Energy & Environmental Research Center
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November 1, 2023

North Dakota Industrial Commission
ATTN: Clean Sustainable Energy Authority
State Capitol – 14th Floor
600 East Boulevard Avenue
Bismarck, ND 58505

Dear Clean Sustainable Energy Program:

Subject: EERC Proposal No. 2024-0031 Entitled "Marathon Petroleum Dickinson Renewable Fuel Facility Expansion"

Enclosed for your consideration is the Energy & Environmental Research Center's (EERC's) proposal, in partnership with Marathon Petroleum Corporation (MPC) and MPC's subcontractors, Burns & McDonnell, Technip Energies, Topsoe, Smith & Burgess, and BARR Engineering, to complete a front-end engineering and design feasibility study for enhancement of the MPC renewable fuel facility in Dickinson, North Dakota. Thank you for considering our proposal.

If you have any questions, please contact me by phone at 701.777.5273 or by email at cwocken@undeerc.org.

Sincerely,

DocuSigned by:
Chad Wocken
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Chad A. Wocken
Assistant Director, Clean Energy Solutions

Approved by:

DocuSigned by:
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Energy & Environmental Research Center

CAW/bjr

Enclosures

Clean Sustainable Energy Authority

North Dakota Industrial Commission

Application

Project Title: Marathon Petroleum Dickinson Renewable Fuel Facility Expansion

Applicant: Energy & Environmental Research Center

Date of Application: November 1, 2023

Amount of Request
Grant: $10,000,000
Loan: $0

Total Amount of Proposed Project: $21,761,930

Duration of Project: 24 months.
(March 1, 2024 – February 28, 2026)

Point of Contact (POC): Chad A. Wocken

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Stop 9018, Grand Forks, ND 58202-9018

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ABSTRACT

In 2021, Governor Burgum announced a North Dakota goal of carbon neutrality by 2030 and at the national level, the federal government set a goal of net-zero carbon emissions by 2050. To achieve these goals and maintain North Dakota leadership in clean, sustainable energy, substantial investment will be required in fuel production and carbon capture and storage infrastructure. Currently, total annual sustainable aviation fuel (SAF) production in the United States is less than 100 million gallons. The United States Aviation Climate Action Plan released in 2021 set a goal of net-zero greenhouse gas emissions from the aviation industry by 2050, with a 2030 production goal of 3 billion gallons and a 2050 production goal of approximately 35 billion gallons, enough to fuel 100% of domestic aviation fuel demand. The proposed project will support these goals by expanding clean energy production in North Dakota while reducing emissions associated with both fuel production and its use.

Objectives: The Energy & Environmental Research Center (EERC) and Marathon Petroleum Corporation (MPC) have embarked on the initial stages of a front-end engineering and design (FEED) study to expand renewable fuel production at the MPC Dickinson facility and diversify its product mix to include SAF. This proposal outlines the project and how Clean Sustainable Energy Authority (CSEA) funding will be used to support the "definition" stage (front-end loading [FEL]-3) and provide the detailed information needed to make a final investment decision (FID) prior to project implementation. The proposed project is needed to catalyze meaningful investment in the enhancement of renewable fuel production in North Dakota that will diversify the state's economy and leverage and expand use of North Dakota's vast resources (both energy and agricultural) while reducing the carbon intensity (CI) of the locally produced products.

Expected Results: The project will support CSEA's mission to develop and deploy large-scale commercial projects (commercial-scale renewable fuel facility expansion and diversification) to reduce environmental impacts and increase the production of sustainable low-CI fuels while also adding carbon capture to further reduce the CI of fuel manufacturing. The proposed FEED study will generate information needed to enable MPC to make an FID to expand the capacity of its Dickinson renewable fuel facility by up to 90%, diversify its renewable fuel products to support emerging clean fuel demands including SAF, implement a pretreatment unit to accommodate the use of a variety of low-carbon feedstocks, and enhance the hydrogen production facility with carbon capture technology to further reduce the CI of renewable fuel manufacturing.

If successful, the project will increase the facility's demand for locally produced agricultural and waste oils; decarbonize regional aviation by adding SAF to its existing renewable product slate; reduce plant emissions by capturing and storing CO_2 from the largest source in the plant; achieve greater economy-of-scale benefits while entering new markets with increased operating flexibility and adaptability to changing market conditions, thus improving its economic viability; increase plant revenues and skilled labor head count which will increase state tax revenues and provide worthwhile job opportunities for its residents; expand industry presence and demonstrate carbon capture opportunities in the state that could attract other companies to North Dakota; and, leveraging these new assets, provide a potential platform for other MPC initiatives.

Duration: 24 months (March 1, 2024 – February 28, 2026)

Total Project Cost: $21,761,930, consisting of a $10,000,000 CSEA grant and $11,761,930 in cash from MPC.

Participants: The project will be managed by the EERC, with participation and sponsorship from MPC. The project will be conducted in partnership with the North Dakota Industrial Commission (NDIC) through CSEA, supported by MPC subcontractors, Burns & McDonnell, Topsoe, Smith & Burgess, Technip Energies, and BARR Engineering.

PROJECT DESCRIPTION

In 2021, Governor Burgum announced a North Dakota goal of carbon neutrality by 2030 and at the national level, the federal government set a goal of net-zero carbon emissions by 2050. To achieve these carbon reduction goals and maintain North Dakota leadership in clean, sustainable energy, a substantial investment will be required in infrastructure related to fuel production and associated carbon capture and storage (CCS). The Energy & Environmental Research Center (EERC) (proposal lead organization) is assisting Marathon Petroleum Corporation (MPC) in its effort to expand the capacity of its Dickinson renewable fuel facility by up to 90%, diversify its renewable fuel products to support emerging clean fuel demands including sustainable aviation fuel (SAF), implement a pretreatment unit to accommodate the use of a variety of low-carbon feedstocks, and enhance the hydrogen production facility with carbon capture technology to further reduce the carbon intensity (CI) of renewable fuel manufacture. To support these goals, MPC has embarked on initial stages of a front-end engineering and design (FEED) study, including preliminary feasibility and design activities, and is seeking Clean Sustainable Energy Authority (CSEA) funding to support the "definition" stage (front-end loading [FEL]-3) to provide the detailed information needed to make a final investment decision (FID) prior to project implementation.

Objectives: The proposed project will generate information required for an FID to add a major fuel to MPC Dickinson Renewable Fuel Facility's existing renewable product slate and expand its capacity by as much as 90% while reducing both plant CO_2 emissions and the CI of its products by more than 20%.

If successful, the project will increase the facility's demand for locally produced agricultural and waste oils by nearly double; decarbonize regional aviation by adding SAF to its existing renewable product slate; reduce plant emissions by capturing and storing CO_2 from the largest source in the plant; achieve greater economy-of-scale benefits while entering new markets with increased operating flexibility and adaptability to changing market conditions, thus improving its economic viability; increase plant revenues and skilled labor head count which will increase state tax revenues and provide worthwhile job opportunities for its residents; expand industry presence and demonstrate carbon capture opportunities in the state that could attract other companies to North Dakota; and, leveraging these new assets, provide a potential platform for other MPC initiatives. These benefits are aligned with the CSEA mandate to enhance production of clean sustainable energy, increasing the state's standing as a leader in clean sustainable energy.

Methodology: FEED can be categorized into four phases defined as FEL-1–FEL-4. FEL-1 typically consists of planning and screening studies. FEL-2 (feasibility design) consists of feasibility studies and preliminary design. FEL-3 (definition design) includes a complete system design with sufficient detail to enable a business decision to invest in the project. FEL-4 consists of project execution consisting of procurement, construction, and operation.

The MPC team previously began the FEED process, investing approximately $8 million to date to preliminarily assess project feasibility at FEL-1 and FEL-2 phases. This proposal requests funds to perform FEL-3 activities, consisting of a detailed process design; capital and operating cost estimates; project schedule; and a project execution plan describing permitting, procurement of equipment and materials, transportation and logistics, construction, commissioning, and start-up of the facilities sufficient to enable investment decisions for this innovative clean renewable fuel project.

Six tasks have been identified to execute this work and include project management and planning, engineering design for facility expansion, hydrogen production facility with carbon capture design, fuel

production reactor design and catalyst selection, process safety studies, and environmental permitting. Additional, detailed methodology can be found in Appendix B, which contains the detailed cost proposals from Burns & McDonnell (BMcD), Technip Energies, and BARR Engineering, and Appendix F, which contains the business plan and business-sensitive information related to each task.

Task 1.0 – Project Management and Planning: The planning and management of project activities will be performed by EERC personnel in close collaboration with MPC project managers. The EERC has a successful track record with similarly structured projects. Specific activities will include:

- Coordination and performance monitoring of all proposed tasks.
- Securing and tracking of cost-share funds.
- Managing budget resources.
- Planning and facilitation of status meetings.
- Preparation and submittal of progress and milestone reports to MPC.
- Preparation and submittal of progress reports and a final report according to North Dakota Industrial Commission (NDIC) requirements.

Upon award, the EERC will facilitate a kickoff meeting with all participants to reaffirm proposed goals, establish points of contact, review roles and responsibilities, review individual scopes of work, and discuss schedule and milestones. Weekly project update meetings/conference calls will be facilitated to verify tasks are on schedule, identify and mitigate anticipated challenges to the schedule, and discuss next work tasks.

Task 2.0 – Fuel Production Engineering Design: The FEED/definition study for the MPC Dickinson Renewable Fuel Facility expansion and associated infrastructure will be performed by BMcD, a qualified engineering company that has completed multiple projects at MPC facilities, including previous work completed at the Dickinson facility. Previous successful projects and knowledge of the existing site provided significant justification for collaborating on this potential project. Lower-level FEL design efforts have been initiated for several subtasks and will conclude in Quarter (Q) 1 2024. Task 2.0 consists of the FEL-3 FEED for the facility expansion. The subtasks for Task 2.0 are as follows:

- Subtask 2.1 – BMcD Task Management
- Subtask 2.2 – Process Design
- Subtask 2.3 – Equipment, Mechanical, and Piping Design
- Subtask 2.4 – Civil and Structural Design
- Subtask 2.5 – Electrical Design
- Subtask 2.6 – Instrumentation and Control Design

Detailed descriptions of each activity are outlined in Appendix F – Business Plan.

Task 3.0 – Hydrogen Production Facility with Carbon Capture Design: Task 3.0 consists of the FEL-3 FEED design for the hydrogen production facility with carbon capture and will be performed by Technip Energies, a qualified engineering company that has previously supported the existing hydrogen plant design at Dickinson. This familiarity with the site provided justification to the partner on a potential expansion project. The subtasks for Task 3.0 are as follows:

- Subtask 3.1 – Technip Task Management

- Subtask 3.2 – Process Design
- Subtask 3.3 – Equipment, Mechanical, and Piping Design
- Subtask 3.4 – Civil and Structural Design
- Subtask 3.5 – Electrical Design
- Subtask 3.6 – Instrumentation and Control Design
- Subtask 3.7 – Carbon Capture Process Design

Detailed descriptions of each activity are outlined in Appendix F – Business Plan.

Task 4.0 – Fuel Production Reactor and Catalyst Selection: Task 4.0 consists of FEL-3 FEED design for the fuel production reactor and catalyst selection and will be performed by Topsoe. MPC and Topsoe have partnered at multiple MPC sites on technologies including the existing catalyst utilized in the Dickinson facility. MPC completed an initial request for proposal (RFP) to multiple licensors for SAF yields, and Topsoe was selected as part of that process. The subtasks for Task 4.0 are as follows:

- Subtask 4.1 – Fuel Production Reactor Design
- Subtask 4.2 – Final Catalyst Formulation Selection

Detailed descriptions of each activity are outlined in Appendix F – Business Plan.

Task 5.0 – Process Safety Study: Task 5.0 consists of FEL-3 FEED design for the process safety study and will be performed by & Burgess (S&B). MPC and S&B have an extensive history of collaboration across MPC sites and have worked on analysis for the Dickinson site previously. The subtask for Task 5.0 is as follows:

- Subtask 5.1 – Facility Relief System Limitation Study

Detailed descriptions of each activity are outlined in Appendix F – Business Plan.

Task 6.0 – Environmental Permitting: This task will include the development of the permitting strategy and filing permit applications for construction and operation. Task 6.0 FEL-3 FEED design for the environmental permitting will be performed by BARR Engineering. BARR Engineering and MPC have collaborated on multiple projects across MPC sites and worked together previously on the Dickinson facility. The subtasks for Task 6.0 are as follows:

- Subtask 6.1 – Permit Strategy Development and Ongoing Project Communications
- Subtask 6.2 – Project Emissions Inventory
- Subtask 6.3 – Federal and State Air Quality Regulatory Evaluations
- Subtask 6.4 – Best Available Control Technology (BACT) Evaluations
- Subtask 6.5 – Air Quality Impacts Analysis (dispersion modeling)
- Subtask 6.6 – Additional Impacts Analysis
- Subtask 6.7 – PSD Application Package
- Subtask 6.8 – Postapplication Agency Communications and Negotiations

Detailed descriptions of each activity are outlined in Appendix F – Business Plan.

