ALASKA NATURAL GAS TRANSPORTATION PROJECTS
OFFICE OF THE FEDERAL COORDINATOR

A guide to Alaska natural gas projects

Ideas for moving Prudhoe Bay's natural gas bounty off Alaska's North Slope are as plentiful as cottonwood seed in the June air.

Some are modest: Truck small amounts of gas to Fairbanks consumers.

Some are epic: Pipe massive amounts to a Southcentral Alaska liquefied natural gas plant from which LNG could be shipped to Asia – the most expensive North American private-sector construction project ever.

Some are pinned to visions of an Alaska energy utopia, where gas for local use is plentiful and relatively cheap, the oil industry reawakens to develop new fields by the dozen, the state treasury overflows with wealth, and new industries sprout from the earth like wild lupine.

Some are backed by tens or even hundreds of millions of dollars to design, engineer and otherwise prepare for construction. These include the major, producer-led LNG project and a much more modest state-led pipeline to Southcentral Alaska.

Some are little more than a concept looking to catch on.

The great North Slope oil discoveries of the 1960s and 1970s also found an estimated 35 trillion cubic feet of natural gas – one and a half times the entire volume of U.S. production last year. The U.S. Geological Survey estimates an additional 221 trillion cubic feet await discovery in Alaska's Arctic, onshore and offshore. If only an economically viable way could be found to move the gas to consumers.

Below we summarize several proposals – big and small – for transporting natural gas from Alaska's North Slope.

LNG export project

This would involve an approximately 800-mile mostly buried pipeline from the Prudhoe Bay field on Alaska's North Slope to Southcentral Alaska, possibly Valdez, possibly Nikiski or somewhere else closer to Anchorage. At the port, a plant would chill the gas to minus 260 degrees to create liquefied natural gas, or LNG, a compressed form of the gas that can be shipped on special tankers to markets worldwide.

Project Information
Sponsors: ExxonMobil/BP/ ConocoPhillips/TransCanada
Estimated cost: $45 billion to $65 billion (2012 dollars)
Route: Parallel the trans-Alaska oil pipeline from Prudhoe Bay to the Fairbanks area. The route then could continue parallel to the oil pipeline to Valdez or possibly head to Nikiski or somewhere else closer to Anchorage.
Gas for Alaskans: The oil companies/TransCanada project would provide at least five points in Alaska from which spur pipelines could be built.
Status: The oil companies/ TransCanada are assessing the via-bility of an LNG export project.

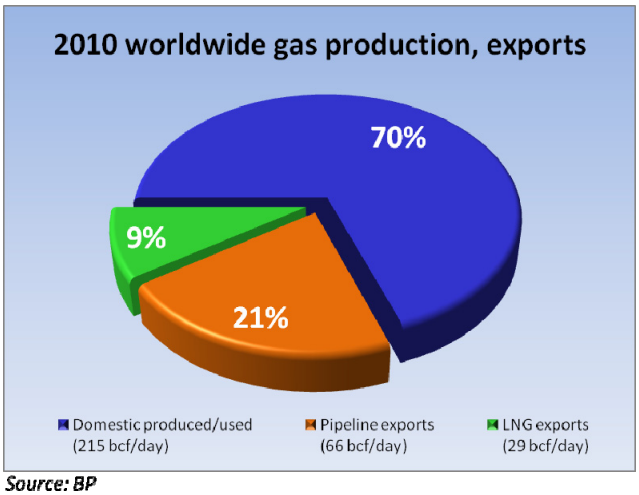
The pipeline under consideration by the major North Slope producers would carry 3 billion to 3.5 billion cubic feet of natural gas per day. Alaskans would use some of this gas, and some gas would be consumed running the pipeline and LNG plant. The plant would make 15 million to 18 million metric tons a year of LNG, the equivalent of 2 billion to 2.4 billion cubic feet a day of gas.

Sponsors

Two separate groups are discussing such a pipeline.

ExxonMobil, ConocoPhillips and BP, the main North Slope producers, plus pipeline company TransCanada in March 2012 said they have begun looking into exporting LNG to Asia, where the gas currently can fetch a much higher price than in North America. They are in the very early stages of looking into this option.

Two of the sponsors – ExxonMobil and TransCanada – in 2010 proposed to build a 48-inch buried pipeline to Valdez, with someone else constructing and operating an LNG plant there. They found insufficient customer interest at that time to pursue the project and have since taken up the new LNG effort with ConocoPhillips and BP.



