



June 30, 2022

Mr. Steve Kaul
Executive Secretary
North Dakota Public Service Commission
State Capitol Building
600 E. Boulevard Ave. Dept. 408
Bismarck, ND 58505-0480

Dear Mr. Kaul:

Re: Dakota Gasification Ten-Year Plan

Enclosed please find ten copies of Dakota Gasification Company's Ten-Year Plan in accordance with NDCC 49-22-04. Notice of the filing of this plan is given to the state agencies and officers as denoted on the attached Service List pursuant to Articles 69-06-01-05 and 69-06-02-02 of the North Dakota Administrative Code.

Sincerely,

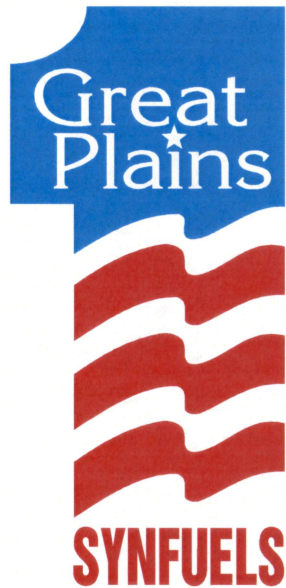
Trinity Turnbow
Assistant Plant Manager
/gmj

Enclosures

cc: Ms. Shana Broast, Mercer County Auditor
Service List (without Enclosure)

1 PU-22-331 Filed 06/30/2022 Pages: 9
2022 Ten Year Plan
Dakota Gasification Company





**DAKOTA GASIFICATION COMPANY
NORTH DAKOTA TEN-YEAR PLAN**

June 30, 2022

Submitted to the North Dakota Public Service Commission
pursuant to

North Dakota Century Code Section 49-22-04

EXISTING ENERGY CONVERSION FACILITIES

BACKGROUND

The Great Plains Synfuels Plant (**Synfuels Plant**), owned and operated by Dakota Gasification Company (**Dakota**), a wholly-owned subsidiary of Basin Electric Power Cooperative (**Basin Electric**), is located approximately eight miles northwest of Beulah, North Dakota. The Synfuels Plant uses technology developed by the Lurgi corporation of Germany to convert lignite coal into synthetic natural gas (**SNG**). The Synfuels Plant is presently capable of producing up to 170 million cubic feet of SNG per day. In addition to producing SNG, the Synfuels Plant presently also produces and sells twelve other products: urea, anhydrous ammonia, diesel exhaust fluid (**DEF**), carbon dioxide (gas), carbon dioxide (liquid), tar oil, ammonium sulfate, crude cresylic acid, krypton-xenon, liquid nitrogen, naphtha, and phenol.

Coal gasification involves a process which combines carbon and hydrogen from the lignite coal under high pressure with steam and oxygen to produce methane and other value added products. The first step in the Lurgi gasification process is the crushing and screening of approximately 32,000 tons of lignite per day into a top size of four-inch diameter pieces and a bottom size (fines) of one quarter inch diameter. During this "sizing" process, approximately 13,200 tons of lignite "fines" per day are screened out. These fines are particles of lignite that are too small to gasify. The fines are sold to Basin Electric for use in generating electricity. The other 19,000 tons of sized lignite per day are delivered to the Synfuels Plant and are used as feedstock for the plant's gasifiers.

The gasifiers are cylindrical pressure vessels 40 feet high and have an inside diameter of 13 feet. The Synfuels Plant has 14 gasifiers. Sized lignite enters the tops of these gasifiers forming tall beds of lignite. Steam and oxygen (produced on site) are fed into the bottom of the lignite beds causing intense combustion (2,200°F). The resulting hot gases break down the molecular bonds in the lignite and steam, releasing compounds of carbon, hydrogen, nitrogen, sulfur and other substances to form a raw gas. This raw gas is then cooled causing tars, oils, phenol, ammonia and some water vapor to condense into liquids. These liquids are then processed separately from the main gas stream.

