

North Dakota Natural Gas Can Power the Artificial Intelligence Revolution

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Introduction

The physical and economic scale of the next generation of artificial intelligence data centers will be enormous:

- *“Two companies seek to develop \$125 billion AI data centers in North Dakota: One of the firms could be Microsoft (Data Center Dynamics September 4, 2024).*
- *“Data centers powering artificial intelligence could use more electricity than entire cities” (CNBC November 23, 2024)*
- *“Meta to build \$10 billion AI data center in Louisiana as Elon Musk expands his Tennessee AI facility” (AP December 4, 2024)*
- *“Three Mile Island nuclear plant will reopen to power Microsoft data centers” (NPR September 20, 2024)*

This paper describes the benefits to North Dakota of AI data center development and presents a strategy to enhance the attractiveness of the state for investment with five policy recommendations:

1. *Add capacity for natural gas transport.*
2. *Clarify existing sales tax exemption.*
3. *Improve workforce development.*
4. *Develop a data center marketing plan.*

North Dakota is uniquely positioned to be a leader in development of artificial intelligence data centers due to its business-friendly regulatory environment, abundant land, cold climate for equipment cooling, and abundant energy resources.

Development of large AI data centers would position North Dakota as a center of high-tech industry and benefit the state's economy in both jobs and tax revenue. As an example, Meta's \$10 billion, 2 GW data center development in Louisiana will create 500 operations jobs plus an additional 5,000 jobs during construction which will include \$200 million in local infrastructure improvements.[i] In addition to these benefits, data center development would solve a very serious problem that the state is going to have in a few years with oil and gas production.

When an oil well is first drilled, the oil is under high pressure so it produces mostly oil and very little natural gas. But as the well matures and more oil is removed the pressure drops and the gas oil ratio goes up. If this additional natural gas can just be flared (burned), then there's no problem and you can keep producing oil. But modern environmental regulations strongly discourage flaring gas, so it must be disposed of in some other way. Right now, most of it is piped out of state where it's converted to liquid fuels, used to produce fertilizer, or for other purposes.[ii] The crisis that's approaching the state is that the infrastructure to dispose of this increasing natural gas production will reach maximum capacity as early as 2027. [iii] It's strange to

think of natural gas as a waste product rather than a resource, but for oil production that's what it is, and if some other way to dispose of this gas is not found then oil production will have to be reduced.

This is where large-scale AI data centers come in. Current data centers use an average of 40 megawatts of electricity. By 2030, a new generation of artificial intelligence data centers will be much, much larger. They will need between 500 megawatts and 5 gigawatts of electricity.[iv] For reference, one gigawatt is about enough electricity to supply half a million average homes. Data centers of this size can't get their electricity from the existing grid because that much spare electricity generating capacity doesn't exist. AI data centers of this size (called "hypercenters") will need to generate their own electricity without connecting to the local grid.

The energy needs of these massive electricity generating stations can only be met in two ways: nuclear or natural gas. AI data centers need to run 24/7 without interruption. For this reason, renewables like wind and solar are impractical because they can't provide continuous energy. As an example of the nuclear approach, Microsoft recently signed a contract to restart the undamaged reactor at Three Mile Island. This will produce 835 MW of electricity, and it will all be used to power a Microsoft data center.[v] Meta, the parent company of Facebook, has issued a request for proposals for building nuclear reactors, either traditional large-scale reactors or small

modular reactors, to power their data centers.[vi] And Amazon Web Services recently paid \$650 million for a data center site in Pennsylvania adjacent to the Susquehanna nuclear plant.[vii] Unlike wind and solar, nuclear can provide continuous power but there are high regulatory barriers and building a nuclear power plant takes a very long time. Natural gas is a much faster and simpler way to get the energy they need.

North Dakota oil producers need to get rid of their natural gas and large-scale AI data centers need natural gas to generate electricity. These two problems can solve each other.

The benefits to the state would be increased investment, new high-quality jobs, improving the state's position as a center for high tech, and preventing economic loss in the private sector and tax revenue from reductions in oil production.

Policy Recommendations

Recommendation 1: Add Capacity for Natural Gas Transport

Increase funding to the North Dakota Pipeline Authority Capacity Purchase Program to facilitate construction of a west to east natural gas pipeline from the Bakken oil fields to Bismarck and Fargo.

Oil and natural gas production from the Bakken and Three Forks geological

formations are located in the western portion of North Dakota, as shown in figure 1. The geographic separation of oil and gas production from the state's population centers creates a barrier to data center development. Oil companies have made extensive use of a variety of temporary housing solutions near the oil fields for their workers. By contrast, large scale data center investment will only occur within a reasonable commuting distance of preexisting high-quality housing and related amenities for their largely white-collar workforce. This means that gas must be transported from the Bakken to the central and eastern portions of the state.

The existing natural gas pipeline network in the northern plains is shown in figure 2. A pipeline owned by WBI Energy already runs from an underground gas storage field in Baker, Montana east to Bismarck and Fargo. However, this is a small diameter pipeline with only enough capacity to serve current residential and business customers.