Source: BP

The Alaska Gasline Port Authority, founded in 1999, has proposed a government-owned Valdez LNG project. The port authority is a joint venture of the Fairbanks North Star Borough and Valdez, two local governments along the pipeline route. The port authority has no recent cost estimates for the project.

Estimated cost

$45 billion to more than $65 billion (2012 dollars) for the producer-led project.

On Oct. 1, 2012, and on Feb. 15, 2013, ExxonMobil, ConocoPhillips, BP and TransCanada updated Alaska Gov. Sean Parnell on their initial work assessing an LNG export project. Their early concept envisions a project costing $45 billion to more than $65 billion for a gas treatment plant, roughly 800-mile pipeline, liquefaction plant at a site in Southcentral Alaska to be determined, LNG storage and a tanker terminal. The concept would involve exports of 15 million to 18 million metric tons of LNG annually, the equivalent of 2 billion to 2.4 billion cubic feet a day of gas.

Gas for Alaskans

The pipeline concept pursued by the oil producers and TransCanada would provide at least five points from which spur lines could be built to provide gas to Alaskans. This project involves only providing gas takeoff points, not building the spur lines, which would be up to the state, utilities or private companies.

The Alaska Gasline Port Authority says under its proposal gas could be taken from the pipeline at Fairbanks and that a spur line from Glennallen could provide gas to Southcentral Alaska.

Status

The North Slope producers and TransCanada have begun to explore the feasibility of an LNG project. TransCanada, on behalf of the project sponsors, conducted a non-binding solicitation of interest Aug. 31 through Sept. 14, 2012, among producers, shippers, buyers and others in a possible export project as well as a pipeline to North American markets. TransCanada said it received interest from potential shippers and "major players from a broad range of industry sectors and geographic locations," including North America and Asia. Under terms of the state's Alaska Gasline Inducement Act license issued to TransCanada in 2008, the state will reimburse the companies for 90 percent of their early development work on the new LNG option.

The port authority continues to tout the LNG export idea in speeches, op-ed columns and interviews.

Pluses

- Short-term economic boost to Alaska during construction.
- With the right project economics, long-term boost as billions of dollars in revenue flows to state treasury, the Alaska Permanent Fund and local governments along the pipeline route.
- Southcentral Alaska gets new industry based on LNG export.

- Outlet for natural gas now stranded on Alaska's North Slope should spur oil and gas exploration there.
- Relatively inexpensive gas made available for heating and power generation in the Fairbanks area.
- For Southcentral Alaska, the project likely provides a new affordable source of natural gas to supplement Cook Inlet supplies.

Minuses

- A very expensive option. High cost makes project risky for lenders that would supply construction financing.
- Federal loan guarantees from 2004 legislation are available only for a pipeline project that delivers gas to the Lower 48, not projects that would export gas. Lack of federal backing would raise project costs.
- Buyers needed at the start for the LNG plant's huge output, with little ramping up of project over time.
- Shippers must commit gas to pipeline for 20-plus years and find long-term buyers for the LNG in a Pacific LNG market that other exporters are targeting.
- North Slope producers want state of Alaska to set stable fiscal terms for gas production and the pipeline.
- Fairbanks area energy costs remain relatively high until pipeline is running.
- Southcentral Alaska could need supplemental source of natural gas before pipeline is finished.

Pipeline to Alberta

This involves an approximately 1,700-mile, 48-inch buried pipeline from the Prudhoe Bay field on Alaska's North Slope to the British Columbia-Alberta border in Canada. From there, the gas could flow to the Lower 48 via an extensive network of existing pipelines.

The gasline would parallel the trans-Alaska oil pipeline from Prudhoe Bay to Delta Junction, then continue into Canada roughly parallel to the Alaska Highway.

The pipeline would move up to 4.5 billion cubic feet of gas per day.

The project includes a 58-mile pipeline to Prudhoe Bay from the Point Thomson gas field.

Project Information
Sponsor: TransCanada/ ExxonMobil (the Alaska Pipeline Project)
Estimated cost: $32 billion to $41 billion (2009 dollars)
Route: Parallel the trans-Alaska oil pipeline from Prudhoe Bay to Delta Junction, then continue into Canada roughly parallel to the Alaska Highway
Gas for Alaskans: Minimum of 5 take-off points available in Alaska
Status: On hold

Sponsor

TransCanada and ExxonMobil, also known as the Alaska Pipeline Project.

