# Data analysis could trigger new shale gas revolution

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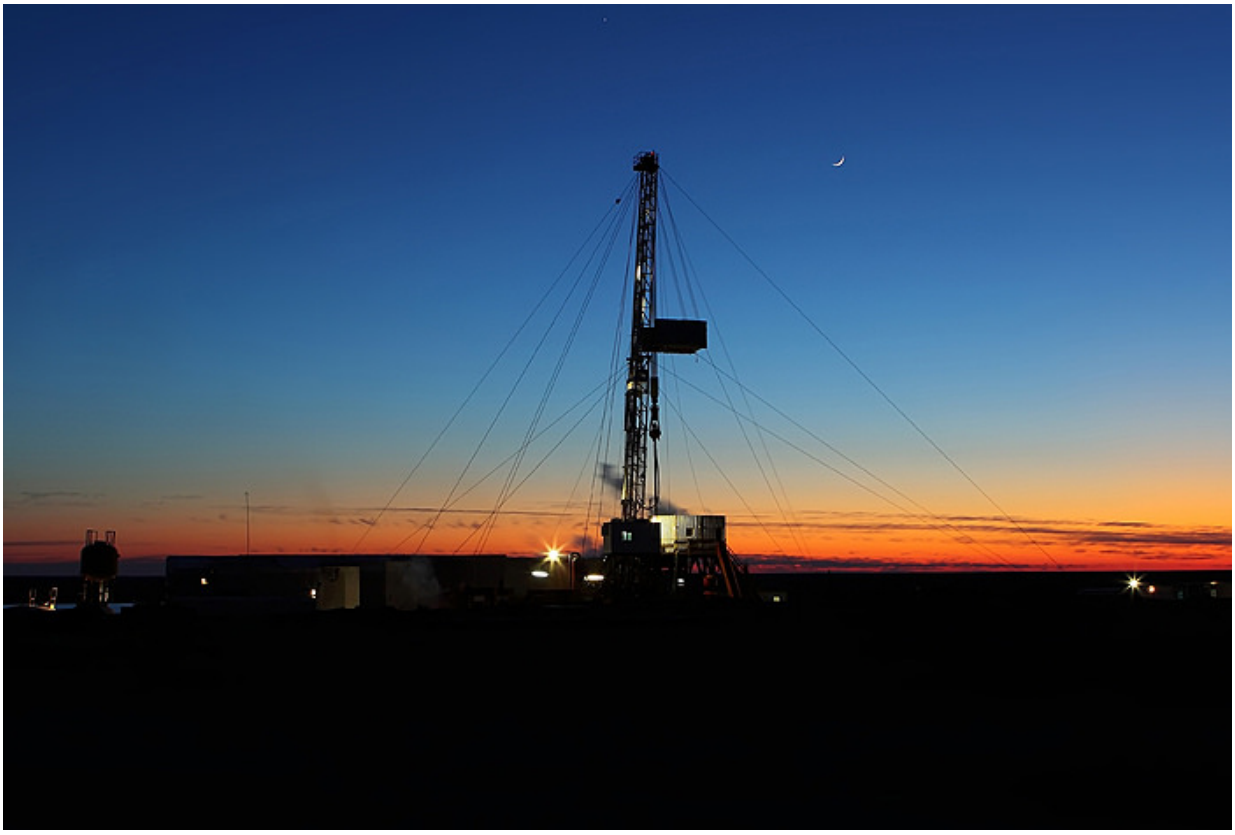

Los Alamos applies its expertise in data analysis and high-performance computing to study oil and gas production as part of its mission to enhance the nation's energy security. Credit: Los Alamos National Laboratory

Extensive data mining and analysis of 20,000 shale gas wells has

revealed how "refracturing" existing wells with new technology could transform them from diminished producers into high-performers long after their initial peak production period has ended.

"Our analysis could potentially aid in reducing the number of new wells to be drilled," said Richard Middleton, lead author of the study by a team of Los Alamos National Laboratory scientists. "In addition, through better fracturing techniques and alternative working fluids such as supercritical carbon dioxide, we see ways to both increase shale gas recovery and minimize environmental impacts through carbon sequestration," he said.

The analysis, reviewing 23 years of production from 20,000 wells, identifies key discoveries, lessons learned and recommendations for greatly improving "tail production," that is, the long-term production after the initial peak production of a well.

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"We hypothesize that manipulating tail production could re-revolutionize shale gas extraction," he said. Shale gas production through hydraulic fracturing is characterized by substantial gas production in the first few months to a year, but the production exponentially declines after only a month or two. Tail production starts about 12 months after this initial exponential decline. "Hydraulic fracturing research has largely focused on the initial 12-month production, since an operator will break even and make a profit from this 'exponential' production. However, in the paper, we try to emphasize the importance and value of this long-term, tail production," Middleton said.

The data mining analysis revealed that "refracturing" existing wells with

new technology can transform them into high-performing wells with the production characteristics of a newly drilled site. The paper in Applied Energy notes that this observation has profound implications in the potential revitalization of the hundreds of thousands of shale gas wells across the United States.

"Refracturing existing wells drastically reduces environmental impacts by using the existing footprint. Refracturing could be particularly important because our research shows that older fracturing technologies leave behind a greater amount of shale gas resources than more modern techniques," the paper notes.

In addition, the longer use of existing wells is cost effective, the authors point out. Restimulating an existing well eliminates the capital cost of a new well, while providing a smaller environmental footprint.

**More information:** The shale gas revolution: barriers, sustainability, and emerging opportunities, DOI: 10.1016/j.apenergy.2017.04.034

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