Anticipated Results: The proposed FEED study and partnership of MPC, the EERC, and NDIC CSEA will support the development of the deployment of the commercial-scale expansion of the MPC Dickinson Renewable Fuel Facility for SAF production. This expansion project further diversifies North Dakota's energy sector, offers value-added opportunities for the state's agricultural oil seed production, reduces environmental impacts of aviation fuel production, and supports CSEA's mission to develop and deploy large-scale commercial projects that reduce environmental impacts and increase the sustainability of energy production. The proposed FEED study will provide the necessary information for the project sponsors to make an investment decision regarding this commercial project. Work products resulting from the proposed FEED study will include the following:

1. Design basis memorandum describing the scope of the proposed facilities
2. Cost estimate summarizing all material and labor costs
3. Detailed schedule consolidating the timelines of all scopes
4. Project execution plan describing permitting, procurement of equipment and materials, transportation and logistics, construction, commissioning, and start-up of the proposed facilities

Upon completion of the FEED study these work products will be used to provide a nonconfidential summary report that can be shared with NDIC and the public without compromising the business-sensitive information acquired through the project. Project status reports will be provided to NDIC as defined in the contract documents. Appendix F provides additional information regarding specific target values related to the anticipated results of the project, including emissions and environmental impact, expanded and diversified production targets, and economic impact.

Facilities and Resources: The EERC has over 254,000 square feet of facilities for technology demonstration, process modeling, and project execution. MPC owns and operates several facilities across the United States, including a renewable diesel facility (the subject of this proposal) in Dickinson, North Dakota. MPC has several hundred engineers who support projects throughout the United States.

A team of industry experts will perform all project activities, with the primary project administrative services provided by the EERC. For over 70 years, the EERC has conducted research, testing, and evaluation of fossil and renewable fuels, emission control technologies, and CCS technologies. The EERC manages over 200 contracts a year, with more than 1300 clients in 53 countries. Systems are in place for EERC project managers regarding fund accounting, budget reporting, contract milestone tracking, and contract services. The EERC is committed to providing all necessary personnel and resources to ensure the timely completion of all activities outlined in this proposal.

Project sponsor MPC has a long history of safe operations in North Dakota, extensive project development experience dedicated to large critical petroleum, natural gas, renewable fuels, and infrastructure projects, and subject matter experts to aid in the technical design of project assets including integrity, engineering, field services and planning, and operations. Additional strength is added to the project team from BMcD, Technip Energies, Topsoe, Smith & Burgess, and BARR Engineering, which have established business relationships with MPC and are recognized as leaders in their fields, of engineering design and consulting services across technical areas and geographies.

Techniques to Be Used, Their Availability and Capability: Design and cost data generated within this project will be acquired using recognized and best-available engineering practices and cost-estimating techniques. The key aspects of this design project include new renewable fuel-manufacturing and industrial-scale carbon capture technologies. While carbon capture technologies are not unique, carbon

capture is not widely utilized in industry. The technologies are commercially available, but their economical integration into existing facilities represents commercial risk. This risk is reduced through partnership with NDIC CSEA, while providing the state of North Dakota a leadership role in deploying clean energy technologies that add value to its energy and agricultural sectors. The proposed project team with support from the specific vendors possess decades of experience in their respective fields, spanning fuel production, infrastructure, storage, industrial facility design, environmental studies, and permitting. MPC has committed the necessary resources to execute this project, as evidenced by the letter of support in Appendix C. MPC has been a part of several engineering design projects for similar systems within North Dakota and around the country.

Environmental and Economic Impacts while Project Is Underway: The proposed FEED study consists of engineering design and project planning. It will not result in any environmental impacts to the study area or partner facilities. Limited travel to prospective site locations and partner offices will occur over the course of the project. Economic impacts during the FEED project will include jobs associated with performing the design and permitting work. Economic impacts during project execution include the jobs required to perform the FEED tasks.

Ultimate Technological and Economic Impacts: Upon successful completion of the proposed FEED study, and assuming a decision to proceed with development, project construction would create approximately 300 jobs and procurement of equipment, materials, and labor to support the construction phase. The construction phase would provide an impactful boost in local wages and spending. Appendix F contains additional information regarding specific target values related to the environmental and economic impacts of the project.

Once operational, the proposed SAF production capacity will be one of the largest in the United States compared with other announced SAF projects. The facility design will maximize SAF production while providing future flexibility in a quickly evolving market. Results of the proposed FEED study will provide more detailed information about the ultimate technological and economic impacts to North Dakota. Initial estimates of Increased job opportunity at the Dickinson Renewable Fuel Facility as well as related agricultural production and transportation (feedstock and fuel products) and other labor impacts are provided in Appendix F.

Why the Project Is Needed: Federal and state decarbonization targets include measures to reduce the CI of all transportation fuels. Unlike gasoline and diesel, which have alternative decarbonization measures (electric vehicles [EVs], biodiesel, ethanol, renewable diesel, renewable natural gas, hydrogen, etc.), aviation has fewer pathways to decarbonization. Currently, total annual SAF production in the United States is less than 100 million gallons. The U.S. Department of Transportation Aviation Climate Action Plan, released in 2021, set a goal of net-zero greenhouse gas emissions from the aviation industry by 2050, with a 2030 production goal of 3 billion gallons and a 2050 production goal of approximately 35 billion gallons, enough to fuel 100% of domestic aviation fuel demand. Hydrotreatment of esters and fatty acids (HEFA) is the most likely near-term option to support the aviation industry's decarbonization goal. Once completed, MPC's facility will be one of the largest HEFA SAF producers in the United States, providing an industry-leading facility located in North Dakota.

The proposed project is needed to provide the necessary technical and economic data to support MPC's decision to proceed with the construction and operation of the proposed facility expansion. The infrastructure within this project will diversify North Dakota's energy economy by producing new value-added products from the state's diverse renewable and fossil resources, and expansion into renewable

fuel technology represents a significant positive step toward low-CI energy with significant growth potential. Completing the proposed FEED study provides the cost information needed to make business decisions based on sound technical and economic information, thereby assuring the long-term viability of the business, and is required to engineer the optimal project to maximize the yield of SAF per barrel of feedstock.

STANDARDS OF SUCCESS

The proposed scope and partnership of MPC, the EERC, and NDIC CSEA will result in a FEED study for large-scale expansion, increase in processing capacity of up to 90%, diversification of low-carbon fuels manufacturing to include SAF, implementation of a pretreatment unit to accommodate the use of a variety of low-carbon feedstocks, and an upgraded hydrogen production facility paired with carbon capture. Successful completion of the proposed FEED study will be measured primarily by the creation of a technically sound design package, including associated cost and schedule estimates for the enhancement of renewable fuel production and subsequent FID. The investment and subsequent construction and operation will generate additional low-carbon fuel sources for transportation in North Dakota and the region, increased jobs and economic development, reduced emissions from fuel manufacture, and enhanced markets for North Dakota's agricultural products, leading to economic and environmental benefits consistent with CSEA goals. The proposed project is expected to result in CO_2 reduction, with a carbon capture estimate of approximately 300,000 metric tons/yr of CO_2. Additionally, during facility design, measures to further reduce the facility's CI scores will be evaluated.

The proposed Dickinson Renewable Fuel Facility expansion represents a significant investment and commitment by MPC in the diversification and sustainability of the energy industry in North Dakota and a major economic development opportunity for the state. MPC's proposed investment in equipment, materials, and labor expected for construction will provide a boost in local wages and spending during both the construction process and long-term operation. Projected economic impacts include increased tax revenue for North Dakota, increased job opportunity both in the short-term during construction and the long-term for operation, and creation of a new local demand for North Dakota oils, agricultural products, and animal/food waste. The project is estimated to bring approximately 10–15 permanent jobs created for operation and management of the project. Appendix F contains additional information regarding specific target values related to the standards of success for the project.

BACKGROUND/QUALIFICATIONS

The EERC has led several engineering design projects, including a retrofit pre-FEED study of a CCS system at Coal Creek Station, a retrofit pre-FEED study of a CCS system at Milton R. Young Station, and a FEED study that led to the implementation of a CCS system for Red Trail Energy. In addition, the EERC is currently leading a FEED study for the Coal Creek Station retrofit and continues to work with Red Trail Energy to validate performance and explore opportunities for increased carbon capture. Finally, the EERC, with partners MPC and TC Energy, is conducting a FEED study for the Prairie Horizon Hydrogen Hub, formerly known as the Liberty Hydrogen Hub, to evaluate creation of a comprehensive clean hydrogen production, infrastructure, and use project in North Dakota. In each of these projects, the EERC has managed multimillion-dollar contracts involving multiple engineering firms, industry partners, and public funding agencies. These projects have provided the EERC with real-world experience in identifying and managing the intricate needs and schedules for the engineering design of large-scale carbon capture facilities, and they have proved invaluable for assessing best methods for efficiently

executing important design studies that are necessary to progress to commercial deployment of novel clean energy technology.

The EERC also has over 60 years of experience collaborating with industry and government on H_2 technology development and is recognized for its role in advancing commercial deployment of technologies for producing, purifying, and utilizing H_2 from coal, natural gas, and renewables. In 2004, the EERC was designated the National Center for Hydrogen Technology by the U.S. Department of Energy (DOE).

MPC is the largest refining company in the United States, with over 2.9 million barrels of crude oil capacity per calendar day. MPC's refining footprint extends from the Midwest as far east as Ohio, to the U.S. Gulf Coast (USGC), Los Angeles, the Pacific Northwest, and Alaska. MPC's 13 petroleum refineries are spread throughout 12 different states. MPC's renewables footprint similarly spreads from the newly operational renewable diesel facility in Martinez, California, to the renewable diesel facility in North Dakota, and MPC is a joint venture partner at five ethanol plants within the Midwest. In 2022, the renewables sector of MPC produced roughly 400 million gallons of renewable fuels. MPLX, a master limited partnership (MLP) formed by MPC, contains significant terminal, fractionation, and logistics assets across the United States.

Committed to North Dakota, MPC has a proven track record of successfully executing major projects, which include environmental, safety, and cost and schedule management. Specific North Dakota assets include the following:

- Mandan Refinery processes 71,000 bpd of crude primarily from North Dakota and manufactures gasoline, distillates, propane, and heavy fuel oil.
- Figure 1 depicts the location of the Mandan Refinery as well as all MPC refineries around the United States.
- Dickinson Renewable Fuel Facility produces 13,600 bpd of 100% renewable diesel from refined soy oil and other organically derived feedstocks.
- Green Bison Soy Processing near Jamestown, North Dakota, has processing capacity of 150,000 bushels/day of soybeans. Oil from the plant can produce 75 million gallons/yr of renewable diesel.
- Mandan Terminal distributes diesel, gasoline, and jet fuel for market and ethanol offloading located at Mandan Refinery (Figure 2).
- Dickinson Rail Terminal possesses offloading/loading capabilities for feedstocks and refined products.
- Patterson Rail Terminal, operated by MPLX, receives renewable products and loads manifest and unit train railcars for delivery across the country.
- MPC has two retail brands, including the MPC and ARCO brands. ~7200 stores stretch across the United States, including the North Dakota region (Figure 3).

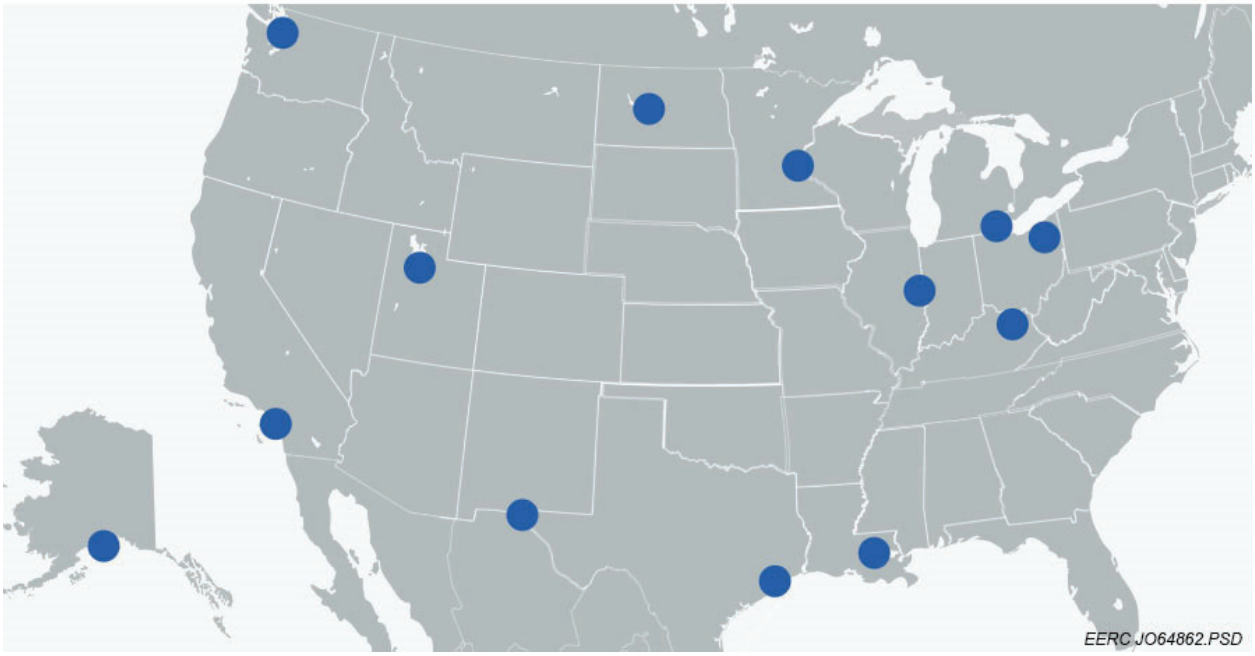

Figure 1. Geographical depiction of MPC refinery asset resources.