Shift conversion, or hydrogen enrichment, is the next step in the process. The raw gas now contains about 2-1/4 parts hydrogen to one part carbon monoxide. To increase the ratio to 3:1 (the minimum needed for methanation) some of the raw gas is passed through catalytic reactors. These reactors convert part of the carbon monoxide and water to hydrogen and carbon dioxide. The raw gas now contains the proper mix of hydrogen and carbon monoxide for SNG production; but first, carbon dioxide, sulfur compounds, and naphtha must be removed in the Rectisol unit.

Methanation takes place by passing the clean gas over beds of a nickel catalyst causing carbon monoxide and most of the remaining carbon dioxide to react with the free hydrogen to form methane. Final dehydration removes traces of water and readies gas for compression into pipeline quality SNG.

In the mid-nineties an ammonia synthesis process was added to the facility. This facility takes a portion of the clean gas from the Rectisol unit and reacts it with steam and oxygen to form anhydrous ammonia. This process separates a pure carbon dioxide stream that can be vented directly to atmosphere.

In February 2018, Dakota completed a 1,100 ton/day urea production facility adjacent to the Synfuels Plant. A diesel exhaust fluid (**DEF**) production facility was constructed as part of this facility. Urea and demineralized water are used to manufacture DEF. Dakota began construction during the summer of 2014. This project also included the construction of additional rail load-out facilities. The feedstock for the urea plant includes both anhydrous ammonia and the pure carbon dioxide produced by Dakota's ammonia plant. The urea and DEF produced by Dakota is shipped by both rail and truck. As part of the urea construction project, a carbon dioxide liquefaction and storage facility

was also constructed. In June of 2020 Dakota began selling up to 100 Tons per day of food grade liquid carbon dioxide. Liquid CO₂ is being shipped via truck.

Coordination Efforts. Adjacent to the Synfuels Plant is the Antelope Valley Station (**AVS**), an electric generating station which is part of a regional power supply system operated by Basin Electric. The Synfuels Plant and AVS share certain common facilities including water supply, water treatment, coal handling, rail and electrical transmission. Lignite for both plants is delivered from the nearby Freedom Mine, operated by The Coteau Properties Company (**Coteau**), a subsidiary of The North American Coal Corporation. Most mining equipment is owned or leased by Dakota Coal Company (another subsidiary of Basin Electric) and is either leased or subleased to Coteau. Dakota Coal Company was incorporated in 1988 and was organized to supply lignite coal to AVS and the Synfuels Plant.

Planned Removal or Construction. Dakota has no plan to remove any of its existing energy conversion facilities from service or add facilities during the ten-year period.

EXISTING TRANSMISSION PIPELINES FACILITIES

The water supply for the Synfuels Plant is provided by a 42-inch diameter steel-lined pipe owned by Basin Electric, which is approximately nine miles in length. This water pipeline also supplies water for Basin Electric's AVS which is located adjacent to the Synfuels Plant. The raw water line runs directly south from an intake structure and pumping station located on Lake Sakakawea to AVS. In turn, AVS processes the water through cold lime softening and transports the softened water to the Synfuels Plant. The line has a maximum operating pressure of 160 psi gauge and a flow rate of 30,000 gpm. The pipeline was constructed with a minimum cover of seven feet.

Pipeline transmission facilities owned by Dakota include its 34-mile, 24-inch diameter Class A carbon steel pipeline extending from the tailgate of the Synfuels Plant, running southwest to an interconnection at the Hebron Tap where it interconnects with the Northern Border Pipeline. The Northern Border Pipeline transports the SNG along with large quantities of Canadian and Bakken natural gas to Ventura and Harper, Iowa and North Hayden, Indiana where it reaches an interconnection to a network of pipeline systems serving customers throughout the United States.

There are two metering stations on the Synfuels Plant to Hebron Tap pipeline, one of them at the Synfuels Plant and the other at the Hebron Tap. These metering stations measure the quantity of SNG transported and analyze SNG quality. Maximum design operating pressure of this pipeline is 1,440 psi. The pipeline is capable of transporting considerably more than 170 million standard cubic feet of SNG per day produced by the Synfuels Plant as it was designed to transport SNG for a coal gasification plant twice the size of the present facility. There is a mid-valve on the pipeline that automatically closes in the event of sudden depressurization. The pipeline first transported SNG on July 28, 1984. The pipeline was constructed with a minimum cover of four feet.