Estimated cost

$32 billion to $41 billion (2009 dollars).

The cost includes a $12 billion gas treatment plant at the Prudhoe Bay field to remove water, carbon dioxide and other impurities from the gas, then compress the raw gas before it enters the pipeline.

Gas for Alaskans

The pipeline would provide at least five points in Alaska from which spur lines could be built to provide gas to Alaskans. The project involves only providing gas takeoff points, not construction of the spur lines, which would be up to the state, utilities or private companies.

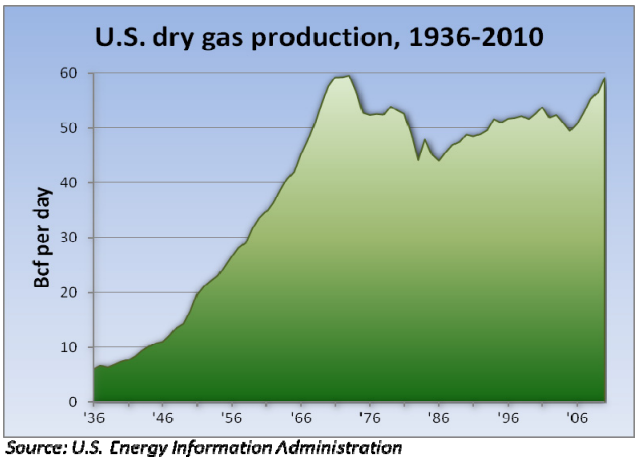
Status

On hold, as North American shale-gas production has oversupplied the market and deflated prices.

The Alaska Pipeline Project spent over $300 million from the project onset through 2011. The sponsors put the project on hold during spring 2012. Under the Alaska Gasline Inducement Act, the state is obligated to reimburse the sponsor for up to $500 million of its pre-construction costs. With TransCanada and ExxonMobil now involved in considering LNG exports, the remaining balance of state reimbursements is available for eligible costs associated with that project.

In January 2012, the sponsors filed with the Federal Energy Regulatory Commission volumes of data on fish, wildlife, soils, vegetation, cultural sites, air quality

and other information that can be used for the environmental impact statement FERC would prepare. Much of that data also could be used for an EIS on a pipeline for an LNG project, because some of the route in Alaska would be same as the route for an Alberta line.



Source: U.S. Energy Information Administration

The sponsor held an "open season" in 2010 at which it solicited pipeline customers. On May 3, 2012, Alaska Pipeline Project officials filed with FERC to formally end their open season efforts, noting, "(P)roducers expressed significant interest in the Alberta Project in the form of conditioned bids for capacity on that pipeline." Unsuccessful negotiations ensued.

The sponsor needed commitments for much of its pipeline's capacity to obtain construction financing.

Proposed timeline

Under an agreement with the state, TransCanada and ExxonMobil have until October 2014 to apply to FERC for a certificate to build and operate the pipeline. This is a two-year postponement from the previous deadline agreed to in the 2008 state license. The state, however, could consider a different deadline after receiving more information on the producer-led LNG option.

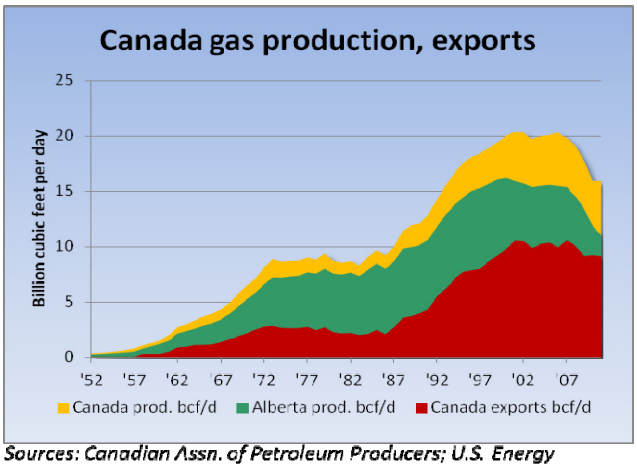
A FERC review of the application would take just under two years, with pipeline construction likely taking another five to six years.

