

Energy & Environmental Research Center

15 North 23rd Street, Stop 9018 • Grand Forks, ND 58202-9018 • P. 701.777.5000 • F. 701.777.518 www.undeerc.org

April 26, 2023

Mr. Reice Haase Deputy Executive Director North Dakota Industrial Commission 600 East Boulevard Avenue, Department 405 State Capitol, 14th Floor Bismarck, ND 58505-0840

Dear Mr. Haase:

Subject: Quarterly Progress Report for the Period January 1 – March 31, 2023 "Underground Storage of Produced Natural Gas – Conceptual Evaluation and Pilot Project(s) (HB 1014)"; Contract No. G-049-092; EERC Fund 23984

Attached please find the Energy & Environmental Research Center (EERC) Quarterly Progress Report for the subject project. If you have any questions, please contact me by phone at (701) 777-5050 or by email at bkurz@undeerc.org.

Sincerely,

DocuSigned by: Bethany Kurz

Bethany A. Kurz Director of Analytical Solutions

BAK/kal

Attachment

c: Karen Tyler, North Dakota Industrial Commission Teresa Bonev, EERC



UNDERGROUND STORAGE OF PRODUCED NATURAL GAS – CONCEPTUAL EVALUATION AND PILOT PROJECT(S) (HB 1014)

Quarterly Progress Report

(for the period January 1 – March 31, 2023)

Prepared for:

Reice Haase

North Dakota Industrial Commission 600 East Boulevard Avenue, Department 405 State Capitol, 14th Floor Bismarck, ND 58505-0840

Project Period of Performance: June 1, 2019 – June 30, 2023

Prepared by:

Bethany A. Kurz Todd Jiang Chantsalmaa Dalkhaa Ailin Assady Michael P. Warmack Meghan A. Taunton Caitlin M. Olsen Matthew L. Belobraydic Teresa A. Bonev

Energy & Environmental Research Center University of North Dakota 15 North 23rd Street, Stop 9018 Grand Forks, ND 58202-9018

April 2023

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UNDERGROUND STORAGE OF PRODUCED NATURAL GAS – CONCEPTUAL EVALUATION AND PILOT PROJECT(S) (HB 1014) Quarterly Progress Report January 1 – March 31, 2023

EXECUTIVE SUMMARY

The Energy & Environmental Research Center (EERC) is performing a project to directly address the intent of Section 25 of House Bill 1014 of the Sixty-Sixth Legislative Assembly of North Dakota as signed into law by Governor Burgum, which states that funding will be made available to the EERC for "pilot projects relating to the underground storage of produced natural gas." The overall goal of the proposed effort is to demonstrate the techno-economic feasibility of produced natural gas ("produced gas") injection into nonhydrocarbon-producing subsurface formations in the Williston Basin for future recovery and use or for pressure maintenance and/or enhanced oil recovery (EOR) in a conventional or unconventional oil reservoir. To achieve the project goal, the EERC set out to partner with North Dakota oilfield producers on up to three pilot project efforts to define and assess the key technical, economic, and regulatory components of each approach.

The EERC's activities this past quarter focused on development of the draft final report for the project. In addition, internal review and revision of several other supporting reports/documents continued. These reports will serve as the basis for a comprehensive final report that will summarize each of the gas storage concepts and scenarios evaluated during the course of the project, including lessons learned and the potential applicability of the approach within western North Dakota as a means to help reduce flaring. Activities during the next quarter will focus on finalizing all existing products.

UNDERGROUND STORAGE OF PRODUCED NATURAL GAS – CONCEPTUAL EVALUATION AND PILOT PROJECT(S) (HB 1014) Quarterly Progress Report January 1 – March 31, 2023

INTRODUCTION

The Energy & Environmental Research Center (EERC) is performing a project to directly address the intent of Section 25 of House Bill (HB) 1014 of the Sixty-Sixth Legislative Assembly of North Dakota as signed into law by Governor Burgum, which states that funding will be made available to the EERC for "pilot projects relating to the underground storage of produced natural gas." The overall goal of the proposed effort is to demonstrate the techno-economic feasibility of produced natural gas ("produced gas") injection into nonhydrocarbon-producing subsurface formations in the Williston Basin for future recovery and use or for pressure maintenance and/or enhanced oil recovery (EOR) in a conventional or unconventional oil reservoir.

The primary objectives of the program are to evaluate the viability of various subsurface formations as storage and/or injection targets, document the facilities and equipment needs and costs for produced gas injection, predict the subsurface storage footprint of injected gas plumes over time, predict gas recovery efficiencies, develop a monitoring plan, and summarize the required regulatory considerations for different injection/storage scenarios. The goal is to obtain the above information through a combination of research activities performed at the EERC and from up to three pilot projects performed in partnership with, and including substantial financial investment from, oilfield operating companies.

ACCOMPLISHMENTS DURING REPORTING PERIOD

Program Management and Reporting

The focus of program activities over the last quarter was to complete the draft final report which is due to the North Dakota Industrial Commission (NDIC) on April 30, 2023. In addition, work continued on a white paper summarizing flaring, gas capture, and infrastructure development in western North Dakota (associated with Bakken development) and the policies North Dakota has put in place in response to increased production and subsequent flaring of gas. Continued work on a higher-level primer explaining the history of Bakken gas production, reasons for gas flaring, progress made with respect to gas capture and processing, and the uses of natural gas and natural gas liquids (NGLs).

FUTURE ACTIVITIES

The planned activities for the next quarter are detailed as follows.

Program Management and Reporting

The focus during the next quarter will include completion of the draft final report for submittal to NDIC and finalization of the other documents that were prepared during the course of the study, including:

- A white paper and information primer on flaring, gas capture, and infrastructure development in western North Dakota (associated with Bakken development).
- A document summarizing the key permitting requirements needed for temporary subsurface gas storage.
- A higher-level primer explaining the history of Bakken gas production, reasons for gas flaring, progress made with respect to gas capture and processing, and the uses of natural gas and NGLs.

PARTNERS AND FINANCIAL INFORMATION

The project is sponsored by NDIC through its Oil and Gas Research Program and partners XTO Energy, MRO, Maroon Bells, Liberty, and EOR ETC. Table 1 shows the expenses through the reporting period. It should be noted that the EERC received an amendment to the NDIC agreement indicating that, on August 4, 2022, NDIC accepted the recommendation of the Oil and Gas Research Council to reallocate \$2,500,000 from Contract No. G-049-092 (Underground Storage of Produced Natural Gas) and provide additional funding of \$2,500,000 for the project under Contract G-054-104 (Field Study to Determine the Feasibility of Developing Salt Caverns for Hydrocarbon Storage in Western North Dakota). Therefore, the budget for this project was reduced from \$6,000,000 to \$3,500,000, as reflected in Table 1. In addition, on December 20, 2022, NDIC voted to grant a variance from the Oil and Gas Research Council Policy 3.02 to allow the project to be completed with a 57% match from NDIC. Paragraphs 2 and 3 of Contract No. G-049-092 were amended to reflect the project cost reallocation to complete the project. This third amendment to the contract was officially executed in early January of 2023.

Sponsors	Budget	Expended	Balance
NDIC	\$3,500,000	\$3,320,529	\$179,471
Industry Share – In-Kind	\$2,611,339		\$(0)
ХТО		\$1,028,120	
MRO		\$734,813	
Maroon Bells		\$252,656	
Liberty		\$395,678	
EOR ETC		\$200,073	
Total	\$6,111,339	\$5,931,868	\$179,471

Table 1. Budget and Expenses to Date