The SNG is compressed by two separate two-stage Allis-Chalmers compressors. In December 1991, Dakota installed two new turbine drivers from Mitsubishi International Corporation in order to have sufficient horsepower to deliver the Synfuels Plant's production into the Northern Border Pipeline system. These turbines are 12,500 hp, 13,700 rpm drivers driven by 1,150 psi steam. The SNG produced at the Synfuels Plant meets or exceeds the quality standards listed in the Northern Border Pipeline Gas Tariff filed with the Federal Energy Regulatory Commission.

This pipeline is regulated under Code of Federal Regulation Title 49, Part 192 (regulations promulgated pursuant to the Natural Gas Pipeline Safety Act of 1968). Reports are monitored by the Office of Pipeline Safety, an agency of the United States Department of Transportation.

In July 1997, Dakota entered into a contract with PanCanadian Resources, which changed its name to Cenovus Energy (**Cenovus**) and has since sold its interest to Whitecap Energy (**Whitecap**) on behalf of the Weyburn Unit pursuant to which Dakota constructed and operates a carbon dioxide pipeline from the Synfuels Plant to the U.S./Canadian border including a compressor station at the Synfuels Plant. The contract allows for purchase up to 95 million standard cubic feet per day (**MMSCF/D**) of carbon dioxide and deliveries commenced in 2001. In May 2005, Dakota signed a contract with Apache Canada Ltd, which subsequently sold its interest to Cardinal Energy, of Weyburn, Saskatchewan to supply their Midale Unit with up to 25 MMSCF/D of carbon dioxide. Dakota and Cenovus were parties to a second sales arrangement calling for the delivery of up to 30 MMSCF/D of carbon dioxide. These additional deliveries required the installation of a third compressor at the Synfuels Plant and a Booster Pump at Tioga, ND. This second Cenovus contract has since expired. At full production, the Synfuels Plant produces approximately 210 MMSCF/D of carbon dioxide. The pipeline, with sufficient compression, is capable of transporting the entire 210 MMSCF/D output to Tioga and up to 165 MMSCF/D from Tioga to the Canadian border. Dakota is pursuing the opportunity to inject the carbon dioxide into Class VI wells for permanent sequestration. This option would require installation of a lateral pipeline from Dakota's facility.

The carbon dioxide pipeline proceeds in a westerly direction from the Synfuels Plant to a point near Killdeer, North Dakota where it turns north, goes under the Little Missouri River and Lake Sakakawea and crosses the United States/Canadian border north of Crosby, North Dakota. The pipeline traverses the major production areas of the northern portion of the Williston Basin. Carbon dioxide is economically available to oil production companies operating in that area. In addition, a connection was placed near Killdeer, North Dakota where the pipeline turns northward which would enable future expansion of the carbon dioxide pipeline south to the oil fields in the Dickinson, North Dakota area and/or into Montana. The pipeline is approximately 167 miles in length. An interconnecting pipeline in Saskatchewan, Canada owned by Dakota's Canadian subsidiary, Souris Valley Pipeline Limited (**SVPL**), is approximately 38 miles in length.

A compressor facility located within the Synfuels Plant boosts the carbon dioxide stream pressure to approximately 2,700 psig to ensure delivery to the oil fields at Weyburn and Midale at a minimum pressure of 2,200 psig. The carbon dioxide is transported in a super critical dense phase which reacts like a liquid. From the Synfuels Plant to Tioga, the pipe has a nominal diameter of 14 inches with a wall thickness of 0.375 inches. From Tioga to the Canadian border, the pipe has a nominal 12-inch diameter and a wall thickness of 0.375 inches. Mainline pipe was constructed using Grade X70 high frequency electric resistance welded steel pipe. Road and railroad crossings were constructed using Grade X65 SMLS pipe. Pipe for the Little Missouri and Lake Sakakawea was also Grade X65 SMLS pipe with abrasion resistant coating. All pipe and field joints were coated with a fusion-bonded epoxy to an average thickness of 17 mills. All field welds were radiographed. The gas stream transported contains a minimum of 94 percent carbon dioxide by volume, and contains less than two percent by volume of hydrogen sulfide, less than two percent by volume nitrogen and less than two percent by volume of methane. This pipeline and associated facilities were designed and constructed and are operated and maintained in accordance with the requirements of the U.S. Department of Transportation, Pipeline Safety Regulations Code of Federal Regulations Title 49, Part 195, Transportation of Hazardous Liquids by Pipeline.