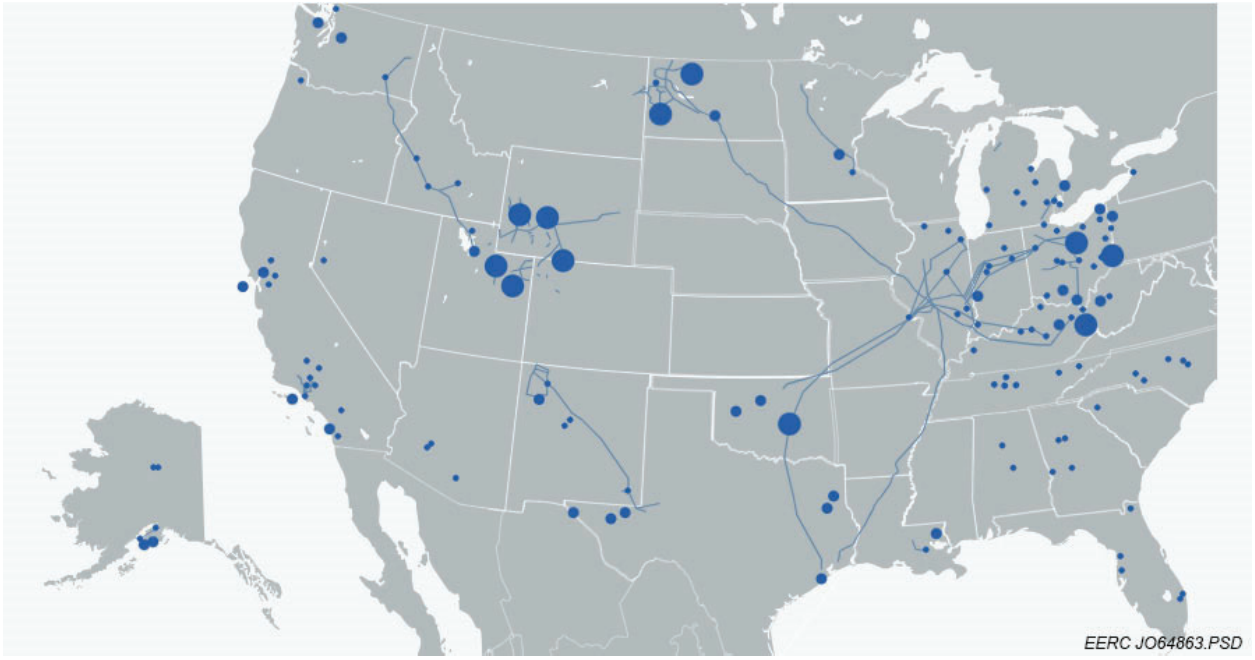

Figure 2. Geographical depiction of MPC Terminal asset resources.

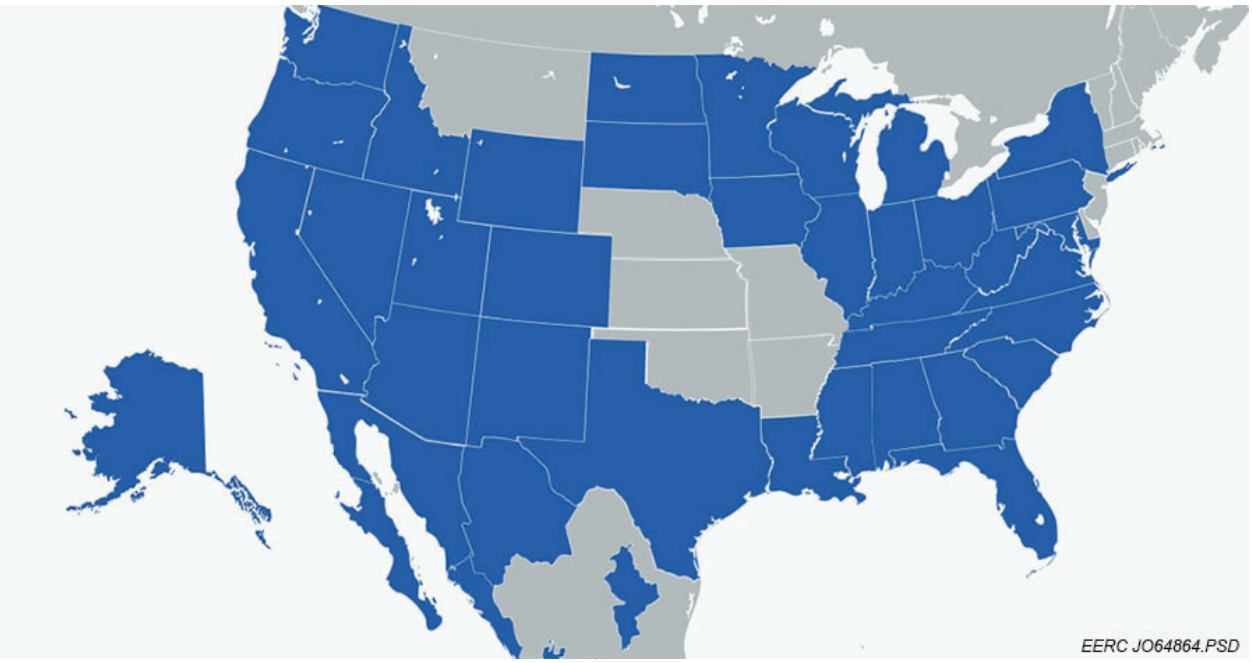

Figure 3. Geographical depiction of U.S. states with MPC and/or ACRO retail assets.

Project Team: The EERC will serve as the lead organization for this project, with Jasmine Oleksik, Senior Research Engineer as the overall project manager. Ms. Oleksik will ensure the overall success of the project by providing experienced management and leadership to all activities within the project, managing budget, schedule, and scope according to the proposed plan. Ms. Oleksik will also be responsible for communication with project participants and EERC project personnel. Other key personnel from the EERC include Chad Wocken, Brad Stevens, Steven Schlasner, and John Harju (project advisor). Resumes of key personnel can be found in Appendix D. An organizational chart is shown in Figure 4.

MPC will be a project sponsor and will be responsible for leading Task 2.0: Engineering and Design, Task 3.0: Hydrogen Production Facility with Carbon Capture Design, Task 4.0: Fuel Production Reactor and Catalyst Selection, Task 5.0: Process Safety Studies, and Task 6.0: Environmental Permitting. Task 2.0 will include the engineering and design for the FEL-3/definition phase. Key personnel from MPC include Andrew Dee, David Whitman, Mitchell Braegelmann, and Paul Dofton. MPC has a diverse, experienced team of technical experts and project management professionals with over 100 years of combined experience.

BMcD is a leading resource for project delivery in the renewable fuels industry. BMcD has planned, designed, and built renewable fuel projects from the ground up and completed retrofits for many existing facilities, giving BMcD the ability to provide quick solutions to complex issues. BMcD has extensive experience with heavy revamp projects and understands the need for accurate scope definition. BMcD will be the contracted vendor for Task 2.0.

Technip Energies is a world-leading engineering and technology company and a market leader in refinery engineering, with expertise in biofuels projects from concept and basic design, including capital

expenditure (CAPEX) estimates, to engineering and turnkey delivery. Technip Energies will be the contracted vendor for Task 3.0.

Topsoe regularly provides engineering services for new units, products, getting plants off the ground, or to revamp or upgrade existing plants. Topsoe designs, engineers, and licenses a broad range of units, plants, and processes across an even broader range of industries and applications. From evaluation and design to detailed engineering and on-the-ground construction support, Topsoe has the in-depth chemical-processing expertise and experience needed to deliver the complete package, with a track record of developing innovative solutions for clean, competitive fuels from renewable feedstock dating to 2004. Topsoe will be the contracted vendor for Task 4.0.

Smith & Burgess provides process safety management solutions, having over 100 employees across five offices located strategically to help clients accomplish their safety and compliance goals as effectively as possible. Smith & Burgess will be the contracted vendor for Task 5.0.

BARR Engineering is an industry-leading provider of engineering and environmental consulting services, helping navigate regulatory requirements and find innovative and economical ways to achieve sustainability and business goals. BARR Engineering will be the contracted vendor for Task 6.0.

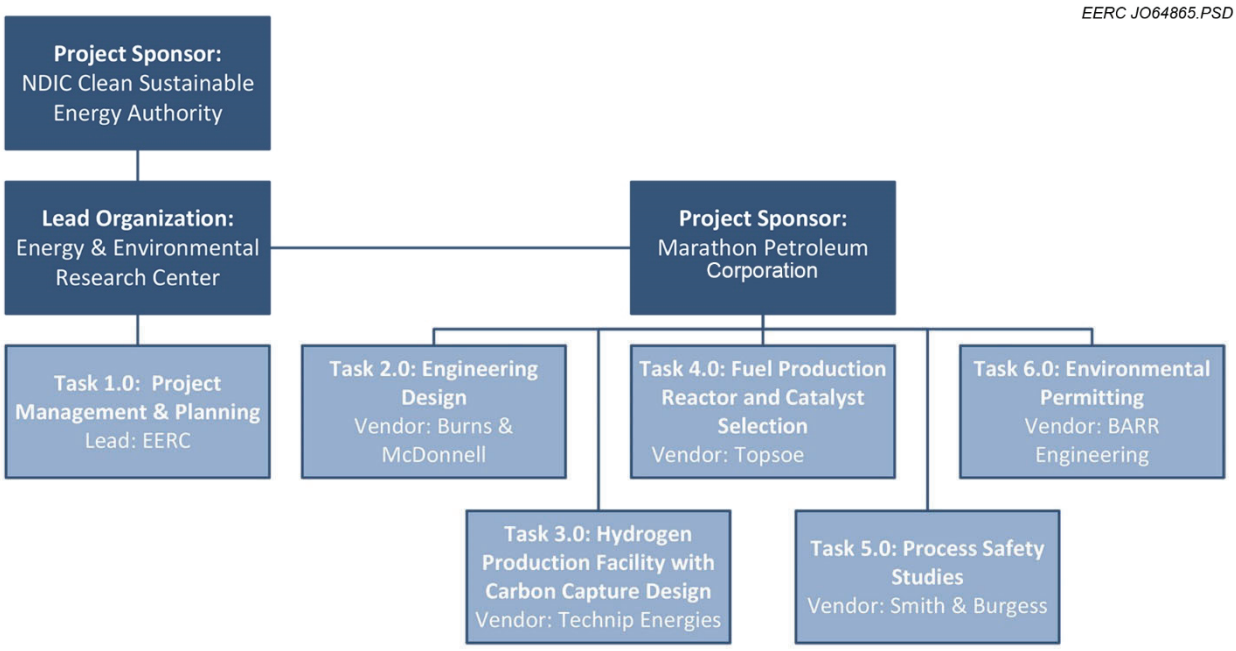

Figure 4. Project organizational chart.

MANAGEMENT

The EERC is the lead organization for this project and will oversee all tasks, schedule regular internal and external meetings with project participants, and ensure that the project is conducted using scientific methodologies and practices in accordance with the project plan (budget, schedule, deliverables, and milestones) and is meeting quality objectives. The EERC will keep all partners informed of project

progress, coordinate activities as necessary for the execution of a successful project, and be responsible for timely submission of all project deliverables and transfer of data and products to the project team.

Once the project is initiated, the project team will engage in weekly conference calls to review project status and future directions. Periodic progress reports will be prepared and submitted to project sponsors for review. Regular meetings will be held with relevant stakeholders to review the status and results of the project and discuss directions for future work. A broad team approach is key to successful execution of this project.

Project progress will be measured by completion of milestones and deliverables as noted in the project timeline in Figure 5. The deliverables are indicated where key design documents and reports are noted, while the milestones are noted as key accomplishments during the project's progress.

TIMETABLE

Project Schedule: The project timeline can be found in Figure 5 and consists of a 24-month duration and a projected start date of March 1, 2024. Project milestones are indicated within the project timeline and are based on anticipated accomplishment of key tasks.

