

## APPLICATION CHECKLIST

Use this checklist as a tool to ensure that you have all of the components of the application package. Please note, this checklist is for your use only and does not need to be included in the package.

<input type="checkbox"/>	Application
<input type="checkbox"/>	Transmittal Letter
<input type="checkbox"/>	Tax Liability Statement
<input type="checkbox"/>	Letters of Support (If Applicable)
<input type="checkbox"/>	Business Plan (Appendix)
<input type="checkbox"/>	Historical Financial Statements (3 years) (Appendix)
<input type="checkbox"/>	Budgeted Projections (Appendix)
<input type="checkbox"/>	Loan/Loan Guarantee Application (if Applicable, Appendix)
<input type="checkbox"/>	Other Appendices (If Applicable)

When the package is completed, send an electronic version to [sustainableenergy@nd.gov](mailto:sustainableenergy@nd.gov) and 2 hard copies by mail to:

Clean Sustainable Energy Authority  
North Dakota Industrial Commission  
State Capitol – 14<sup>th</sup> Floor  
600 East Boulevard Ave Dept 405  
Bismarck, ND 58505-0840

For more information on the application process please visit:  
<http://www.nd.gov/ndic/csea-infopage.htm>

Questions can be addressed to Al Anderson (701) 595-9668.

Clean Sustainable Energy Authority  

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North Dakota Industrial Commission

## Application

**Project Title: Vapor Recovery Units to Capture Fugitive Gas Emissions from Oil & Gas Locations**

**Applicant: Marathon Oil Company**

**Date of Application: 11/01/2021**

**Amount of Request**  
**Grant: \$3,200,000**  
**Loan: \$0**

**Total Amount of Proposed Project: \$6,400,000**

**Duration of Project: 11/01/21, with 6 Year Usable Life Expectancy.**

**Point of Contact (POC): Zachary Weis**

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## ABSTRACT

### **Objective:**

The objective of this project is to purchase and install a fleet of vapor recover units (VRU's) on Marathon Oil Company (Marathon) operated oil and gas production facilities. The utilization of the VRU's will provide Marathon additional capability to reduce emissions by preventing the flaring of the low-pressure natural gas that comes off of the production equipment and is unable to be sent through the third party natural gas sales system.

### **Expected Results:**

The deployment of the Vapor Recovery Units throughout a portion of Marathon's operations under the jurisdiction of the State of North Dakota will reduce the emission intensity of the oil and gas produced from those operation locations. With reducing the flaring of the low-pressure natural gas on these locations, Marathon is able to reduce the impacts to the environment and increase the volumes captured for sales.

### **Duration:**

Based on manufacture timeline, the Vapor Recovery Units for this grant application are available for delivered starting January 2022 through May 2022. Installation of the Vapor Recovery Units can start in January 2022 and would continue as units are available. It is anticipated that each VRU would be installed on a production site for approximately a one-year period and then the unit would be relocated to a site with higher production volumes. All locations identified for VRU installation are under the regulatory jurisdiction of the State of North Dakota. It is anticipated that the VRU's will have a total 6-year usable life.

### **Total Project Cost:**

Each Vapor Recovery Unit is expected to cost approximately \$200,000, including purchase, installation, and winterization. A fleet of 32 Vapor Recovery Units would total \$6,400,000.

### **Participants:**

The key participant in this project is Marathon Oil Company. The key equipment provider would be Flogistix, from whom which Marathon would purchase the Vapor Recover Units. It is anticipated that a fabrication company will be required to 'winterize' the Vapor Recover Units for use in North Dakota.

## PROJECT DESCRIPTION

### Objectives:

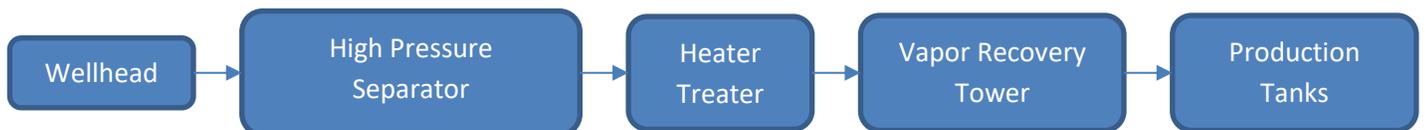
This proposed project will be to purchase a fleet of 32 Vapor Recovery Unit's (VRU's) that will be installed on Marathon Oil Company operated oil and gas production facilities.