Pluses

- Short-term economic boost to Alaska during construction. Estimated 8,000 to 10,000 jobs during peak construction.
- Likely long-term economic boost as billions of dollars in revenue flows to state treasury, the Alaska Permanent Fund and local governments along the pipeline route.
- Outlet for natural gas now stranded on Alaska's North Slope should spur oil and gas exploration, finding new crude for the trans-Alaska oil pipeline and extra gas for a gas pipeline.
- With a spur line, consumers in Alaska's Railbelt could be assured of an affordable supply of gas for decades. The project could supplement Cook Inlet supplies in Southcentral Alaska. For the Fairbanks area, relatively inexpensive gas would ease high energy prices for heating and power generation.
- About half of the construction cost could be backed by federal loan guarantees; federal tax breaks are available for pipeline and gas treatment plant.

Minuses

- High cost makes project risky for lenders that would supply construction financing.
- Requires major gas shippers – likely the North Slope producers – to commit to using the pipeline for at least 20 years.
- Not knowing what natural gas market prices will be over that long time horizon makes the project extremely risky for gas shippers. Low prices could shrink or eliminate their profits.
- North Slope producers want state of Alaska to set stable fiscal terms for gas production and the pipeline.



Sources: Canadian Assn. of Petroleum Producers; U.S. Energy Information Admin.

- Fairbanks area energy costs remain relatively high until natural gas is flowing. Pipeline might not be running before Southcentral Alaska needs supplemental source of natural gas.

Pipeline to Southcentral

A 737-mile, 36-inch buried pipeline from the Prudhoe Bay field on Alaska's North Slope to the Big Lake area of Southcentral Alaska. From there, the gas could flow to consumers, utilities and other industry via the local distribution pipelines of ENSTAR Natural Gas Co. Pipeline also would supply Fairbanks area.

Project Information
Sponsor: Alaska Gasline Development Corp.
Estimated cost: $5.4 billion to $10 billion (2012 dollars)
Route: Parallel the trans-Alaska oil pipeline from Prudhoe Bay to just north of Fairbanks, then continue south to Big Lake, roughly parallel to the Parks Highway
Gas for Alaskans: That is the main purpose of this proposal. Pipeline would supply Fairbanks, Southcentral.
Status: Preliminary planning

The pipeline would parallel the trans-Alaska oil pipeline from Prudhoe Bay to just north of Fairbanks, then continue south to Big Lake, roughly parallel to the Parks Highway.

The pipeline would move up to 500 million cubic feet of gas per day. The project also is known as the "bullet line," the in-state line and the Alaska Stand Alone Pipeline, or ASAP.

Sponsor

Alaska Gasline Development Corp., a state agency the Legislature created in 2010. Some supporters say the state-led effort is a backup if the larger producer-led project stalls.

Estimated cost

$5.4 billion to $10 billion (2012 dollars). Sponsor is using midpoint of $7.7 billion as a working number.

The cost includes a gas treatment plant at the Prudhoe Bay field to remove propane, butane and other gas liquids as well as water, carbon dioxide and other impurities from the gas, then compress the raw gas before it enters the pipeline.

Project cost does not include a separate 35-mile spur line as well as local gas distribution network needed for Fairbanks. A local gas pipeline network already exists in Southcentral.

Gas for Alaskans

Gas for Alaskans was the main idea for this project when the state Legislature funded a feasibility study in 2010.

Status

Project is in its very early stages. Feasibility study issued in July 2011 provided a preliminary plan, and the sponsor recommends the state spend $370 million to firm up the design, cost estimates and engineering, acquire permits and seek customers that would ship gas through the pipeline. The Alaska Legislature in 2012 provided some funding for pre-construction work to continue.

Proposed timeline

2011-2015 – Project sponsor sharpens engineering and cost estimate, obtains permits, solicits customers.

2016-2019 – Construction and commissioning.

2019 – First gas flows.

Pluses

- Short-term economic boost to Alaska during construction of multibillion-dollar project.
- The project could deliver gas to Fairbanks and Southcentral before a larger pipeline to an LNG plant in Southcentral Alaska or to Alberta.
- Depending on the project’s economics, consumers in Alaska's Railbelt could be assured of an affordable supply of gas for decades. In Southcentral Alaska, the gas could supplement Cook Inlet supplies used for heating and power generation. Delivering natural gas to Fairbanks could greatly lower that community's high cost of energy.

- The project might give rise to a new industry in Southcentral Alaska that exports liquefied natural gas.