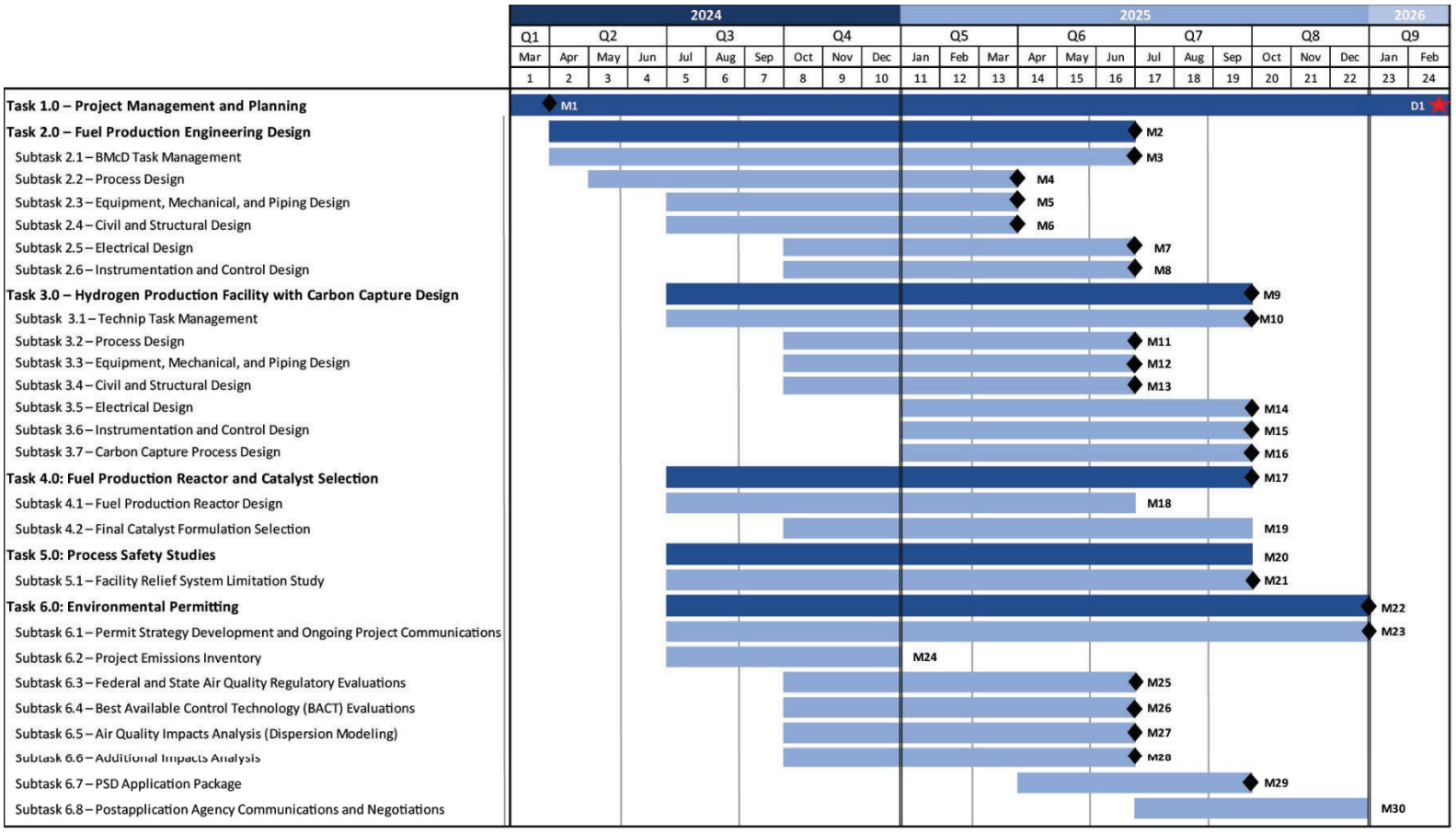

Figure 5. Project timeline.

BUDGET

The total cost of the proposed project is $21,761,930, which includes $10,000,000 from CSEA and $11,761,930 cash from MPC. The budget contains a proposed contract with BMcD, Technip Energies, Topsoe, Smith & Burgess, and BARR Engineering. Travel dollars are included to support site visits and project review meetings in Bismarck and field trips to multiple locations in western North Dakota. The detailed breakdown is presented in Table 2. It should be noted that the cost estimates used in Table 2 represent conservative estimates and the proposal team is committed to performing the work proposed. As such, actual cost share provided by MPC will likely exceed the 1.2:1 MPC:NDIC ratio reflected here. Appendixes B and F contain more detail regarding proposed subcontractor budgets. The budget notes can be found in Appendix E.

Table 2. Estimated Costs

Project Associated Expense	NDIC Share (Cash)	MPC Cost Share (Cash)	Total Project
Labor	$438,651	$0	$438,651
Travel	$6,749	$0	$6,749
Subcontractor - MPC	$9,253,070	$11,761,930	$21,015,000
Printing & Duplicating	$992	$0	$992
Laboratory Fees & Services			
Document Production Service	$22,247	$0	$22,247
Technical Software Fee	$9,011	$0	$9,011
Engineering Services Fee	$8,562	$0	$8,562
Total Direct Costs	$9,739,282	$11,761,930	$21,501,212
Facilities & Administration	$260,718	$0	$260,718
Total Cash Requested	**$10,000,000**	**$11,761,930**	**$21,761,930**

MPC has a strong track record of living up to its fiduciary duty to manage the capital of its stakeholders. The capital barrier to entry into emerging technologies is significant, as demonstrated by the cost estimate above; however, it represents a massive investment on behalf of the proponents over and above the proposed grant value. MPC is dedicated to innovation and to bringing carbon reduction services to industry, despite the significant risk involved in being a first mover. Government incentives such as the 45V or 45Z tax credit, premium SAF price, and CSEA partnership are imperative to commercializing these emerging technologies. CSEA's participation will solidify the commitment between all stakeholders to proceed through the FEED process. Appendix C contains a Letter of Support from MPC committed to the proposed FEED study.

TAX LIABILITY

The EERC, a department within the University of North Dakota, is a state-controlled institution of higher education and is not a taxable entity; therefore, it has no tax liability to North Dakota or any of its political subdivisions. The signed Tax Liability form is contained in Appendix J.

CONFIDENTIAL INFORMATION

Appendix A contains a confidential information request. This proposal includes a summary application for public release and confidential information that has been provided in Appendixes A, B, E, F, G, and H to this proposal.

PATENTS/RIGHTS TO TECHNICAL DATA

Not applicable.

STATE PROGRAMS AND INCENTIVES

The applicant has participated in several programs administered by NDIC, including the Lignite Research, Development, and Marketing Program; the Oil and Gas Research Program; the State Energy Research Center; and the Renewable Energy Program. Table 3 lists funding received by the EERC from these state programs in the last 5 years.

Table 3. Summary of EERC Funding from State Programs over the Past 5 years

Project Title	Start Date	End Date	Value
FERR-1.3 – Integrated Carbon Capture and Storage for North Dakota Ethanol Production	12/01/18	05/31/20	$500,000
State Energy Research Center	07/01/19	06/30/23	$10,000,000
Underground Storage of Produced Natural Gas – Conceptual Evaluation and Pilot Project(s)	06/01/19	06/30/23	$6,000,000
Assessment of Bakken and Three Forks Natural Gas Compositions	11/01/19	06/19/20	$300,650
Improving EOR Performance Through Data Analytics and Next-Generation Controllable Completions	01/27/20	09/30/24	$500,000
Wastewater Recycling Using a Hygroscopic Cooling System	01/31/20	09/30/22	$100,000
PCOR Initiative to Accelerate CCUS Deployment	02/01/20	09/30/24	$2,000,000
FERR-3.2 – Produced Water Management Through Geologic Homogenization, Conditioning, and Reuse	02/01/20	01/31/22	$300,000
Bakken Production Optimization Program 3.0	05/01/20	04/30/23	$6,000,000
EERC Technical Support for RTE CCS Activities – November 1, 2019	06/01/20	11/30/21	$500,000
Flue Gas Characterization and Testing	07/01/20	11/30/21	$3,741,450
Laboratory-Scale Coal-Derived Graphene Process	09/01/20	04/30/23	$162,500
H_2 Energy Development for North Dakota	07/01/21	06/30/23	$500,000
Ammonia-Based Energy Storage Technology	04/01/21	03/31/23	$101,390
Field Study to Determine the Feasibility of Developing Salt Caverns for Hydrocarbon Storage in Western North Dakota	07/01/21	06/30/23	$9,400,000
Unitized Legacy Oil Fields: Prototypes for Revitalizing Conventional Oil Fields in North Dakota	07/01/21	06/30/24	$3,000,000
Williston Basin CORE-CM Initiative	02/01/22	05/31/23	$750,000
FEED for CO_2 Capture at Coal Creek Station	02/01/22	08/31/23	$7,000,000
iPIPE 2.0: The intelligent Pipeline Integrity Program	01/01/22	12/31/23	$400,000
Adv. Processing of Coal and Waste Coal to Produce Graphite for Fast-Charging Lithium-Ion Batteries	02/01/22	01/31/25	$500,000
Liberty H_2 Hub Front-End Engineering and Design	11/01/22	10/31/24	$10,000,000
Redundancy Study for CO_2 Capture at Coal Creek Station	05/26/23	03/31/24	$837,313
Williston Basin CORE-CM Initiative	07/01/23	09/30/24	$1,050,000
Coal Creek Carbon Capture: Geologic CO_2 Storage Complex Development	07/01/23	09/30/26	$6,119,690
Bakken Production Optimization Program 4.0	07/28/23	10/31/25	$4,000,000

APPENDIX C

LETTERS OF SUPPORT

BURNS McDONNELL

October 31, 2023

Mr. Chad Wocken
Assistant Director, Clean Energy Systems
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Re: Letter of Commitment Regarding the Dickinson Renewable Fuels Project – 22.5 KBPD Sustainable Aviation Fuel

Dear Mr. Wocken:

On behalf of Burns & McDonnell, this letter expresses our support for and commitment to the Dickinson Sustainable Aviation Fuel (SAF) project for which a proposal is being submitted to the North Dakota Industrial Commission.

Burns & McDonnell is a family of companies bringing together a team of more than 13,500 consultants, engineers, architects, construction, and support professionals to design and build critical infrastructure. We have an integrated construction and design mindset and offer full-service capabilities. Founded in 1898 and working from 70 offices globally, Burns & McDonnell is 100% employee-owned.

We understand the importance of this project to the overall renewable fuel efforts at the Dickinson refinery and we are committed to supporting Marathon, the Dickinson Refinery, and the EERC in making this project a success. The following key factors distinguish our firm from others, contributing to the success of this partnership:

- Safety is our Top Priority: We believe all incidents are preventable, and we are committed to providing a safe and secure working environment for our employees, clients, and subcontractors. Our safety commitment begins in the early phases with a focus on designing a plant that is safe to build and safe to operate.

  We are extremely proud of our safety rating as an engineering, procurement, and construction (EPC) contractor. It is our expectation that everyone working on our projects goes home safely to their families every night. That is why our safety statistics are considerably better than both industry standards and our competition. As a full-service EPC company, our depth of experience in safe project delivery across the US has resulted in 125 million hours over five years with a total recordable incident rate of 0.16. Our construction sites are among the safest in the industry, and we rank in the top 5% of contractors in the US.

- Extensive Renewables Experience: Burns & McDonnell is a leading resource for project delivery in the renewable fuels industry, executing over 100 renewable fuels and chemicals projects over the last 25 years. Our recent experience includes several projects to evaluate production of sustainable aviation fuel for multiple confidential clients. We have planned, designed, and built renewable fuel projects from the ground up and completed retrofits for many existing facilities, giving us the ability to provide quick solutions to complex issues. We also have extensive experience with heavy revamp projects such as this one and understand the need for accurate scope definition.

BURNS McDONNELL

- **Project History:** Burns & McDonnell supported the Dickinson refinery through a Tallow Unloading project as well as the initial SAF Feasibility study. We will be a primary contributor to the Feasibility update effort for the SAF project and intend to continue supporting the project through the proposed Definition phase. Our past experience at the site enables us to leverage our knowledge of the site and history of this project.
- **Proven Team:** Our project leadership team has extensive Marathon experience and familiarity with the goals for this project. We plan to carry over several of the team members from the Feasibility update effort for the proposed Definition phase. Our proposed project team was selected because of their significant renewable and refining backgrounds, technology evaluation experience, knowledge of Marathon's systems and units involved on this project, and construction-oriented estimating capabilities.
- **Commitment to Marathon:** We are strongly committed to Marathon and the Dickinson refinery. Over the past 15 years of working together, Burns & McDonnell has executed over $2B in total project value for Marathon. As always, our goal is to create value during a robust engineering effort with an efficient cost and schedule.

We appreciate the opportunity to offer our services for this project and look forward to participating with the Energy and Environmental Research Center and Marathon. If you have any questions or need any additional information, please contact me at (816) 807-8559.