Building a large diameter west to east natural gas pipeline would encourage large scale AI data center development as well as facilitate growth in other energy intensive industries. Building it, however, presents a first mover problem. Pipeline developers will not be willing to make the large investment necessary to build such a project without signed long term contracts from end users to purchase the gas that would be transported through the pipeline. At the same time, industrial developers are unlikely to make large investments for natural gas consuming

Figure 1 : Subsurface Map of the Bakken and Three Forks Formations

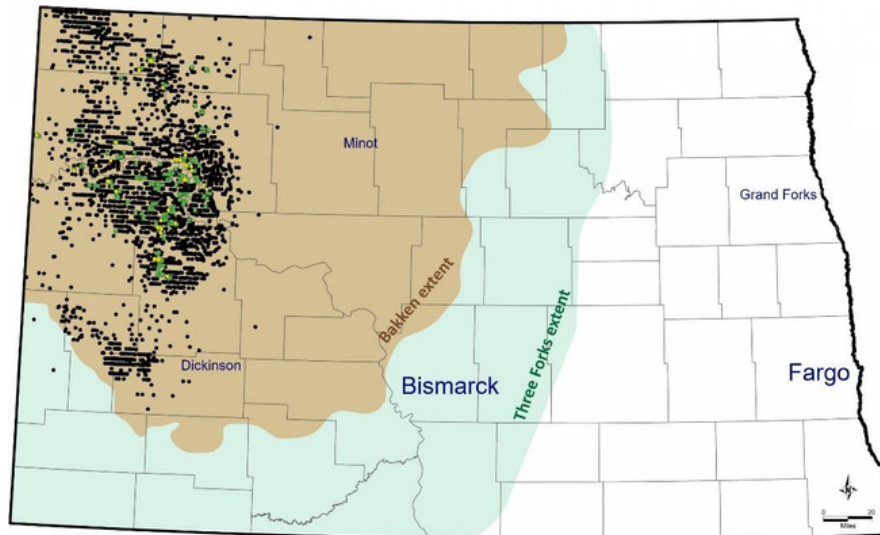
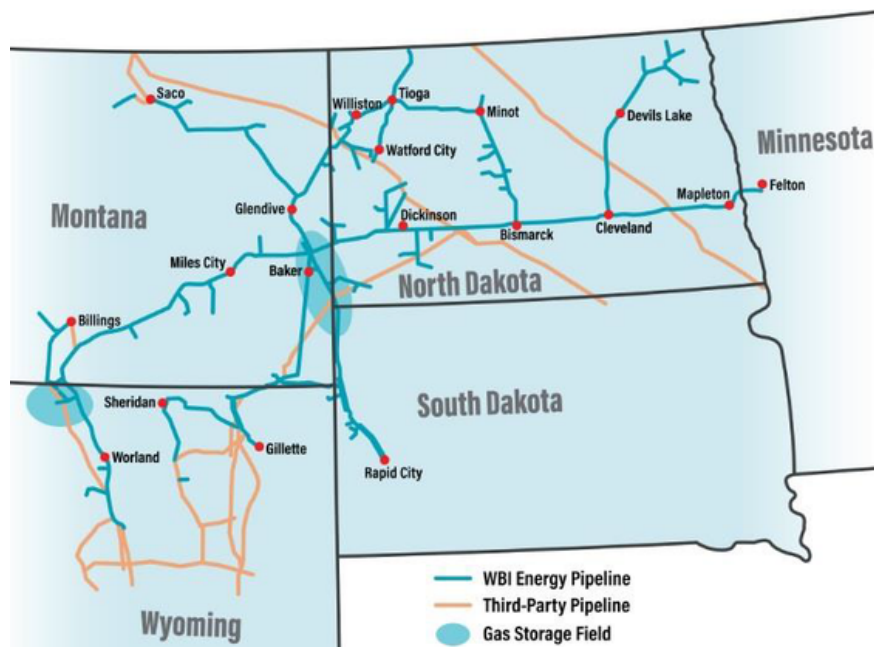


Figure 1 Subsurface map of the Bakken and Three Forks Formations and productive wells. Black circles are upper Three Forks horizontal wells. Green squares are middle Three Forks horizontal wells, and yellow diamonds are lower Three Forks horizontal wells.

Figure 2 : Natural Gas Transmission Pipeline Map of the Upper Mid-West Region



industries without a guarantee that the pipeline to provide them with gas will exist.

The North Dakota Pipeline Authority Capacity Purchase Program (CPP) is designed to overcome this problem. Through this program, the state is able to commit to purchasing the gas transported by a proposed pipeline. This financial certainty allows the pipeline developer to proceed with the project. Once the pipeline project is underway, potential consumers of the gas will be willing to make investments in their projects. The Pipeline Authority can then release its contracted gas to the new consumers without cost to taxpayers. If demand from new customers does not consume the full amount of gas that has been contracted, the Pipeline Authority would offer the remaining amount to a natural gas marketing firm for sale on the open market.[viii] The CPP is funded by a \$30 million line of credit from the Bank of North Dakota authorized by the state legislature. While this amount of funding is sufficient for smaller pipeline projects, it may not be sufficient for a large diameter pipeline across the state.