Minuses

- Likely requires state to issue billions of dollars in revenue bonds and possibly direct state funding if the pipeline does not have enough customers to carry the cost.
- The cost estimate is soft. A much higher cost than the midpoint $7.7 billion estimate would alter the project economics.
- Requires major gas shippers to make long-term commitments to use the pipeline.
- The project would produce far less new state revenue than a larger pipeline for an LNG export project due to the small volume of gas moved.
- Requires the state to bear all of the pre-construction cost because no private developer will do so.
- The cost of gas to Alaskans would be higher than gas from the larger LNG export project.
- The project would not spark as much Arctic oil and gas exploration as the bigger pipeline.
- The project relies on assumptions about demand for gas that must come true to make the gas as affordable to Alaskans as predicted. These include:
    1) A revived liquefied natural gas export plant will take almost half of the daily gas flow.
    2) A major mine, such as the Donlin gold prospect in Western Alaska, will start up by 2019 and consume some of the gas flow.
    3) A utility or utilities will build a spur line and a local gas distribution pipeline network in Fairbanks by the time the pipeline from Prudhoe Bay is ready.
    4) Cook Inlet gas production will fall to such a point that power plants and the local gas utility in Southcentral Alaska will consume a lot of North Slope gas.

Cook Inlet gas exploration

Project Information
Sponsor: Various drilling companies
Estimated cost: Unknown
Route: Gas from Cook Inlet is transported within the Southcentral region by pipelines.
Gas for Alaskans: This plan would service the Southcentral region. LNG exports also are possible.
Status: Currently being pursued by several companies

In June 2011, the U.S. Geological Survey estimated the Cook Inlet region still holds an estimated 19 trillion cubic feet of natural gas that could be produced using current technology.

That's more than double the total Cook Inlet gas production over the past 50 years. But how much of the gas could be produced profitably with current technology likely is a much smaller number, possibly as little as 10 percent.

Separately in June 2011, the Alaska Division of Oil and Gas estimated that Cook Inlet alone could continue to profitably supply all of the region's natural gas needs until 2018-2020, at which time supplemental supplies would be needed. The study said the gas industry must continue investing in the Inlet for this prediction to hold.

The state Legislature over several years has created a package of incentives to boost Cook Inlet gas production.

A key incentive offers up to $25 million in tax credits for the first exploration well drilled from a jack-up rig, up to $22.5 million for the second well drilled by a different company and up to $20 million for a third well by a third producer.

At least two companies are pursuing those incentives. Furie Operating Alaska LLC moved a jack-up rig to Cook Inlet and started drilling in late summer 2011. The company continued drilling in 2012 and has begun developing plans to start production. Buccaneer Energy hopes the jack-up rig, partly financed with state money, that it brought to Cook Inlet in 2012 will be active in 2013. In addition, Hilcorp has acquired Chevron and Marathon's holdings in Cook Inlet and

has boosted development spending for oil and gas production.

Another state incentive provides a 20 percent to 65 percent tax credit for oil and gas exploration or development capital spending, in Cook Inlet or elsewhere in Alaska.

Importing LNG or CNG

Project Information
Advocates: Various utilities
Estimated cost: Unknown
Route: LNG or CNG would be brought by boat to Southcentral for regional use.
Gas for Alaskans: This would be a stop-gap measure to ensure that Anchorage area has enough gas.
Status: No specific plans have been presented at this time.

In 2011, three Anchorage utilities joined to consider the idea of importing liquefied natural gas or compressed natural gas to Southcentral Alaska.

ENSTAR Natural Gas Co. supplies gas for residential and business furnaces, and Chugach Electric Association and Municipal Light & Power burn gas to make electricity. They've since been joined by electric utilities in Homer and the Matanuska-Susitna Borough and the Donlin gold-mine prospect in western Alaska.

The utilities estimate Cook Inlet fields might not produce enough gas by 2015 to fulfill their needs. The supply gap would start small but grow to 100 million to 200 million cubic feet a day on average by 2020, depending on the success of Cook Inlet gas exploration, they told state utility regulators in October 2012. Their idea is that an import project should be scalable so that more gas could come in as the utilities' needs grow.

Since these utilities initially united to consider gas imports, the USGS and Alaska Division of Oil and Gas have issued rosier projections of Cook Inlet's potential gas supply. But the utilities still think they'll likely need LNG or CNG supplies before new discoveries are producing or a pipeline is built.

The utilities continue to explore the cost, design, location, volumes needed, potential suppliers, regulatory issues and other aspects of opening an LNG or CNG import plant. While the USGS and state say there's a high probability that Cook Inlet's gas prospects are better than previously thought, that's short of the certainty of supply the utilities need.