Sincerely,

David Nispel
Managing Director, Refining
Oil, Gas & Chemical

Marathon Petroleum Company LP

539 South Main Street
Findlay, OH 45840

October 31, 2023

Mr. Chad Wocken
Assistant Director, Clean Energy Systems
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

Subject: Cost Share Commitment Related to EERC Proposal Entitled "Dickinson Refinery Expansion"

Dear Mr. Wocken:

Marathon Petroleum Company LP (together with its affiliates, "MPC") is writing to express its cost share commitment and support for the efforts of the Energy & Environmental Research Center ("EERC") to secure funding through the North Dakota Industrial Commission ("Funding Opportunity"). EERC's proposed project, the Dickinson Refinery Expansion, will investigate the potential expansion of MPC's renewable diesel production facility located in Dickinson, North Dakota. MPC has been evaluating opportunities to expand its existing renewable diesel production and assessing alternative production options for other renewable fuels.

MPC is a leading, integrated, downstream energy company headquartered in Findlay, Ohio. The company operates the nation's largest refining system. MPC's marketing system includes branded locations across the United States, including Marathon brand retail outlets. MPC also owns the general partner and majority limited partner interest in MPLX LP, a midstream company that owns and operates gathering, processing, and fractionation assets, as well as crude oil and light product transportation and logistics infrastructure. MPC also operates a number of renewable fuels facilities, including the Dickinson, North Dakota renewable diesel production.

As outlined in the Funding Opportunity, and in support of the EERC's proposal, MPC commits to provide combined cash cost share of at least fifty percent (50%) of the allowable costs associated with EERC's proposal related to the Dickinson Refinery Expansion, with allowable costs projected to total $21,761,930. This commitment is conditioned upon the successful negotiation of the final funding award with the North Dakota Industrial Commission.

Sincerely,

Marathon Petroleum Company LP
By: MPC Investment LLC, its general partner

Brad Levi (Oct 30, 2023 12:21 EDT)

By: Bradley J. Levi
Title: Senior Vice President

WA

Approved as to Form

Marathon Petroleum Company LP

539 South Main Street
Findlay, OH 45840

October 31, 2023

Mr. Chad Wocken
Assistant Director, Clean Energy Systems
Energy & Environmental Research Center
15 North 23rd Street, Stop 9018
Grand Forks, ND 58202-9018

RE: Letter Agreement – Conditions for EERC's Proposal Entitled "Dickinson Refinery Expansion"

Dear Mr. Wocken:

Marathon Petroleum Company LP ("MPC") is pleased to offer this letter agreement to the Energy & Environmental Research Center ("EERC") in furtherance of EERC's grant application titled *"Dickinson Refinery Expansion"* (the "Proposal") to secure funding from the North Dakota Industrial Commission ("NDIC"). MPC is providing a cost share commitment letter associated with the Proposal, and this letter includes a commitment of fifty percent of allowable costs associated with the Proposal up to $21,761,930. Such commitment is conditioned on the following items:

(i) EERC's final Proposal project plan being acceptable to MPC;
(ii) NDIC's award of the Proposal; *and*
(iii) EERC's grant to MPC and its affiliates of all licenses, authorizations, and similar rights, including rights to any intellectual property, related to the scope of work under the Proposal as those granted to the NDIC or any third party under any cooperative agreement or similar arrangement.

MPC looks forward to joining TCEDH and the EERC in this effort.

Sincerely,

Marathon Petroleum Company LP
By: MPC Investment LLC, its general partner

Brad Levi (Oct 30, 2023 12:21 EDT)

By: Bradley J. Levi
Title: Senior Vice President

WA

Acknowledged and agreed as of the date first written above:

Energy & Environmental Research Center

_____
By:
Title:

APPENDIX D

QUALIFICATIONS OF KEY PERSONNEL

CHAD A. WOCKEN
Assistant Director for Clean Energy Solutions
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5273, cwocken@undeerc.org

Education and Training
B.S., Chemical Engineering, University of North Dakota, 1994

Research and Professional Experience
2001–Present: EERC, UND.
Assistant Director for Clean Energy Solutions (September 2019–Present).

- Leads multidisciplinary team of engineers and scientists focused on applying scientific principles to address challenges to energy production.
- Team's applied research activities include process modeling; engineering studies; and technology evaluation and development at bench, pilot, and demonstration scale.
- Has over 25 years of experience spanning work in oil and gas production, fuel processing, electricity generation, emission control, environmental remediation, and process engineering.
- Drawing on engineering training and diverse experience, enjoys defining problems and developing innovative solutions to promote clean energy solutions.

Principal areas of research include developing alternative fuel and chemical processes and innovative energy technologies. Currently, leads projects focused on developing and advancing alternative chemical and fuel production processes at bench, lab, and pilot scale and optimizing processes associated with oil and gas production and midstream operations. In addition, manages a group of researchers and a lab facility containing batch and continuous reactor systems capable of testing a variety of thermochemical processes.

Principal Engineer, Transformational Energy Group Lead (2015–August 2019); Senior Research Manager (2009–2015); Research Engineer (2001–2009).

<u>Project/Program Management</u>

- Developed new research program and managed design and fabrication of facility to test and evaluate solid-oxide fuel cells with variety of gaseous fuels including actual syngas produced from EERC's pilot-scale gasification systems.
- Led process-modeling team within EERC's Bakken Production Optimization Program, focused on applying computational modeling expertise to crude oil production processes and addressing emission reduction and gas flaring while also reducing crude oil volatility.
- Directed EERC's associated gas-flaring mitigation activities, aiding industry partners in their efforts to identify technologies to reduce flaring. These efforts led to creation of Flaring Solutions Database, clearinghouse of business and technology solutions that have potential to utilize gas at wellhead and reduce flaring.
- Managed a Defense Advanced Research Projects Agency (DARPA)-funded project that successfully developed technology to produce drop-in-compatible jet fuel for military from renewable feedstock.

Activities included planning work activities, developing and executing risk-based project management plan, coordinating activities of five project partners to meet project goals, and communicating with DARPA project manager.
- Managed scale-up and design of 300-barrel/day renewable fuel pilot plant capable of producing specification-compliant jet and diesel fuels from renewable oil feedstock.

Technology Development and Research
- Designed and executed oil and gas gathering pipeline leak detection demonstration project, resulting in tangible performance improvements for three pipeline operators.
- Conducted technical and economic assessment of alternative uses for associated gas in effort to reduce amount of gas being flared in Williston Basin. Technologies evaluated included gas-processing operations to recover natural gas liquids, gas-fired power generation, transportation fuel, and traditional petrochemical unit operations.
- Performed system-level engineering evaluation of integrated algae production at coal-fired power plant to assess carbon uptake, emission control requirements, relative scale, and viability of water and waste heat utilization.
- Designed, fabricated, and operated several fixed-catalyst bed reactor systems to evaluate variety of thermocatalytic processes to produce renewable fuels and chemicals.
- Conducted testing at coal-fired power plants and developed control technologies to reduce atmospheric emission of particulate matter, mercury, and other contaminants.

1995–2001: Project Engineer, URS/Radian International, Salt Lake City, Utah (1997–2001), and Milwaukee, Wisconsin (1995–1997).

Process Design, Operation, and Optimization
- Designed remediation systems to remove BTEX compounds and chlorinated solvents from groundwater. Project tasks included site evaluation, technology selection, system design, and creation of specifications.
- Performed start-up and long-term operations of groundwater remediation systems. Responsibilities included troubleshooting equipment/system malfunctions, process optimization, writing operations and maintenance manuals, establishing performance verification criteria, defining operational cost, and directing technicians' work.
- Conducted detailed reviews of industrial wastewater treatment systems to identify alternative treatment technologies, process optimizations, and water reuse alternatives.

Construction Oversight
- Provided on-site oversight for several construction projects consisting of mechanical equipment installation, instrumentation and process control, building and road construction, excavation, and underground utility installation. Daily responsibilities included evaluating work for conformance with construction drawings and specifications; coordinating work activities; and facilitating communication between design firm, client, and contractors.

Project Management
- Served as project manager for several large projects that were completed successfully. Activities included developing cost proposals, managing budget and schedule, equipment and subcontractor acquisition, and maintaining effective communication with client.

1994–1995: Process Engineer, Archer Daniels Midland, Clinton, Iowa.

Plant Operation

- Supervised operations and personnel at wet corn mill oil extraction and refining plant. Tasks consisted of prioritizing work activities, scheduling maintenance of process equipment, monitoring product quality, and extensive system troubleshooting and failure analysis.

Publications

Has authored or coauthored numerous publications.

BRADLEY G. STEVENS, P.E.
Principal Research Engineer, Civil Engineering
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5293, bstevens@undeerc.org

Education and Training

B.S., Civil Engineering, University of North Dakota, 1989.
Registered Professional Engineer – North Dakota No. PE-4340.

Research and Professional Experience

2022–Present: Principal Research Engineer, Civil Engineering, EERC, UND.

- Responsibilities include managing variety of projects and tasks in areas of oil and gas production and processing, hydrogen production and utilization, electrical grid resiliency, and risk mitigation.
- Expertise includes soil, groundwater, and industrial process water remediation; process instrumentation and control; wind power generation; hydrogen production; and oil and gas production.

2021–2022: Senior Research Engineer, Civil Engineering Team Lead, EERC, UND.

2011–2021: Senior Research Engineer, EERC, UND.

- Responsibilities included execution of wide-ranging projects under EERC's Bakken Production Optimization Program, including study of alternative natural gas use, saline and hydrocarbon soil remediation, and statistical analysis of various oil and gas industry segments.

2005–2011: Research Manager/Engineer, EERC, UND.

- Responsibilities included management of the EERC's Plains Organization for Wind Energy Resources® (POWER®) wind energy program. POWER management duties included strategic planning, fiscal management, program presentation, proposal preparation, and personnel management. Technical duties included installation and setup of wind-monitoring equipment, assessment and analysis of wind resource data, wind turbine production estimates, and theoretical project economics.
- Other responsibilities included supervision of design, installation, and operation of electrolysis-derived hydrogen production and dispensing system.

1998–2005: Research Engineer, Remediation, EERC, UND.

- Responsibilities included management, testing, data analysis, and report preparation for commercial application of centrifugal membrane filtration; project management, specification, construction, and demonstration of freeze–thaw process for utilization of marginal waters; participation in Red River Water Management Consortium (RRWMC) as technical staff member advising RRWMC members regarding pertinent water supply and water quality issues; management and operation of and data analysis and report preparation for sorption and regeneration process for mercury removal from primary and secondary liquid wastes assessment; and data analysis activities related to wind energy.

1992–1998: Project Manager/Engineer, Summit Envirosolutions, Inc., Minneapolis, Minnesota.

- Responsibilities included specification and coordination of installation of remote data acquisition equipment for municipalities in Minnesota for use as aquifer resource management tools; specification, installation, and maintenance of groundwater flow control and flow measurement equipment in association with research and development cooperative agreement with NASA involving state-of-the-art methods of remote data acquisition, patented as RealFlow®; design, installation, and maintenance of permanent and mobile remediation systems in Minnesota, Wisconsin, Nevada, and Arizona, including groundwater pump-and-treat systems, soil vapor extraction systems, and coupled air sparging–soil vapor extraction systems; and management of 20 projects in Minnesota, Wisconsin, and Illinois involving mechanical and electrical control and data retrieval for remedial systems including telemetry-based remedial systems. Other pertinent experience included work with programmable logic controllers and ladder logic programming and training in the use of Intellution FIX DMACS human–machine interface software.

1990–1992: Project Engineer, Delta Environmental Consultants, Inc., St. Paul, Minnesota.

- Responsibilities included design, permitting, installation, and operation of treatment systems for remediation of contaminated groundwater and soils. Sites ranged from automotive service stations to railroad maintenance yards for projects located in a five-state region. Remediation technologies included subsurface air sparging and soil vapor extraction.
- Other project responsibilities included data interpretation and permit compliance for 14 remediation systems for a major oil company; supervising excavation of contaminated soils; and permitting and supervising in-place abandonment of 12,000-gal underground storage tank.

1988–1990: Research/Engineering Technician, EERC, UND.

- Responsibilities included design, construction, operation, maintenance, data collection and reduction, and formal report preparation for bench-scale treatability programs involving single-stage, two-stage, coupled nitrification–denitrification activated sludge systems, activated carbon adsorption, and ion exchange treatment of coal-processing waters. Maintained and operated pure oxygen plug flow reactor for biological treatment of synthetic wastewater. Assisted in production of pilot-scale wastewater treatment facility and design and analysis of bench-scale wastewater treatment models.

Patents

Barrett, D.P.; Davis, R.J.; Dustman, J.E.; Gibas, D.R.; Stevens, B.G.L.; Wilson, B.T. Measuring System for Measuring Real-Time Groundwater Data. U.S. Patent 5,553,492, Sept 10, 1996.

Publications

Has authored or coauthored numerous publications.

DR. STEVEN M. SCHLASNER
Senior Engineer
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
15 North 23rd Street, Stop 9018, Grand Forks, North Dakota 58202-9018 USA
701.777.5479, sschlasner@undeerc.org

Education and Training

Ph.D., Chemical Engineering, The Ohio State University, 1987
M.S., Chemical Engineering, The Ohio State University, 1983
M.B.A., University of South Dakota, 1977
B.S., Chemical Engineering, South Dakota School of Mines & Technology, 1980
B.A., Chemistry and Mathematics, St. Olaf College, 1974
Diploma, Air War College (correspondence), Air University,1997
Professional Engineer (retired), Ohio and Oklahoma

Research and Professional Experience

2010–Present: Senior Engineer, EERC, UND, Grand Forks, North Dakota.