The entire carbon dioxide pipeline system (including the SVPL pipeline in Saskatchewan) is operated remotely from Dakota's operations center at the Synfuels Plant by means of a microwave-based radio communication system.

In 2014, Dakota constructed a synthetic natural gas pipeline to transport synthetic natural gas from Dakota's Synfuels Plant site to the adjacent AVS plant site. Dakota owns, operates, and maintains this pipeline. This pipeline has a nominal diameter of 10 inches with a wall thickness of 0.365 inches and totals approximately 3.2 miles in length. Mainline pipe was constructed using Grade X52 high

frequency electric resistance welded steel pipe. All pipe and field joints were coated with a fusion-bonded epoxy to a minimum thickness of 17 mils. In addition, an abrasion resistant coating was added to all pipe installed by boring. All field welds were radiographed. The gas stream transported contains approximately 94.3 percent methane, 3.9 percent hydrogen, and 0.8 percent carbon dioxide. This pipeline and associated facilities were designed and constructed and are operated and maintained in accordance with the requirements of the U.S. Department of Transportation, Pipeline Safety Regulations Code of Federal Regulations Title 49, Part 192, Transportation of Natural and Other Gas by Pipeline.

Planned Removal or Construction. Dakota has no current plan to remove any of its existing transmission pipeline facilities from service. Dakota is pursuing opportunities that could be available through Section 45Q of the Internal Revenue Code with respect to the balance of carbon dioxide produced by the Synfuels Plant which is not being sold to the Canadian oil fields. This project will potentially begin operation in the fall of 2022.

ENVIRONMENTAL

Dakota has acquired all of the environmental permits that are required for the construction and/or operation of the Synfuels Plant, including those for the 1,100 ton/day urea production facility that began operation in 2018.

The various active environmental permits issued by the Department of Environmental Quality include the air pollution control permits, deep well injection permits, solid waste disposal permits, hazardous waste storage permits, storm water pollution prevention permits and a Title V Permit to Operate.

Within this ten-year period, Dakota may need to expand the ash disposal landfill adjacent to the current site.

PROJECTED DEMAND FOR SERVICES

Dakota has started construction of a six mile CO₂ pipeline and four injections wells to geologically sequester CO₂ that is not committed to the Canadian customers. Pending permit approval, the project is on track to begin sequestration activities in the fall of 2022. The pipeline and associated facilities will meet U.S. Department of Transportation (USDOT) regulations, including the design, installation, pressure testing, operations, and maintenance requirements as outlined in 49 Code of Federal Regulations (CFR) Part 195, Transportation of Hazardous Liquids by Pipeline, as well as other applicable codes, regulations, and standards. Including the mainline and laterals, the proposed pipeline is approximately 6.8 miles in length, comprised of a mainline approximately 2.9 miles in length and constructed of 12-inch nominal diameter pipe and five lateral pipelines, totaling an additional 3.9 miles of 6-inch nominal diameter pipeline, each of which originate at the mainline and end at a sequestration well site.

Dakota has been approached by Bakken Energy to purchase the Synfuels Plant with the intention of converting the facility to clean hydrogen production. The design of the facility is still being developed. The fundamental concept is to consume natural gas from the Bakken oil field utilizing the existing CO₂ pipeline for transportation. Roughly half of the Synfuels plant equipment would be repurposed and an autothermal reformer, and associated processes, would be added to the facility.

Conceptually, the purchase of the facility could occur in late 2022 or early 2023. The gasification facility would continue to run as it is currently configured during the development of the new facility. The coal operation would discontinue within a few months of the hydrogen plant startup, which is expected in late 2026 or early 2027.