In a typical facility, low-pressure gas that is processed by the production equipment is not at an acceptable pressure to be sent into the third party natural gas sales system. This low-pressure gas is typically used on location as lease used gas or combusted in a flare. Based on historic natural gas prices, it is economically difficult to capture this low-pressure gas.

The VRU will compress the low-pressure natural gas coming from the production facility to a higher pressure. This pressure change will allow the previously non-captured gas to meet the minimum pressure requirements of the third party gas sales system and the gas can then be sold to the third party midstream company.

### Methodology:

Production fluids, including natural gas, at a Marathon production facility typically are sent through the following equipment flow process:



Natural gas is typically sold into the third party gas sales system off the High Pressure Separator, and can be sold off the Heater Treater as well. However, given the Vapor Recovery Tower operates at a pressure range from 10-15 psi, the natural gas that comes off of this vessel is not able to meet the minimum pressure requirements of the third party gas sales system.

This project would install Vapor Recovery Units after the Vapor Recovery Tower to collect and compress the natural gas coming off that unit. The now compressed natural gas will be at a higher pressure allowing for it to meet the minimum pressure requirements of the third party gas sales system. There is also the potential to collect and compress natural gas coming off the Heater Treaters, dependent on operating pressures further utilizing the VRU to reduce emissions.

For this project, Marathon plans to utilize Flogistix FX12 model Vapor Recovery Units. The FX12 utilizes a LeRoi compressor with integral gear housing that allows for various gearing options. It is equipped with a 125hp 460V 3-phase electric motor. It has a 350 psig maximum working pressure. The FX12 has a flow rate range of 225 to 475 MSCFD. The FX12 also has a Flux telemetry system for detailed

Supervisory Control and Data Acquisition (SCADA) oversight and notifications allowing Marathon to track the operations of the VRU and collect operational data of the VRU.

This project would install Vapor Recovery Units on new facilities with Vapor Recovery Towers at facility startup. It is anticipated that a new well facility will have sufficient gas coming off the Vapor Recover Tower for the initial 12-18 months of production for the VRU. After this time, the VRU would be removed from the facility and placed onto another new facility at startup. This approach allows for the flexibility of the deployment of the VRU's to where the highest emissions reduction and gas collation can be achieved increasing value to the royalty owner, state of North Dakota and Marathon.

### **Anticipated Results:**

Based on the 225 to 475 MSCFD range of an FX12 Vapor Recover Unit, and the typical production from a Marathon operated Bakken facility in the first year of production, the FX 12 VRU has the potential to eliminate approximately 33 MMSFC of natural gas of being flared, per facility with a single VRU. With 32 VRU's in operation, this project has the potential to eliminate over 1,000 MMSCF of natural gas flaring for each year they are in operation.

Based on the success of this project, it may lead to the expanded use of Vapor Recovery Units at Marathon facilities and could lead to the promotion of this technology throughout the basin.

### **Facilities:**

Facilities that would be applicable for installation of Vapor Recovery Units would be Marathon facilities that:

- Have a Vapor Recovery Towers included as part of the facility design, which is typically the new-build facility;
- Have sufficient lower pressure gas to meet the range of the FX12 Vapor Recovery Unit, which is 225 to 475 MSCFD; and are
- Connected to gas sales and have available takeaway capacity.

### **Resources:**

Marathon will have in-house facility engineering team to design and develop specifications for the Vapor Recovery Units. We also have Operations, Maintenance, and Measurement organizations to provide day-to-day support. We will rely on Flogistix for manufacturing and troubleshooting of the VRU's as they are the manufacture and supplier of the equipment. We will also rely on a third party fabrication company to provide winterization of the VRU's.

Marathon is currently renting eight VRU's from Flogistics to gain experience and an understanding of their benefits.

**Techniques to Be Used, Their Availability and Capability:**

The Vapor Recover Units will be utilized to capture and compress low pressure natural gas, that would have been flared, to a higher pressure that allows for it to meet the third party gas gatherer minimum pressure requirements and be sold. VRU's are not readily available and need to be arranged for in advanced of installation on location in order for weatherization improvements to be done for Bakken operation. The manufacturing lead time of a VRU is up to 26 weeks.