- Develops and analyzes clean energy and petrochemical technologies, systems, and markets by performing:
  - Technical, economic, and life cycle modeling, optimization, and assessment of energy, petrochemical, and carbon capture/transport technologies; their capabilities, functional performance, and efficiencies; their compatibility with and ability to integrate into existing industrial processes, infrastructure, supply chains, and other systems; and their associated economics.
  - Pilot-scale R&D of novel hydrogen production technologies.
  - Market assessment of energy, petrochemical, and carbon resources; production technologies and assets; and infrastructure with respect to supply, demand, distribution systems, value chains, and other systems focusing on North Dakota and regional systems and markets.

35-year career in chemical process engineering and R&D encompasses energy, bioprocess, and materials technologies, especially hydrogen, CO_2 capture/transport, petroleum-refining, and petrochemical technologies.

2006–2009: R&D Chief Engineer and Team Lead of the H_2 Production/CO_2 Capture Team, ConocoPhillips Company, Bartlesville Technology Center, Bartlesville, Oklahoma.

- Supervised the lead Downstream R&D team addressing climate change issues by directing multimillion dollars of internal and external research into H_2 production and CO_2 capture technologies.
- Managing internal R&D focused on company-specific needs and economics.
- Executive Board member and Work Package Leader in an international CO_2 capture (“CACHET”) project: seven work packages; six precombustion technologies; 28 organizations from 17 countries; €13 million (CY2006).
- Industry Co-Lead of U.S. Department of Energy FreedomCAR and Fuel Partnership’s Hydrogen Production Technical Team: a team of technologists from the U.S. Council for Automotive Research

and energy partner member companies, national laboratories, and DOE technology development managers responsible for developing R&D plans and road maps, identifying data gaps and R&D needs, reviewing research results, and evaluating technical progress toward hydrogen production research goals. Twice presented program updates to National Research Council reviewers performing biennial program assessments.

- Technical Team member of the CO_2 Capture Project's (Phase 2) Capture Team: $55 million (CY2004) consortium of eight major energy companies within which the Capture Team oversaw more than 20 contractors developing 12 carbon capture technologies.

2001–2009: R&D Senior Engineer, Long-Range Technology, ConocoPhillips Company, Bartlesville Technology Center, Bartlesville, Oklahoma.

- Company lead engineer in R&D joint ventures developing compact hydrogen and hydrocarbon fuel production technologies employing process intensification techniques.
- Member of Technical Team supervising development of a synthetic fuel process – five partners more than $50 million (CY2001) research investment.
- Technical representative to a joint venture developing a novel compact hydrogen production process – two partners more than $5 million (CY2002) investment. Dr. Schlasner's technical assessment led to termination of joint venture.

1992–2001: Refinery Senior Engineer, Sweeny Petrochemical Complex, Phillips Petroleum Company, Old Ocean, Texas.

- Advanced process control engineer for fluidized catalytical cracker (FCC), continuous catalytic reformer (CCR), naphtha hydrotreater and other petroleum refinery units. Oversaw control system operations, and supervised multimillion dollar control system upgrades to an FCC and a 60-mile regional olefin product pipeline, as well as construction of a new CCR.
- Process/operating engineer for benzene hydrogenation, pentane isomerization, two aromatic extraction and other refinery units. Debottlenecked the "hydro" and "isom" units, then set production records. #2 person on complex's largest operating team responsible for developing and executing more than $40 million (CY1997) budget. Resolved wastewater biotreater environmental Notice of Violation without incurring fine while reducing emissions by 85% and operating cost by $200 thousand annually.

1987–1992: Process Engineer, Phillips Petroleum Company, Bartlesville, Oklahoma.

- Corporate Engineering. Automated a linear high density polyethylene plant HYSYS® process simulation provide high-quality, quick-turnaround design information to Corporate Licensing in support of bid packages. Reduced time and cost of preparing the first design package by more than 60%.
- Advanced Composites. Developed unidirectional tape and stampable sheet thermoplastic composites processes and products for the industrial and aerospace markets.
- R&D Biotechnology Division. Performed high-density, microbial-based drug and enzyme R&D and toll fermentations in a Biological Safety Level 2 pilot plant.

1980–2004: Individual Mobilization Augmentee, Air Force Research Laboratory (AFRL), Wright-Patterson Air Force Base, Ohio and Tyndall Air Force Base, Florida.

- Colonel. Senior Reservist. Senior officer augmenting AFRL military leadership during war. Served as acting Deputy Director for Sensors, and Materials & Manufacturing Directorates with 500 to 1000

assigned personnel each. Advised Sensors management on use of its 31 reservists and AFRL as member of AFRL Reserve Board overseeing 210 Reservists.

- Field-grade officer. Division Senior Reservist. Served as acting Chief of Airbase and Environmental Technology Division and advised Division on management of its five Reservists. Member of 27-person Tiger Team that reviewed workforce management of AFRL's 5000+ scientists & engineers for the Secretary of the Air Force who implemented team's recommendations.
- Company grade officer. Developed microcomputer-based laboratory automation solutions supporting organic polymer and composite materials R&D. Advised Materials Directorate on microbial biotechnology R&D, e.g., microbial degradation of hazardous paint waste.

1974–1978: Lieutenant. U.S. Air Force, 44th Strategic Missile Wing (Strategic Air Command), Ellsworth Air Force Base, South Dakota.

- Assistant Wing Operations Scheduling Officer: Scheduled missile alert, training and other duties of 150 missile combat crewmembers – Second Lieutenant to Lieutenant Colonel.
- Missile Combat Crew Commander: Commanded Alternate Command Post crew certified to assume command of the Wing in event the Wing Command Post on base was disabled.
- Deputy Missile Combat Crew Commander: Deputy commander of a Wing Instructor crew.

Professional Activities

Member, National Hydrogen Association, Director (2006–2007)
Member, American Chemical Society
Member, American Society for Microbiology
Member, Tau Beta Pi
Member, Beta Gamma Sigma

Select Publications and Presentations

Jensen, M.D.; Schlasner, S.M.; Gorecki, C.D.; Wildgust, N. *Opportunities and Challenges Associated with CO_2 Compression and Transport During CCS Activities*; Plains CO_2 Reduction (PCOR) Partnership Phase III Task 6 Deliverable D85 for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-05NT42592; EERC Publication 2017-EERC-06-17; Energy & Environmental Research Center: Grand Forks, ND, May 2017.

Leroux, K.M.; Klapperich, R.J.; Azzolina, N.A.; Jensen, M.D.; Kalenze, N.S.; Bosshart, N.W.; Torres Rivero, J.A.; Jacobson, L.L.; Ayash, S.C.; Nakles, D.V.; Jiang, T.; Oster, B.S.; Feole, I.K.; Fiala, N.J.; Schlasner, S.M.; Wilson IV, W.I.; Doll, T.E.; Hamling, J.A.; Gorecki, C.D.; Pekot, L.J.; Peck, W.D.; Harju, J.A.; Burnison, S.A.; Stevens, B.G.; Smith, S.A.; Butler, S.K.; Glazewski, K.A.; Piggott, B.; Vance, A.E. *Integrated Carbon Capture and Storage for North Dakota Ethanol Production*; Final Report (Nov 1, 2016 – May 31, 2017) for North Dakota Industrial Commission and Red Trail Energy; Energy & Environmental Research Center: Grand Forks, ND, May 2017.

Energy & Environmental Research Center. *Liquids Gathering Pipelines: A Comprehensive Analysis*; Report for the North Dakota Industrial Commission and the North Dakota Legislative Energy Development and Transmission Committee; Energy & Environmental Research Center: Grand Forks, ND, Dec 2015.

Lord, D.; Luketa, A; Wocken, C.A.; Schlasner, S.; Aulich, T.R.; Allen, R.; Rudeen, D. *Literature Survey of Crude Oil Properties Relevant to Handling and Fire Safety in Transport*; Sandia Report No. SAND2015-1823; Sandia National Laboratories: Albuquerque, NM, and Livermore, CA, March 2015.Jensen, M.D.; Schlasner, S.M.; Sorensen, J.A.; Hamling, J.A. Operational Flexibility of CO_2 Transport and Storage. *Energy Procedia* **2014**, *63*, 2715–2722.

Jensen, M.D.; Schlasner, S.M.; Sorensen, J.A.; Hamling, J.A. *Subtask 2.19 – Operational Flexibility of CO_2 Transport and Storage*; Final Report (Feb 3 – Dec 31, 2014) for U.S. Department of Energy National Energy Technology Laboratory Cooperative Agreement No. DE-FC26-08NT43291; EERC Publication 2014-EERC-12-17; Energy & Environmental Research Center: Grand Forks, ND, Dec 2014.

Harju, J.A.; Wocken, C.A.; Stevens, B.G.; Almlie, J.C.; Schlasner, S.M. End-Use Technology Study – An Assessment of Alternative Uses for Associated Gas. Presentation for the North Dakota Pipeline Authority Natural Gas End-Use Technology Study Webinar, Nov 5, 2012.

Wocken, C.W.; Stevens, B.G.; Almlie, J.C.; Schlasner, S.M. End-Use Technology Study – An Assessment of Alternative Uses for Associated Gas; Topical Report for North Dakota Industrial Commission Contract No. G024-052; Energy & Environmental Research Center: Grand Forks, ND, Sept 2012.

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JASMINE L. OLEKSIK
Senior Research Engineer
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Principal Areas of Expertise

Ms. Oleksik's principal areas of interest and expertise are syngas production, characterization, and storage; biofuel production process design and system operation; oil extraction from renewable sources and utilization; and waste conversion for chemical and fuel production.

Education and Training

Ph.D., Chemical Engineering, University of North Dakota, In progress (May 2022 – Present)
M.S., Chemical Engineering, University of North Dakota, 2020.
B.S., Chemical Engineering, University of North Dakota, 2017.
Proficient in the use of the following computer programs and simulation software: Microsoft Excel, Word, Project, and PowerPoint; ChemCad; Aspen Plus; Visio; Ansys Fluent.

Research and Professional Experience

April 2022–Present: Senior Research Engineer, EERC, UND. Ms. Oleksik work included chemical process design and development, operation of bench- and pilot-scale processes including combustion and gasification systems, syngas characterization, storage, and distribution, biofuel production process design and system operation, and waste conversion for chemical and fuel production. Ms. Oleksik contributes to the design, modeling, and fabrication of experimental equipment; oversees and operates equipment; interprets data; performs project management tasks and project oversite; preparation and contribution to for proposals, reports, and papers; and presents project results to clients and at national and international conferences.

July 2018–April 2022: Research Engineer, EERC, UND. Ms. Oleksik responsibilities included design and development of syngas storage, cleaning and blending system for solid-oxide fuel cell testing, biofuel process design and operation of systems, and laboratory work focused on chemical looping combustion, recovery of rare-earth elements from coal and coal by-products, and oil extraction for utilization in biofuels. Additionally, Ms. Oleksik contributed to the design, modeling, and fabrication of experimental equipment; oversees and operates equipment; interprets data; helps to prepare proposals, reports, and papers; and presents project results to clients and at national and international conferences.

August 2016 – July 2018: Graduate Research Assistant, Department of Chemical Engineering, UND. Ms. Oleksik transitioned a strain of algae chlorella vulgaris from autotropic to heterotrophic growing conditions and investigated various solvent extraction techniques to facilitated oil recovery and optimized the extraction of oil from both growing conditions for utilization for biofuels and replace for petrochemicals.

May 2015–August 2016: Undergraduate Research Assistant, Department of Chemistry, UND. Ms. Oleksik evaluated methods for the extraction and chromatographic analysis of lignin decomposition

products, performed preliminary experiments on metal catalyst screening, performed detailed kinetic experiments on the most promising catalysts, and worked on data presentation and interpretation.

Professional Activities

Member, American Institute of Chemical Engineers

Relevant Publications

Voeller, K.; Bilek, H.; **Kreft, J**.; Dostálková, A.; Kozliak, E.; Kubatova, A. Thermal Carbon Analysis Enabling Comprehensive Characterization of Lignin and Its Degradation Products. *ACS Sustainable Chem. Eng.* **2017**, *5* (11), 10334–10341; DOI: 10.1021/acssuschemeng.7b02392.

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Oleksik, J.L. *Waste Utilization for Bio-Based Alternatives to Chemicals and Fuels*; Final Report for State Energy Research Center; EERC Publication 2020-EERC-08-06; Energy & Environmental Research Center: Grand Forks, ND, August 2020.

Oleksik, J.L.; Schlasner, S.M.; Eckberg, A.A. *Corn Oil Extraction Efficiency Optimization*; Final Report for State Energy Research Center; EERC Publication 2021-EERC-04-14; Energy & Environmental Research Center: Grand Forks, ND, April 2021.