**Dakota Gasification Company
2022 North Dakota Ten Year Plan
Service List - Notice of Filing**

North Dakota Aeronautics Commission
P.O. Box 5020
Bismarck, ND 58502-5020

North Dakota Office of Attorney General
600 East Boulevard Ave., Dept. 125
Bismarck, ND 58505-0040

North Dakota Department of Agriculture
600 E Boulevard Ave., Dept. 602
Bismarck ND 58505-0020

North Dakota Department of Health
600 E Boulevard Ave., Dept. 301
Bismarck, ND 58505-0200

North Dakota Department of Human Services
600 E. Boulevard Ave., Dept. 325
Bismarck N.D. 58505-0250

North Dakota Department of Labor & Human
Rights
600 East Boulevard Ave., Dept. 406
Bismarck, ND 58505-0340

North Dakota Department of Career &
Technical Education
600 East Boulevard Ave., Dept. 270
Bismarck, ND 58505-0610

North Dakota Department of Commerce
1600 East Century Ave., Suite 6
PO Box 2057
Bismarck, ND 58503

Energy Infrastructure and Impact Office
North Dakota Department of Trust Lands
1707 North 9th St.
P.O. Box 5523
Bismarck, ND 58506-5523

North Dakota Game & Fish Department
100 North Bismarck Expressway
Bismarck, ND 58501-5095

Job Service of North Dakota
P.O. Box 5507
Bismarck, ND 58506-5507

North Dakota Department of Trust Lands
1707 North 9th Street
PO Box 5523
Bismarck, ND 58506-5523

North Dakota Parks & Recreation Department
Liberty Memorial Building
604 E Boulevard Ave, Dept. 750
Bismarck, ND 58505

ND Natural Resources Conservation Service
220 East Rosser Avenue
Federal Building, Room 270
Bismarck, ND 58501

North Dakota State Water Commission
900 East Boulevard Avenue Dept 770
Bismarck, ND 58502-0850

United States Department of Defense
ND Joint Forces Headquarters
PO Box 5511
Attn: State Director for North Dakota
Bismarck, ND 58506-5511

Fish and Wildlife Service
North Dakota Field Office
3425 Miriam Avenue
Bismarck, ND 58501-7926

United States Army Corps of Engineers
North Dakota Regulatory Office
3319 University Drive
Bismarck, ND 58504

Federal Aviation Administration
2301 University Dr # 23A
Bismarck, ND 58504

North Dakota Transmission Authority
600 East Boulevard Avenue Dept. 405
Bismarck, ND 58505-0840

North Dakota Industrial Commission
600 E. Boulevard Ave. Dept. 405
Bismarck, ND 58505-0840

Office of the Governor
600 East Boulevard Avenue
Bismarck, ND 58505-0001

North Dakota Department of Transportation
608 East Boulevard Avenue
Bismarck, ND 58505-0700

State Historical Society of North Dakota
612 East Boulevard Avenue
Bismarck, ND 58505-0830

Indian Affairs Commission
600 East Boulevard Avenue
1st Floor, Judicial Wing - Room #117
Bismarck, ND 58505

North Dakota Pipeline Authority
c/o North Dakota Industrial Commission
State Capitol 14th Floor
600 East Boulevard Avenue Dept. 405
Bismarck, ND 58505-0840

Grand Forks Air Force Base
226 Steen Blvd
Bldg. 812
Grand Forks AFB, ND 58205

Minot Air Force Base
196 Missile Avenue
Minot AFB, ND 58705-5003

Mercer County Commission
P.O. Box 39
Stanton, ND 58571-0039

ND Department of Environmental Quality
4201 Normandy Street
Bismarck, ND 58503-1324

ND Geological Survey
600 East Boulevard Avenue
Bismarck ND 58505-0840

North Dakota Forest Service
Bismarck Field Office
916 East Interstate Avenue Suite #4
Bismarck ND 58503-1227
Telephone: (701) 328-9944

Bureau of Land Management
North Dakota Field Office
99 23rd Avenue West, Suite A
Dickinson, ND 58601

Military Aviation and Installation Assurance
Siting Clearinghouse
3400 Defense Pentagon, Room 5C646
Washington, DC 20301 - 3400

Twentieth Airforce 91st Missile Wing
Minot Air Force Base
196 Missile Avenue
Minot AFB, ND 58705-5003