**Environmental and Economic Impacts while Project is Underway:**

As noted in the above 'Anticipated Results', each Vapor Recovery Unit has the potential to eliminate approximately 33 MMSFC of natural gas of being flared, per facility with a single VRU. With 32 VRU's in operation, this project has the potential to eliminate over 1,000 MMSCF of natural gas flaring for each year they are in operation.

In addition to the environmental benefits anticipated by the VRU's, the economic benefit will be shared by the royalty owner, State of North Dakota and Marathon. The additional previously uncaptured natural gas will now be collected and sold to the third party midstream partner. The increase in natural gas sold will increase royalties and taxes paid and will help defray the cost of installing the VRU.

**Ultimate Technological and Economic Impacts:**

With the installation of the Vapor Recover Units, the ultimate recovery of natural gas will increase on a per well basis. This increased capture of natural gas will accelerate the economic payback of the well along with the reduction in flaring and emissions. The grant dollars will offset half of the initial purchase and operating cost of the VRU's. The economic benefit of the VRU capturing the low-pressure gas would be difficult to achieve based on historic natural gas prices.

**Why the Project is Needed:**

Marathon has limited operational and economic experience with Vapor Recovery Units deployed in the Bakken. This project will work to prove up the operational and economical success of Vapor Recovery Units. If this project is successful for Marathon, it has the potential to be utilized broadly in the Bakken to reduce natural gas flaring and reduce emissions.

## STANDARDS OF SUCCESS

The standards by which the success of the project will be in the following range depending on well count per facility with VRU installed:

- Reduced emissions from reduced gas flaring.
  - 30 to 90 tons of VOC per year.
- Reduced environmental impacts from reduced gas flaring.
  - 1500 to 20,000 metric tons of CO<sub>2</sub>e per year.
- Reduced gas flared and Increased gas sales from production facility.
  - 30,000 MSCF to 150,000 MSCF of VRT flaring per year.
- Increased royalties paid to mineral owners and taxes paid to state of North Dakota.
  - Royalty and tax amount are dependent on individual leases and natural gas market price.
- Increased life of VRU project.
  - Production team will adapt the use of a VRU on facilities based on success of program which could lead to extended use of VRU on a facility or installation of fit for purpose VRU based on decreased production resulting increased gas capture.
- Increased employment opportunities to support operations and maintenance activities.
  - Two to four full time equivalent positions within Marathon and contractor.

The above standards of success are for one VRU over a single year. Standards of success for entire VRU program would multiply the above emissions, environmental impact and gas flared volumes by 32 to represent impact from entire program.

## BACKGROUND/QUALIFICATIONS

*Please provide a summary of prior work related to the project conducted by the applicant and other participants as well as by other organizations. This should also include summary of the experience and qualifications pertinent to the project of the applicant, key personnel, and other participants in the project.*

Marathon Oil Corporation (Marathon) is an independent exploration and production (E&P) company focused on four of the most competitive resource plays in the U.S., complemented by a world-class integrated gas business in Equatorial Guinea. We became an independent E&P company on July 1, 2011 and are based in Houston, TX.

Marathon is committed to our framework for success, with the foundation of a strong balance sheet and the competitive advantages of our multi-basin portfolio, including the Eagle Ford in Texas, the Bakken in North Dakota, the STACK and SCOOP in Oklahoma and the Permian in New Mexico. This diverse portfolio is oil weighted, but well balanced with an approximate 50% oil and 50% gas/NGL production mix.

Specify for the Bakken in North Dakota, Marathon owns and operates 830 Wells across the 290,000 net acres of active leasehold within the Bakken. In the second quarter of 2021, Marathon Bakken production was 107,000 net barrels of oil equivalent per day.

Marathon Bakken Asset Team in North Dakota includes a high skilled team of individuals. This the following organizations: Production Operations, Maintenance, Measurement, Facility Engineering, Construction, Health / Environment / Safety, and Regulatory. Members of these teams have years of experience working directly in the Bakken Asset.

Support to Marathon for this project will come from Flogistix, a leader end-to-end emission management and environmental performance. Flogistix will be responsible for manufacturing of the Vapor Recovery Units, as well as operational and maintenance support.