Foerster, I.; Seames, W.; **Oleksik, J.;** Kubatova, A; Ross, A. A Comprehensive Study of Techniques to Optimize the Extraction of Lipids from the Autotrophic Strain of the Microalgae *Chlorella Vulgaris*. *Life* **2023**, 13 (10) 1997 https://doi.org/10.3390/life13101997.

DR. JOHN A. HARJU
Vice President for Strategic Partnerships
Energy & Environmental Research Center (EERC), University of North Dakota (UND)
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701.777.5157, jharju@undeerc.org

Education and Training

Ph.D., Petroleum Engineering, University of North Dakota, 2022.
M.Eng., Petroleum Engineering, University of North Dakota, 2020.
B.S., Geology, University of North Dakota, 1986.

Research and Professional Experience

2002–Present: EERC, UND.
July 2015–Present: Vice President for Strategic Partnerships.

- Leads efforts to build and grow dynamic working relationships with industry, government, and research entities globally in support of the EERC's mission to provide practical, pioneering solutions to the world's energy and environmental challenges.
- Represents the EERC regionally, nationally, and internationally in advancing its core research priorities: coal utilization and emissions, carbon management, oil and gas, alternative fuels and renewable energy, and energy–water.

Principal areas of interest and expertise include carbon sequestration, enhanced oil recovery, unconventional oil and gas development, waste management, geochemistry, technology development, hydrology, and analytical chemistry, especially as applied to the upstream oil and gas industry.

2003–June 2015: Associate Director for Research.

- Led a team of scientists and engineers building industry–government–academic partnerships to carry out research, development, demonstration, and commercialization of energy and environmental technologies.

2002–2003: Senior Research Advisor.

- Developed, marketed, managed, and disseminated research programs focused on the environmental and health effects of power and natural resource production, contaminant cleanup, water management, and analytical techniques.

2017–Present: Adjunct Lecturer, Department of Petroleum Engineering, UND.

1999–2002: Founder/Vice President, Crystal Solutions, LLC, Laramie, Wyoming.

- Firm was involved in commercial E&P produced water management, regulatory permitting and compliance, and environmental impact monitoring and analysis.

1997–2002: Gas Research Institute (GRI) (now Gas Technology Institute [GTI]), Chicago, Illinois.
2000–2002: Principal Scientist, Produced Water Management.

- Developed and deployed produced water management technologies and methodologies for cost-

effective and environmentally responsible management of oil and gas produced water.

1998–2000: Program Team Leader, Soil, Water, and Waste.

- Managed projects and programs related to the development of environmental technologies and informational products related to the North American oil and gas industry.
- Formulated RFPs, reviewed proposals, and formulated contracts.
- Performed technology transfer activities.
- Supervised staff and contractors.
- Served as Manager of the Environmentally Acceptable Endpoints project, a multiyear program focused on rigorous determination of appropriate cleanup levels for hydrocarbons and other energy-derived contaminants in soils.
- Led GRI/GTI involvement with industry environmental consortia and organizations, such as PERF, SPE, AGA, IPEC, and API.

1997–1998: Principal Technology Manager (1997–1998) and Associate Technology Manager (1997), Soil and Water Quality.

1988–1996: EERC, UND.

1994–1996: Senior Research Manager, Oil and Gas Group. Served as:

- Program Manager for assessment of the environmental transport and fate of oil- and gas-derived contaminants, focused on mercury and sweetening and dehydration processes.
- Project Manager for field demonstration of innovative produced water treatment technology using freeze crystallization and evaporation at oil and gas industry site.
- Program Manager for environmental transport and fate assessment of MEA and its degradation compounds at Canadian sour gas-processing site.
- Program Manager for demonstration of unique design for oil and gas surface impoundments.
- Director of the National Mine Land Reclamation Center for the Western Region.
- Co-PI on project exploring feasibility of underground coal gasification in southern Thailand.
- Consultant to an International Atomic Energy Agency program entitled “Solid Wastes and Disposal Methods Associated with Electricity Generation Fuel Chains.”

1988–1994: Research Manager (1994), Hydrogeologist (1990–1994), Research Specialist (1989–1990), and Laboratory Technician (1988–1989).

Professional Activities

Member, National Coal Council (appointed 2018)
Member, National Petroleum Council (appointed 2010)
Member, Mainstream Investors, LLC, Board of Governors (2014–present)
Member, DOE Unconventional Resources Technology Advisory Committee (2012–2014)
Member, Interstate Oil and Gas Compact Commission (appointed 2010)
Member, Rocky Mountain Association of Geologists

Publications

Has authored or coauthored more than 100 professional publications and nearly 300 technical presentations.

Mitchell Braegelmann
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Dickinson ND, 58601
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Summary: Over 10 years of experience in manufacturing facilities with varied experience in supervision, process improvement, process safety management, and project management.

Experience:

2023–Present ***Marathon*** Dickinson, ND
Process Optimization Group

- Project Development
  - Site process engineering resource for decisions on major projects development.
  - Responsible for developing project backlog of high-return projects for site development and implementation.

2020–2023 ***Marathon*** Dickinson, ND
Technical Services and Engineering Supervisor

- Supervision
  - Led multidisciplined team of engineers through commissioning and start-up of $500 million retrofit of the Dickinson refinery to produce renewable diesel.
  - Managed multidisciplinary team of process, project, and controls professionals.
  - Adjusted resources as needed to achieve site goals through use of additional permanent employees, contractors, temporary employees, and interns.
- Business practice development
  - Established process-monitoring program to bring visibility to key performance indicators.
  - Implemented a capital and expense project review and prioritization process.
- Optimization
  - Worked with vendors and technical resources to increase hydrogen and renewable diesel production above design conditions.
  - Increased uptime of the facility by managing contaminants and better controlling chemical injection systems.

2015–2020 ***Dakota Prairie Refining/Tesoro/Andeavor/Marathon*** Dickinson, ND
Process Safety Management Engineer

- Process Safety Culture Development
  - Developed shared ownership in the process safety program by training employees on their specific impacts to an effective process safety program.
  - Routine auditing of process safety elements and their implementation.
- Process Safety Management (PSM) Program Development
  - Wrote standards for PSM-related programs including PHA, MOC, PSI, employee involvement, temporary portable buildings, and exclusion zones.
  - Reviewed and managed processes to ensure implementation was according to standards and that performance was sustained.
- Incident Investigation

- Lead investigator for incidents including data review, interviews, cause mapping, and report writing.
- Managed overall program implementation including management review and action item effectiveness review.
- Analyzed incident and near-miss data for trends in minor incidents. Identified areas of the facility and types of events likely to produce significant incidents if not mitigated.

2011–2015 ***Cargill Texturizing Solutions*** Cedar Rapids, IA
Food Starch Process Development Engineer

- Continuous Improvement
  - Led Kaizen events on starch production processes to reduce down time on batch changes while also decreasing off-specification material and manufacturing costs.
  - Responsible for monthly key process indicators.
  - Developed business case justification for capital projects within the starch department.
- Food Starch Manufacturing and Technology Lead
  - Responsible for technology selection for plant expansion. Worked with vendors to select the right partners, and led piloting efforts for dryers, agglomeration, grinding, sifting, and pneumatic transport technologies.
  - Led process modeling and batch scheduling efforts to ensure the expanded plant would meet project commitments for production, waste generation, and energy efficiency.

2010–2011 ***Cargill Corn Milling*** Cedar Rapids, IA
Project Engineer

- Capital Project Implementation
  - Safely managed complex construction projects.
  - Typically managed four to five small capital projects concurrently.

2009–2010 **Cargill Corn Milling** Blair, NE
Engineer Training Program/Project Engineer

- Developed basic understanding of a range of chemical processes.

Special Experience/Skills:

- Kaizen event leader
- Design of experiments/statistical analysis
- Process hazard analysis and layers of protection analysis facilitator
- Incident investigation leader trained in 5Y, ABS cause mapping, and tap root methodologies

Education

2003–2009 **University of North Dakota** Grand Forks, ND
Masters – Chemical Engineering

Bachelors – Chemical Engineering

David Whitman
Senior Project Engineer – Renewable Fuels
Marathon Petroleum Company
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Education: Rose-Hulman Institute of Technology
B.S. Mechanical Engineering May 2002

ESI/George Washington University
Masters Certificate in Project Management December 2006

Licenses: Licensed Professional Engineer – Illinois (2008–2013); Indiana (2013–present)
Certifications: PMI Certified Project Management Professional (2009–present)

Research and Professional Experience
2019–Present: Marathon Petroleum Company
Renewable Fuels Senior Project Engineer
Lead project engineer for development major renewable fuels projects. Responsibilities include the following:

- Coordinate design development with process group and engineering firms to meet novel process design requirements within equipment standards and constraints.
- Facilitate specification and standards reviews for renewables plant applicability.
- Complete project quality reviews.
- Evaluate project design and scope options to support renewable fuel and sustainability metrics.
- Support execution strategy development for greenfield project sites.

Major Project Engineer
Responsible for feasibility and definition project scope development for multimillion-dollar refinery revamp projects. Responsibilities include the following:

- Coordinate engineering firms and licensors on multiple projects to ensure projects meet company specs, follow project development process, and meet budget and schedule constraints.
- Work with local and corporate project team members to control scope and maximize project benefits while maintaining constructability and operability in the design.
- Responsible for project approvals and budgeting.

2013–2019: Duke Energy Edwardsport IGCC Station
Project Engineering Manager

- Led project engineering department at integrated gasification combined cycle (IGCC) power plant. The group was primarily responsible for development and execution of station improvement and capital maintenance projects, along with managing the station capital budget.
- Responsible for team development, performance, and work distribution
- Completed incident, project, and budget reviews as part of station management team.
- Member of station incident command team – Planning Section Chief (backup).
- Supported final start-up and commissioning of station following plant construction.

2002–2013: Marathon Petroleum Company Illinois Refining Division

Project Manager

- Managed multimillion-dollar projects from front-end development through implementation.
- Responsible for project budgeting, forecasting, and reporting.
- Managed engineering contractors and coordinated project team efforts.
- Managed construction scope and costs.

Relief Systems Coordinator

- Coordinated complete update of refinery's relief system design and documentation.
- Member of corporate team to develop relief systems standard for company.
- Developed local guidelines for managing and maintaining the relief system.
- Consulted on projects to evaluate relief systems impact.

Area Project Engineer

- Developed and implemented small- to mid-sized projects for refinery operating teams.
- Supported the operating teams in meeting process safety management requirements.
- Provided engineering assistance to maintenance for routine and shutdown-related work.

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SUMMARY OF QUALIFICATIONS

Offering 42 years domestic and international experience with increasing managerial responsibilities in project development, process design, project engineering, and technical management roles in oil refineries. Has held key management positions at six different refineries. Currently serving as Project Development and Engineering Manager, Major Capital Projects. Career highlights include the following:

- Refinery project development and economic justification
- Project engineering management and management of refinery capital programs
- Process engineering and technical management for routine operations support engineering as well as small to large capital projects
- Operations representative and engineering supervisor overseeing design, construction, and start-up of a large refinery upgrade project in Saudi Arabia
- Operations management at a variety of levels from refinery operations manager and front-line supervision to working as an operator during a strike
- Have held a variety of refinery leadership team positions
- Adept at refinery PSM programs including MOC, PHA, HAZOP, and incident investigation

Included in this experience are the processes and administrative support shown below:

REFINING	**UTILITIES**	**ADMINISTRATIVE**
Amine Treating	Boilers and Steam Production	Department Management
Crude Distillation	Fuel Systems	Refinery Economic Evaluation
Catalytic Reforming	Wastewater Treatment	Project Economic Justification
Distillate and LPG Treating	Sludge Dewatering and Handling	Project Management
Gas Recovery	Flare System and Safety Valves	Conceptual Process Design
Hydroprocessing	Tanks, Loading and Blending	Detailed Design
NGL Processing	Hydrogen Reforming	MOC, PHA, HAZOP, and PSSR
Solvent Deasphalting	**CONTROL SYSTEMS**	Facilities Commissioning, Start-Up
Sulfuric Acid Alkylation	Honeywell DCS	Operations Training Support
Sulfur Recovery	Analyzers and Field Instruments	Environmental Permit Support
Coking and Visbreaking	Logic Systems	Incident Investigation

WORK EXPERIENCE

Marathon Petroleum (formerly Andeavor and Tesoro Corporation), Los Angeles, CA, Refinery

Corporate Refining Renewables Technologist – 2020 to present

Responsible for vetting new and emerging renewables and sustainability technologies for potential application at the 15 refining locations to facilitate strategic investments that lower carbon intensity, improve energy efficiency, and meet sustainability objectives. Integrate involvement across the enterprise to develop the business case and initiate the conceptual studies that result in renewable and sustainability capital projects. Currently leading scale-up

and implementation of novel organic oils pretreatment facility to support the Martinez Renewable Diesel Project. Other technologies currently being evaluated include carbon capture and sequestration for a hydrogen plant and several waste to fuels opportunities that utilize Fischer–Tropsch and pyrolysis biomass gasification to liquids.

