LSU Petroleum Engineering Professor Receives Grant to Track Subsurface CO2 Flow

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BATON ROUGE, LA – LSU Craft & Hawkins Department of Petroleum Engineering Associate Professor Mehdi Zeidouni is the recipient of a $252,160 grant from the LSU Institute for Energy Innovation for his work on tracking subsurface carbon dioxide flow and well-sealing capacity in Geological Carbon Storage (GCS) projects.

"CO_2 capture and storage (CCS) is a practically proven technology widely considered to be part of the solution to the decarbonization equation," Zeidouni said. "Louisiana is an ideal place to benefit from CCS and to lead the CCS efforts both nationally and globally for a number of reasons."

According to Zeidouni, what makes the state a great place for CCS is that Louisiana's economy is highly carbon-intensive in the nation with

- ~200 million tons of annual CO_2 emission;
- the cost of CO_2 capture is relatively low in Louisiana because most CO_2 comes from industrial sources, not power generation;
- the existence of many large point-sources of CO_2, which promotes the economy of scale;
- Louisiana's subsurface geology provides huge capacity to store large volumes of CO_2 safely in thick, highly porous, and contiguous rocks in the subsurface;
- there's a wealth of subsurface information that exists thanks to the long history of oil and gas

exploration and development that can be used to accurately characterize the subsurface;
- and Louisiana's extensive oil and gas infrastructure and skilled workforce can be leveraged for CCS industry.

"Large volumes of CO_2 are predicted to be captured and eliminated via GCS over the upcoming years in the Gulf Coast region and especially in the Louisiana Chemical Corridor along the Mississippi River," Zeidouni said. "Tracking CO_2 migration within and beyond the target injection zone is required to verify that the injected CO_2 is contained within the intended CO_2 storage complex and help the operators optimize the injection operations to maximize the storage efficiency."

Zeidouni added that Class VI well permitting requires the operators to demonstrate GCS site feasibility by characterizing the site and showing its potential to contain the injected CO_2 prior to injection and over the post-closure period of GCS projects.

"Accordingly, monitoring, verification, and an accounting program is an essential part of the Class VI permitting with the goal of ensuring long-term safety and monitorability of the GCS sites," Zeidouni said.

Zeidouni's project aims to improve the effectiveness of pressure and temperature data in monitoring GCS projects at various phases. P&T data at injection/observation wells can be acquired at low cost along the entire length of wellbores to determine the fate of injected CO_2 in the subsurface. He will also introduce new methods to acquire and analyze P&T data to enable quantitative estimation of major unknowns of interest, including CO_2 plume lateral/vertical extent (partly through estimation of gravity number), CO_2 injection profile, and upwell CO_2 migration.

Zeidouni expressed his appreciation for the support from four research partners—Advanced Resources International, Carbonvert, BASF, and Gulf Coast Carbon Center at the Bureau of Economic Geology. Through collaboration with these partners, he plans to enable practical implementation of his proposed P&T monitoring approaches.

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Contact: Libby Haydel
Communications Manager
225-578-4840
ehaydel1@lsu.edu (mailto:ehaydel1@lsu.edu)

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