## MANAGEMENT

The Bakken Production Manager, Jeff Parker, will overall manage this Vapor Recovery Unit Project. Mr. Parker is currently the Production Manager for Marathon Oil Company's Bakken Asset Team, based in Dickinson, North Dakota. In his current role, he is responsible for Production Operations, Maintenance, Measurement, and Workover. Mr. Parker has supported the Bakken Asset Team for the past eight years, leading multiple organizations, including: Drilling, Completions, Facility Engineering, Construction, and Production Engineering. Prior to the Bakken Asset Team, Mr. Parker's career with Marathon Oil Company was focused on Drilling and Completions for sixteen years. He has led drilling and completions operations in Wyoming, Michigan, the Gulf of Mexico, Kurdistan, Offshore UK, Offshore Ireland, and Offshore Norway.

Supporting this project will also come from the greater Marathon Bakken Asset Team, including: Facility Engineering for design, Construction for installation, Operations for day to day activities, Maintenance for both preventative and reactive requirements, Measurement for data quality, and HES for emission reduction verification.

Key to the initial start of this Vapor Recovery Unit Project will be a delivery schedule for the 32 Vapor Recover Units. This will be combined with Marathon's Bakken Asset Team's project schedule to plan and schedule Vapor Recovery Unit installations.

Monthly and Quarterly Meetings will be set up with Flogistics to review the delivery schedule of the 32 Vapor Recovery Units as well as Vapor Recovery Unit performance once installed and operational on Marathon production facilities.

Monthly and Quarterly Meeting will be set up internally with Marathon to review gas captured and emission reduction for each Vapor Recovery Unit installed.

## TIMETABLE

Key to this project will be the delivery of FX12 Vapor Recovery Units from Flogistics. The below table is an indicative schedule provided by Flogistics.

<b>Production Facility</b>	<b>Initial Production Date</b>	<b># of FX 12 Required</b>	<b>Indicative Delivery Date(s)</b>
Emiley	02/15/22	2	01/07/22 & 02/01/22
Emmet	03/01/22	2	02/02/22 & 02/07/22
State Howard	05/15/22	1	02/09/22
Hugo / Connolly 31	03/15/22	1	02/15/22
Bailey	06/01/22	2	02/16/22 & 02/22/22
Austin	04/01/22	2	02/23/22 & 03/01/22
Stone	07/01/22	2	03/01/22 & 03/03/22
Bethol	05/01/22	2	03/08/22 & 03/08/22
Hilda	07/15/22	2	03/09/22 & 03/15/22
Prudence	02/15/23	2	03/16/22 & 03/22/22
Lazy HE	06/15/22	2	03/23/22 & 03/29/22
Paulson 44	01/15/23	1	03/30/22
Ravn	02/01/23	2	04/05/22 & 04/06/22
Voigt	01/01/23	1	04/12/22
Rice	03/01/23	2	04/12/22 & 04/13/22
George Tuhy	04/01/23	2	04/20/22 & 04/21/22
Marlin 44	03/15/23	2	04/27/22 & 04/28/22
Bean USA	05/01/23	2	05/04/22 & 05/02/22

The FX12 Vapor Recovery Units from Flogistics will be installed on the production facility prior to initial production.

## BUDGET

The primary budget will be the initial purchase, winterization, and initial installation of the Vapor Recovery Units. The direct operating costs of the VRU, indirect costs of the VRU on the installed facility and future cost to relocate the VRU will be incurred by Marathon oil Company.

<b>Project Associated Expense</b>	<b>NDIC Grant</b>	<b>NDIC Loan</b>	<b>Applicant's Share (Cash)</b>	<b>Other Project Sponsor's Share</b>	<b>Total</b>
32 x Vapor Recovery Units, including winterization & initial installation	\$3,200,000		\$3,200,000		\$6,400,000
<b>Total</b>	\$3,200,000		\$3,200,000		\$6,400,000

## CONFIDENTIAL INFORMATION

Marathon Oil Company has no requirements for confidentiality with this project.

## PATENTS/RIGHTS TO TECHNICAL DATA

There are no patents or rights that Marathon Oil Company wish to reserve.

## STATE PROGRAMS AND INCENTIVES

Oil and Gas Research Council Grant: "Underground Storage of Produced Natural Gas — Conceptual Evaluation and Pilot Project(s) (HB 1014)" - Submitted By: Energy & Environmental Research Center with Marathon Oil Company partnership.

North Dakota Industrial Commission – Bakken Restart Task Force/Cares Act – DUC Well Completion Program – 10 wells participated with \$1,955,992.79 received from program.