Project Development and Engineering Manager, Capital Projects – 2016 to 2020

Led the development and engineering of a $515MM project to convert a small North Dakota refinery into the largest soy oil to renewable diesel plant in North America. Responsibilities included process technology and engineering contractor selection and interface with strategy and business development, commercial, procurement, logistics, and other organizations to align the process requirements with the business case. Took the project from a preliminary concept through appraise, select, and define stages (FEED). Supported start-up and troubleshooting at site. Led the activities that determined optimal plant capacity and location. Coordinated permitting, third-party logistics, and input of refinery personnel with project engineering, construction, and other departments such as commercial and logistics. Also responsible for Capital AFE package preparation and management of the engineering activities while embedded with the engineering contractor at its office.

Consulting Engineer, Capital Projects – 2015 to 2016

Managed appraise and select stage project engineering activities for capital projects larger than $30MM. Provided project managerial support for process engineering and operational activities for large capital projects during define and execute stages (PHAs, P&ID reviews, operability reviews, capital AFE package preparation, project technical objectives, etc.) Was responsible for supporting $460MM LARIC (LA Refinery Integration and Compliance) Project and roughly $500MM CPUP (Clean Product Upgrade Projects) for mixed xylenes production.

Manager Major Capital Synergy Projects – 2013 to 2015

Lead a multidisciplined team of seven professionals responsible for the business case and project development, appraise and select stage engineering of $460MM capital program to integrate a 104-MBD and 270-MBD Los Angeles area refinery sites into one integrated refining complex (LARIC). When completed, the combined site will be the largest and most complex refinery in the western United States.

Senior Manager of Engineering – 2012 to 2013

Responsible for the business case and project development, engineering, and execution of $150MM capital program at of 17.5 complexity 104-MBD Los Angeles area refinery. Managed over 40 on-site personnel comprised of project engineers, process engineers, design and drafting, document control, and field construction support. Helped develop the yearly capital budget. As part of the refinery leadership team, worked closely with operations, technical, and maintenance personnel to have operator-friendly, safe, environmentally compliant, low-cost projects integrated into the refinery during TAR and online construction.

Manager of Operations – 2011 to 2012

Responsible for the daily operation of 17.5 complexity 104-MBD Los Angeles area refinery. Accountable for $215MM annual operating budget. Managed over 200 employees, both hourly represented and salaried professionals. Oversaw the selection, hiring, and onboarding of 20 new hourly employees. As part of the refinery leadership team, also involved in setting refinery-wide safety, production, reliability, and gross margin improvement goals.

Manager of Operations Coordination – 2010 to 2011

Responsible for coordinating the refinery oils plan in a 17.5 complexity 104-MBD Los Angeles area refinery. Integrated the plan from the supply and optimization department with the refinery operations department to ensure smooth unit operation and margin optimization. Managed the refinery shift superintendents and hydrocarbon schedulers to operate the refinery

according to plan or improve the plan upon opportunity. Also led the development of projects and initiatives to improve refining gross margin.

Technical Manager of Process Engineering, Control Systems, and Laboratory – 2008 to 2010

Managed 42 employees in the technical support department. Responsible for daily operations support and capital project development. Member of the refinery leadership team, participated in managing $230MM/yr expense budget and $200MM/yr capital program. Also led a seven-person maintenance improvement team to streamline the refinery turn-around work process.

Process Engineering Manager, Major Capital Projects – 2007 to 2008

Process Engineering Manager at Engineering Office in Long Beach, CA, for $1B capital program to upgrade and modernize Los Angeles refinery. Led a team of refinery and contract engineers to develop conceptual design and cost estimates for various refinery processes. Units impacted included coker, hydroprocessing, a new vacuum unit, boilers, cogeneration, sulfur plant, flare, amine, sour water, and other utility systems. Also supported environmental permitting activity and development of economic cases.

Tesoro Corporation, Anacortes WA, Refinery

Project Manager, Golden Eagle Coker Modification Project – 2006 to 2007

Seconded as project manager at Engineering Office in Long Beach, CA, for $500MM 50-MBD coker modernization project in San Francisco Bay area refinery. This was a fast-track, out-of-sequence project with a challenging environmental compliance deadline. Responsible for assisting lead project manager and director of capital projects in all facets of engineering and procurement activities including technical evaluations, material procurement, change order management and approval, HAZOP, and managing refinery input.

Staff Engineer and Operations Venture Manager, Anacortes Coker Project – 2005 to 2006

Led an OEM refinery team to integrate a $470MM coker project through FEL 1 phase into an existing refinery. Other units included a relocated amine unit, a SRU, and extensive pipeway. Facilitated conceptual and detailed design, staffing evaluation, training, PHA, utility studies, and environmental permit support. Saved over $20MM capital by deleting additional units and processing incremental H_2S from the amine unit in an adjacent facility. Also led a team of six employees to improve maintenance turnaround performance. Implemented a turnaround contractor QA/QC auditing program that identified ways to improve work planning.

Senior Process Engineer, Low-Sulfur Gasoline Projects – 2002 to 2005

Lead process engineer responsible for $12MM upgrade of an existing FCC gasoline splitter, NHT, and CR to meet low-sulfur gasoline regulations. Highlights included retrofitting an existing column into an amine contactor and other value engineering items, saving over $2MM in capital during a lean capital environment. Also supported environmental permitting to integrate various projects into overall refinery low-sulfur fuels program. Implemented $3MM project with less than a 1-year payback that saved energy and increased crude oil processing by lowering the pressure on the crude column.

Senior Process Engineer, ROSE Project Design and Start-Up – 2000 to 2002

Lead process engineer responsible for the detailed design, and commissioning, training, and start-up activities of over $55MM ROSE deasphalting unit. This fast-track project started up on schedule and was the smoothest start-up of the ten most recent ROSE units. Was integral part of a diverse project team during the transition from construction through on-stream operation. Also provided follow-up technical support as required during process upsets and other emergencies.

Saudi Aramco, Ras Tanura (Saudi Arabia), Refinery

Engineering Supervisor, Refinery Upgrade Project Start-Up – 1997 to 2000

Engineering Supervisor and operations support for training, commissioning, and start-up of $500MM refinery extension on a $1.2B refinery upgrade project. Units include 44-MBD HGO hydrocracker with H_2 plant, 60-MBD visbreaker, and sulfur treating with 300-LTD recovery unit. Responsible for supervision of a team of over 14 Saudi Arab engineers during the transition from construction through precommissioning, start-up, on-stream performance tests, and normal operations.

Senior Operations Representative, Refinery Upgrade Project – 1994 to 1997

On-site refinery representative at London-based E&C contractor's office for engineering, operations, maintenance, and management interests on a +$500MM refinery upgrade project. Responsible for all review, approval, and value engineering activities during project detailed design. Oversaw and coordinated construction and precommissioning work on location in Saudi Arabia. Supervised entry-level Saudi Arab engineers.

Process Specialist – 1991 to 1994

Provided operations engineering coverage for a 320-MBD NGL separation and LPG treating facility. Solved daily operations and engineering problems. Made major contributions in a fast-track demothballing and optimization project of 60-MBD idled NGL plant. Supervised entry-level Saudi Arab engineers. Developed HYSIM computer models of plant distillation sections.

Sun Refining and Marketing Company, Toledo Refinery

Senior Process Engineer – 1989 to 1991

Provided technical leadership for a variety of projects within this 125-MBD fully integrated refinery. Developed economic justification, strategy, and process design for solutions to complex problems. Involved with long-range planning and capital budgeting process.

The Standard Oil Company (BP America), Toledo Refinery

Operations Front Line Supervisor – 1987 to 1989

Supervised eight operators in 125-MBD integrated refinery. Responsible for daily operation of crude-vac., iso-cracker, reformer, sat. gas plant, flare system, pollution control and sulfur unit. Worked as an operator on a crude unit and iso-cracker during a 113-day strike in 1988.

Senior Special Projects Engineer – 1985 to 1987

Responsible for the development, design, justification, and project management of capital projects. Supervised field start-up and troubleshooting of installed projects.

Senior Control Systems Engineer – 1981 to 1985

Responsible for control systems projects, including economic evaluation, design, equipment selection, installation, and start-up. Provided technical service on boilers and safety valves.

EDUCATION

Bachelor of Science, Chemical Engineering, May 1981
Clarkson College of Technology (Clarkson University), Potsdam, New York
GPA in major: 3.4/4.0. GPA overall: 3.1/4.0
Dean's List three semesters. New York State Regents Scholarship

PUBLIC OUTREACH

Gang Alternative program board of directors – 2010 to present

Currently President of the board for a local $6MM/ year nonprofit that provides public outreach services and after school programs to prevent at-risk youth from joining gangs. GAP also provides community cleanup and graffiti removal services.

PROFESSIONAL AFFILIATIONS

Engineer-in-Training, State of New York
Stationary Engineer, State of Ohio
American Institute of Chemical Engineers
AIChE Toledo Section “1991 Young Chemical Engineer of the Year” Award

Matt J. Baebler
Marathon Mandan & Dickinson Refineries
Phone: (801) 244-9245 | E-mail: MGBaebler@marathonpetroleum.com

Education and Training

BS Mechanical Engineering Missouri S&T 1979

MS Engineering Management Missouri S&T 1980

Research and Professional Experience

40 years of professional petrochemical experience. Current position is Marathon Project Director focusing on renewable fuels projects at 3 locations. Employment includes working for Amoco, BP, Tesoro/Andeavor, and now Marathon. Experiences include plant responsibilities of Project & Maintenance engineering, Engineering Supervision, Technical/Process Manager, and Operations Manager across 6 domestic refineries. Corporate assignments include Project Management, Capital Project Director of Refining, Economics & Scheduling, Director for Operations, and Director of Energy & Green House Gas, mostly domestically but a couple years internationally with base in London.

Publications

none

Patents, Copyrights, and software systems developed

none

Synergistic Activities

none

Andrew Dee
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Qualifications Summary

Offering 8 years of experience within the oil and gas industry value chain. Key roles include technical service refining experience, logistics and distribution planning, and renewable fuels project development.

Work Experience

Marathon Petroleum Company, Findlay Ohio

Asset Development Renewable Engineer ***July 2021 – Present***

- Complete technoeconomic analysis for renewables projects
  - Integration within existing MPC refining assets and new greenfield project development
  - Includes screening of new or emerging technology applicability to MPC
- Participate in multiple cross-organizational strategy teams to develop a strategy and associated project opportunities for MPC
  - Hydrogen, sustainable aviation fuel, circular plastics
- Support multiple renewables facilities yearly capital budget projections
  - Economic analysis, transparent economic build-up, and project idea generation
- Developed and evaluated logistics projects in collaboration with MPLX Terminaling, Business Development, Refining, Scheduling, and Trading

Operations Analysis ***October 2020 – July 2021***

- Provide analytical support for the East Clean Product Value Chain
  - Marketing and Exchange class of trade focused
    - Economic model evaluations to determine netbacks, return on investment, and net present value for brand, wholesale and exchange classes of trade
    - Monthly and quarterly benchmarking and value-add tracking/presenting to the East Division Management
- East Division Brand pricing specialist back-up

SD&P Engineer Long-Term Strategy and Analysis ***November 2018 – October 2020***

- Operated and maintained the Logistics Supply Chain Model
  - Model results were analyzed for capital project economic benefits and the yearly transportation budget
- Developed and evaluated logistic projects in collaboration with MPLX Terminaling, Business Development, Refining, Scheduling, and Trading
  - Projects included, Mt. Airy build-up scope development, Detroit Butane Rail Rack Modifications, Canton Refinery ACE Project
- Initiated and maintained terminaling storage and throughput contract agreements with MPLX and other outside third-party customers

- Mt. Airy TSA, LBC Sunshine Naphtha Tankage, Midwest Terminals Rail storage and transload agreement

Marathon Petroleum Company, Garyville, LA

Technical Services Area Process Engineer ***May 2015 – November 2018***

- Provided technical process support for the area team
  - Area teams include:
    - Tank Farm: May 2015 – June 2017
    - HF Alky, Butamer, Propylene Splitter: June 2017 – November 2018
  - Assisted in troubleshooting and daily unit optimization
  - Collaborated with Operations, Maintenance, Product Control, Engineering as well as other TS Engineers (Unit and Controls Engineers)
- Design and implementation of process optimization projects
  - Chemical injection systems (asphalt, export diesel, finished product corrosion inhibitor)
  - Alkylate unit hydraulic debottlenecking

Product Control Intern ***May 2014 – August 2014***

- Updated unit utility usage in the PIMS model for units across the refinery
- Calculated new bonus values for gasoline blending in the PIMS model
- Retrieved and input process data into the U12/U212 Platformer submodels used in refinery economic PIMS model

Engineering & Analytical Services Intern ***May 2013 – August 2013***

- Provided Excel Toolkit and unit performance monitor support to the refineries' technical service engineers
- Updated, flagged, and troubleshot unit process unit material balances at the multiple refinery locations

Education

Bachelor of Science, Chemical Engineering — May 2015
Trine University — GPA: 3.8/4.0