

# Exploring new methods of thermal recovery

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Berna Hascakir, assistant professor in the Harold Vance Department of Petroleum Engineering at Texas A&M, was featured in a recent article on thermal recovery by Jennifer Pallanich in the Upstream Technology bimonthly magazine.

Oils that are trapped underground that have a high viscosity are called 'heavy oil' and are difficult to extract. Thermal recovery is the science of reducing the viscosity so the oil can flow and be recovered. Of the many thermal recovery methods, steam injection, invented in the 1960s, is the most common.

"It's easy to apply and it has been tested," says Hascakir, who has studied thermal recovery methods for over a decade. "So operating companies know that if they invest x amount of money, they know how much they will get out of that project. But the oil recovery is not that high, so you cannot recover all the oil in place," she added.

She is referring to the fact that creating steam is energy intensive and it can often take 10 barrels of water to produce 1 barrel of oil.

Hascakir currently heads the research group HOCAM (Heavy Oil, Oil Shales, Oil Sands, & Carbonate Analysis and Recovery Methods) which aims to find environmentally friendly and economic solutions for challenging reservoirs, including those with heavy oil. Specifically, her group is using thermal enhanced [oil recovery](#) in conjunction with smart well technologies and seismic monitoring. One of the enhanced methods is radio-frequency heating or microwave heating. The challenge is to

heat the heavy oil in order to change its viscosity while allowing for the different materials the heating will pass through in order to reach the target.

"High absorbance molecules are jostling back and forth, and this motion is generating heat," she says. She equates it to plastic and food in a microwave oven where the microwaves pass through plastic and heat only the food. "You can target some part of the reservoir by using microwave heating." The drawback? "You don't know where the high absorbance molecules are in the heterogeneous reservoir."

Just like the water molecules in food which will turn to steam with the application of microwaves and heat the food molecules around it, "reservoirs rich in water content will respond to this method positively," she adds. So instead of heating water with conventional methods and pumping it down the well as steam, the microwaves create steam in place which reduces the viscosity of the oil around it so the oil can flow and be recovered.

More information on her research can be found at her [website](#).

Provided by Texas A&M University

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