To encourage construction of this project the legislature should prepare to increase funding for the Pipeline Authority Capacity Purchase Program. The amount of the funding increase that may be necessary should be determined in consultation with subject matter experts at the Pipeline Authority.

The need for this increased funding is not

only great, it is also urgent. Construction of a cross state large diameter natural gas pipeline would take roughly four years. Current natural gas pipeline maximum capacity is estimated to be reached between 2027 and 2031.[ix] This means that to avoid forced reductions in oil production, a cross-state pipeline project would need to begin between 2023 and 2027. At the time of this writing, the earlier date is already one year in the past.

Recommendation 2: Clarify the Sales Tax Exemption for Data Center Equipment

Clarify that the sales tax exemption for data center equipment also applies to equipment replacement.

In constructing a data center, purchasing the computer hardware housed within can easily consume more than half of the entire development budget. Under current state law those components are exempt from sales tax. But because the technology is advancing so rapidly, this computer equipment will become obsolete and need to be replaced every two or three years. The sales tax exemption as written is ambiguous as to whether these replacement components would also be tax exempt. A minor change in the exemption language to clarify this point in the affirmative would provide an additional incentive for investment.

Recommendation 3: Improve Workforce Development

Encourage North Dakota universities to expand programs to train a workforce that will meet AI data centers' needs.

A well-educated and appropriately technically trained workforce will also help to attract new data center development. While major data center operators are likely to relocate some of their existing personnel to new facilities in North Dakota, they will also need to hire workers from the local community. To ensure that a workforce ready to meet the needs of data center operators is available, North Dakota Universities, Colleges, and Community Colleges should expand and focus programs to meet those needs. Programs in IT, facilities management, cybersecurity, and related disciplines should be increased. Outreach to existing data center operators to establish training, apprenticeship, and internship opportunities such as Amazon's Data Center Technician and AWS Academy programs would be beneficial in attracting new development as well as reinforcing North Dakota's position as a high-tech hub.

[xii]

Recommendation 4: Develop a Data Center Marketing Plan

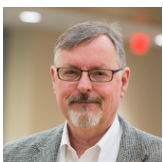
Develop a marketing strategy to show potential data center developers the advantages of citing their facilities in North Dakota.

To attract data center development, the state should develop a plan to actively market North Dakota's advantages in abundant energy, business friendly regulatory environment, cold climate reducing cooling costs, and a well-trained workforce. The marketing plan should target giant tech companies such as Alphabet (Google), Microsoft, and Amazon as well as smaller data center companies. A media campaign including both digital and traditional media should be supplemented by hosting industry conferences or tech summits to showcase the state's advantages and to build a brand as a desirable location for data center and other high-tech investment.

References

- [i] Meta's U.S. data center fleet, <https://datacenters.atmeta.com/us-locations/>
- [ii] As of 2024, 82% of North Dakota natural gas was exported out of the state. <https://www.nd.gov/innovation-industries/energy-natural-resources>
- [iii] Slide 37 of the ND Pipeline Authority presentation at the June 26, 2024 Industrial Commission Meeting. https://youtu.be/Fb41_mzfxbk?si=yjjKBdLC95yCOVeQ&t=1203
- [iv] <https://www.cnbc.com/2024/11/23/data-centers-powering-ai-could-use-more-electricity-than-entire-cities.html>
- [v] <https://www.npr.org/2024/09/20/nx-sl-5120581/three-mile-island-nuclear-power-plant-microsoft-ai>
- [vi] <https://www.utilitydive.com/news/meta-seeks-up-to-4-gw-of-new-nuclear-power-to-help-meet-ai-sustainability/734599/>
- [vii] <https://www.power-eng.com/nuclear/aws-acquires-data-center-campus-connected-to-susquehanna-nuclear-station/>
- [viii] Increased tax revenue from oil production enabled by the pipeline would mitigate any price differential between the Authority's contract price and the market price received from the gas marketing firm. This backup plan for gas disposition has never been needed under the Capacity Purchase Program.
- [ix] Slide 37 of the ND Pipeline Authority presentation at the June 26, 2024 Industrial Commission Meeting. https://youtu.be/Fb41_mzfxbk?si=yjjKBdLC95yCOVeQ&t=1203
- [x] <https://attorneygeneral.nd.gov/open-records-meetings/>
- [xi] An example of such a problem is documented here <https://www.constructiondive.com/news/north-dakota-county-cuts-power-19-billion-data-center-project-fx-solutions-atlas-power/653772/>
- [xii] <https://www.aboutamazon.com/news/aws/aws-data-center-economic-impact-study>
<https://aws.amazon.com/training/awsacademy/>

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