. We've done this for decades, if not longer," he said in an interview. "We're seeing significant interest."

The technologies his company hopes to roll out will scan parts and equipment, conducting integrity and safety inspections in fractions of the time it would take humans to do the same work, an enticing prospect for an industry now pursuing labor-saving solutions to keep overall costs lower. Such innovations allow oil companies to stay in business, retain employees and expand their payrolls ([Energywire](#), July 19).

Yet despite fears of automation supplanting workers, Laubenthal says these technologies his company aims to pursue in R&D partnerships will augment oil field workers.

"You will always need some expertise in terms of how to interpret the readings, how to make sure that the sensors are at the right spot; that's always going to be there," he said. "You can maintain more proactively instead of reactively, so there are some significant benefits for operators."

The oil price crash from mid-2014 saw capital fleeing the oil patch. Ambitious visions were shelved and ongoing projects scaled back as pressure to reduce spending and costs mounted.

This wave of thrift in oil and gas hit universities and research centers hard.

Laboratories reported taking steep hits to their projects, while some oil companies abandoned university collaborations altogether. Research directors were forced to make painful adjustments ([Energywire](#), Oct. 5, 2015).

University technology hubs are still feeling the pinch but say that things are steadily getting better.

"Our industry supported research dropped about 30 percent," said Scott Tinker, director of the University Texas, Austin's Bureau of Economic Geology (BEG). "It has stabilized."

BEG's Advanced Energy Consortium still hasn't regained its full strength, he noted. A handful of companies were compelled to pull their names off the list of supporting members after the oil price crashed. "Some are coming back into it now, but many companies went away via acquisitions," Tinker said. "So for consortia, the pool of companies is smaller."

Partnerships with the University of Houston were also hit as the industry stepped away from R&D. But Ramanan Krishnamoorti, the chief energy officer at UH, says some companies are coming back, and he sees signs of a rebound as the oil industry finds its footing, even in an atmosphere of \$50-per-barrel crude.

"The University of Houston reports increased participation in its energy-related consortia, with more companies participating after membership had decreased," he said. "It also reports doing technical development projects with a number of companies, including signing master research agreements with companies."

UH is also finding new avenues for tapping into oil and gas research dollars. "UH has seen increased activity from international oil companies, including Oil India Limited, with whom the university is engaged in projects on advanced reservoir management and carbon capture and sequestration," Krishnamoorti added.

Falling behind

R&D has long been a subject of angst in the United States, particularly when experts draw international comparisons.

The U.S. federal government funds basic and applied research on a massive scale, and the nation's universities are world-leading centers for technology research. But the private sector in the United States has a long history of devoting far less resources to R&D compared to international competitors.

Scholars partly blame this lagging interest in R&D spending for the demise of a host of U.S. technology companies and the near-extinction of the U.S. semiconductor industry before the Reagan administration intervened to save it from foreign competition.

Other analysts complain that even as U.S. companies achieve breakthroughs in R&D to create new technologies, those companies are too quick to sell off these innovations or cede them to foreign interests, leading to U.S. inventions enriching the manufacturing sectors of other nations. Some observers of these trends are now pushing back.

The Boston Consulting Group, previously a champion of offshoring U.S. manufacturing capabilities, is now calling for an [innovation revolution](#) to save them, with advanced R&D leading the way.

BCG says the United States still leads the world at the "front end of R&D" — basic and applied science and research. But the nation is lagging in development, the phase for bringing research discoveries into commercial reality. Here, China now outspends the United States in commercially minded R&D, says analysts, and will be spending twice as much as the United States in development research within five years at current trend rates.

BCG sees university-centered research consortia and greater government support for industry-directed R&D as critical to turning the situation around. "Such collaboration is especially critical if U.S. industry is to successfully compete with other nations in deploying advanced Industry 4.0 manufacturing systems, such as autonomous robots, additive manufacturing machines, and digital simulation tools," analysts state in their report.

Advocates for even greater technology R&D and research collaboration fear more setbacks are in store.

As proof, they point to the Trump administration's push to dramatically slash spending on R&D efforts at the Department of Energy, and calls by the administration for the elimination of the Manufacturing Extension Partnership (MEP), run by the National Institute of Standards and Technology.

Robert Atkinson, president of the Information Technology and Innovation Foundation, argues that eliminating the \$130 million MEP would be a major blow to U.S. innovation and competitiveness. MEP combines federal, state and private money at 60 centers around the country to boost R&D endeavors. "It mostly helps small manufacturers adopt lean production, adopt new technologies, figure out how to export. It is a fantastic program," said Atkinson. "The Canadians have a similar program. They spend 10 times more than we do per GDP. The Germans spend 20 times more. The Japanese spend 40 times more. Trump wants to eliminate it."

Fears about DOE cuts

Atkinson also argues against cuts to R&D projects at DOE.

He fears for the future of ARPA-E, or DOE's Advanced Research Projects Agency-Energy. Calls to slashing ARPA-E's funding or even eliminating the program altogether would see the U.S. further retreating from advanced technology R&D, he says.

BCG analysts share the view that other nations are excelling at generating economic output from advanced R&D, while U.S. industry largely languishes.

Though the United States leads in total dollars devoted to basic R&D, it "has struggled in recent decades, however, to translate technological breakthroughs into domestic manufacturing," says the report. "Flat-panel displays, lithium ion batteries, digital mobile handsets, notebook computers, and photovoltaic cells and panels are all examples of products created with technologies that were invented in the U.S. but largely industrialized elsewhere."

Given the spotty history of R&D in other U.S. industries, the oil and gas industry's sharp pullback from R&D spending during the oil price downturn generated great concern, seeing how the shale oil and gas revolutions (sparked in part thanks to U.S. government-supported R&D) saw the U.S. oil and gas industry eclipsing its peers abroad. Domestic oil production has nearly doubled and natural gas output is up by some two-thirds due to oil companies' willingness to engage in patient and often expensive research, say energy R&D advocates.

Signs of revived interest in R&D at oil and gas may help to alleviate earlier worries. As oil companies grow comfortable with the current business climate, their comfort levels with R&D support appears to be rising, as well, albeit slowly.

Exxon Mobil Corp. announced earlier this summer millions of dollars in donations to universities across the country, including \$13 million to colleges and universities in Texas. Exxon Mobil continues to pursue a partnership in advanced energy technology research with UT Austin. Exxon and Italian energy company Eni SpA both recently announced initiatives in advanced biofuels research.

The Research Partnership to Secure Energy for America, an initiative from the George W. Bush administration, lives on independently thanks to support from both industry and academia.

Laubenthal at BHGE sees promise for his company's forthcoming Cincinnati R&D hub, a 26,000-square-foot solution center being built at an estimated cost of \$4 million. The center will pursue research and develop technologies in a range of applications, including corrosion prediction, digital pipeline and facilities inspections, and end-of-life hardware and systems modeling.

The suite of inspection technologies slated to be pursued there includes advanced X-ray systems, ultrasound, sensors and more. The company plans to broaden its customer base to include the automotive, aviation and electronics industries, but Laubenthal predicts activity will be driven mainly by energy R&D.

"Our technologies are really resourced from multiple industries," he said. "We deploy them, we sell and we service to customers across a range of industries, but oil and gas is one and clearly a more prominent one given where we are today."

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