Gas to Fairbanks by truck or pipe

Several ideas have been floated for getting North Slope natural gas to the Fairbanks area, where energy costs are much higher than in Southcentral Alaska.

In late 2012, the administration of Gov. Sean Parnell proposed a $355 million cash-and-loan package to finance a North Slope LNG plant and fund storage and distribution infrastructure in the Interior. The governor has asked all of the parties promoting such a project to unite on a single endeavor.

LNG trucked to Fairbanks area - Proposal 1, GVEA

Project Information
Sponsor: Golden Valley Electric Association; Fairbanks Natural Gas; Spectrum Alaska
Estimated cost: Unclear (depends on project)
Route: Trucks would transport the LNG down the Dalton Highway from Prudhoe Bay to the Fairbanks area
Gas for Alaskans: This project would bring gas only to the Fairbanks area.
Status: Each proposal is in the planning stage

In August 2011, the Fairbanks-area electrical utility Golden Valley Electric Association and oil refinery owner Flint Hills Resources announced a project to buy North Slope gas, superchill it to make LNG and truck it about 500 miles to North Pole to reduce their own energy costs.

At the time, the two partners pegged the cost at $200 million, including an LNG plant, about 40 trucks, storage, plus a plant to regasify the LNG in North Pole. The partners since have split.

Moving ahead on its own, Golden Valley proposes to truck 22 million to 26 million cubic feet a day of gas to the Fairbanks area. The gas could be used to replace expensive oil-based fuels that the utility burns in a power plant and that other Fairbanks-area users burn.

In December 2012, Golden Valley said its project would take two years to permit, build and ramp up.

The utility says BP has agreed to supply gas for the project.

LNG trucked to Fairbanks area - Proposal 2, Fairbanks Natural Gas

The local gas utility in Fairbanks also has proposed a trucked-LNG project. Fairbanks Natural Gas has liquefied Cook Inlet and trucked it north since 1998. Concerns about reliability of Cook Inlet supplies prompted the company's parent – Minnesota-based Pentex Alaska Natural Gas – to form Polar LNG.

Polar has contracted with ExxonMobil to buy gas from the oil company's Prudhoe Bay production. In 2009, it leased state land near Prudhoe Bay as a site for an LNG plant. The LNG plant hasn't been built yet.

The project would let the gas utility add customers in Fairbanks.

LNG trucked to Fairbanks area - Proposal 3, Spectrum Alaska

Spectrum, a subsidiary of a small-scale LNG business in the Lower 48, has proposed liquefying about 50 million cubic feet of North Slope gas per day. The LNG would be trucked to customers in the Fairbanks area and sold to North Slope users. One Spectrum partner developed Fairbanks Natural Gas in the 1990s.

Spectrum had no gas supplier or customers as of year-end 2012. The company told regulators it is working to secure both and hopes to start construction in 2013 if it obtains the permits needed. Production then would begin in 2014 or 2015, the company said.

Piped natural gas to Fairbanks

Fairbanks Pipeline Co. started in 2010 and is proposing a Prudhoe Bay-to-North Pole pipeline to deliver natural gas to Interior Alaska customers. Fairbanks Pipeline is owned by Energia Cura, a Fairbanks energy consulting and service business.

Project Information
Sponsor: Fairbanks Pipeline Company (Energia Cura)
Estimated cost: $716 million
Route: Prudhoe Bay to the Fairbanks area following state highways
Gas for Alaskans: This project would bring gas to the Fairbanks area, but sponsor says it could be expanded to supply extra gas for Southcentral.
Status: Planning stage

The company said it is targeting Golden Valley Electric, military bases, trans-Alaska pipeline pump stations and mines, as well as Fairbanks Natural Gas, the small local gas utility. It has estimated the 514-mile, 12-inch buried pipeline would cost $716 million, delivering 52 million cubic feet of gas per day on average.

The route would follow state highways. The Energia owners have funded costs so far. They hope others, including the state, possibly through its Permanent Fund savings account, become owners.

Fairbanks Pipeline held an open season soliciting customer interest during the third-quarter of 2010 and said it got non-binding interest for 32 million cubic feet of gas a day as of 2014, ramping up to 52 million in 2019. Gas buyers would pay $9.66 per thousand cubic feet, under the plan. The company also has suggested a larger, 18-inch pipeline project that, besides serving Interior Alaska markets, also would deliver about 200 million cubic feet a day to Southcentral.

For more information, please visit our website: www.arcticgas.gov

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