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LNG DEVELOPMENT AND NATURAL GAS STORAGE ISSUES, (a panel presentation)

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OVERVIEW:

Forty years ago Cook Inlet was awash in natural gas, so much so that gas brought to the surface incidental to oil production was disposed of by flaring. In one year alone, from one field, the Granite Point Oil Field, 9 billion cubic feet (bcf) of gas was flared. Additional billions of cubic feet were flared from other fields.

By Order of the Alaska Oil and Gas Conservation Commission (AOGCC)¹, the wasteful practice of flaring gas was halted, and industrial users such as the ConocoPhillips/Marathon Oil Company LNG facility and the Kenai Fertilizer plant became large consumers of the region's abundant natural gas. Over the years, utility and consumer demand also increased.

Currently, nearly seventy percent of Alaskans rely upon natural gas to heat homes and businesses, generate electricity and fuel and supply industry. This demand has depleted eighty percent of all known Cook Inlet gas reserves²; and the reserves to production ratio, a key indicator of the health of a basin has dropped significantly.

The challenge of delivering long-term reliable energy to Southcentral Alaska is becoming increasingly complex. Depending upon one's perspective, gas is either still plentiful, or we are on the verge of a crisis. A central issue is whether existing natural gas supplies in the Cook Inlet region are adequate to satisfy both domestic demand and the export of LNG³.

State and Federal agencies believe Cook Inlet remains relatively under-explored; and the distribution of field sizes in the basin suggests there are still large fields waiting to be discovered⁴. Nevertheless, exploratory drilling in Cook Inlet has not kept pace with demand and increases in the price of natural gas. Exploratory drilling in the basin remains well below the levels of the late 1960's and early 1970's when most of the known gas was discovered. (See Figure 1).

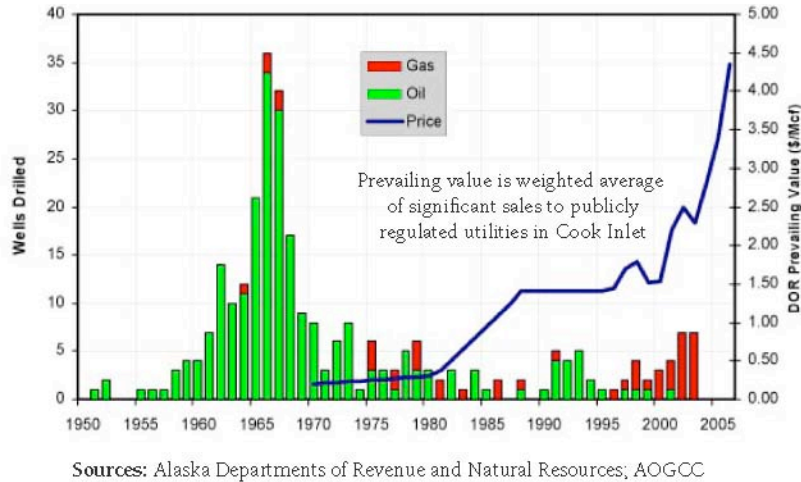


Figure 1 Exploration Wells Drilled in Cook Inlet and Natural Gas Price

ENERGY ALTERNATIVES:

Following are some alternatives, identified by Dunmire Consulting, which have been considered to one extent or another as possibilities for satisfying the region’s future energy needs⁵:

- **Exploration for new reserves.** Exploration for new reserves is proceeding in Cook Inlet basin, but market incentives must be sufficient to encourage investors to take the risks inherent in exploration for new natural gas. Tax, royalty and other incentives may also have a place in stimulating new exploration.
- **North Slope gas to Cook Inlet.** The North Slope has large known reserves of natural gas. A major uncertainty affecting the future of Cook Inlet gas development is when North Slope gas might be available to Southcentral consumers. That uncertainty makes it more difficult for Cook Inlet producers to decide how much to invest in exploration and development in Cook Inlet and for utilities and other consumers to decide about investing in gas-using equipment. At some future time, Southcentral consumers could get North Slope gas either through a spur line from a main pipeline or through a pipeline direct from the North Slope to Southcentral.
- **Coal Gasification.** Agrium U.S. Inc. has been investigating a proposal to substitute synthetic gas from coal for natural gas from Cook Inlet. The proposal would take coal from Healy in Interior Alaska, south by rail, transfer it to barge, and then ship it to a coal gasification plant on the Kenai Peninsula. The synthetic gas could be used to produce fertilizer and could also add electricity to the Southcentral power grid. Proponents say coal gasification allows for efficient capture of concentrated streams of carbon dioxide (CO₂), virtually eliminating emissions of this greenhouse gas. The captured CO₂ could be used for enhanced oil recovery. It’s estimated that 13 Cook Inlet oil fields might produce an additional 300 million barrels, through enhanced recovery techniques using CO₂.

- **Other Potential Sources of Gas for Southcentral.** The Bristol Bay area and Alaska Peninsula have been estimated to hold anywhere from 7 to 23 trillion cubic feet (tcf) of natural gas and the Nenana Basin 3 to 10 tcf. Exploration is also taking place elsewhere in Interior Alaska. Sizeable discoveries in any of these basins will present transportation challenges.
- **Importing LNG.** Southcentral Alaska could import LNG via the Kenai LNG plant, if the plant were modified to import rather than export LNG. This option would not have as long a lead time as some other alternatives and it would ensure ample supply—but Alaskans would be exposed to world market prices (which could be significantly higher than current local prices). A big consideration in the feasibility of this option is the capital cost of modifying the LNG plant.
- **Coal-Bed Methane.** Coal-bed methane is a form of natural gas that has been identified in the Susitna Basin north of Anchorage and potentially exists throughout the region. However, the economic potential of coal-bed natural gas has not been established, and its development in Alaska has been controversial.
- **Coal.** Alaska has abundant sources of coal. One objection to coal is that it has higher CO₂ emissions than other energy sources.
- **Wind Power.** With support from Chugach Electric, Municipal Light and Power, and others, the Fire Island Wind project is underway, with preliminary permitting and feasibility to be completed by 2011. This project would involve construction of wind turbines on Fire Island, just offshore from Anchorage. The turbines would be able to supply electricity to the Southcentral power grid and help offset demand for natural gas. However, there is uncertainty about how wind turbines might affect air traffic at Anchorage's nearby international airport.
- **Hydropower.** Chugach Electric already uses hydropower to a small extent. Proponents say use of this renewable resource has relatively few effects on land and water systems. But further development of hydropower in this region will require a long lead time for licensing and a significant amount of capital for development.
- **Nuclear Power.** A small-scale nuclear "demonstration project" is being proposed for the community of Galena along the Yukon River. It would start up in 2012. Power from this facility, if it were built, would not be available for Southcentral. However, if it were successful it could promote more local interest in this abundant but controversial source of energy. Problems with nuclear power include long-term land use, the risk of accidents, and nuclear waste storage.
- **Tidal Power.** A demonstration project of tidal power in Knik Arm is scheduled to be under construction by 2015. Tidal power is a renewable resource—but it could adversely affect aquatic life and boat traffic.
- **Geothermal Power.** A geothermal unit began operating at Chena Hot Springs Resort in the Interior in August 2006. Other potential geothermal sites, including Mt. Spurr in Southcentral, are under consideration. Geothermal power is a renewable resource, but the costs of connecting to the local electrical grid may make such sites uneconomic to develop.
- **Distributed Generation.** Distributed generation is the practice of replacing central gas-fired generation with on-site co-generation, or fuel

cells. If those systems were fueled by sources other than gas, they could reduce gas consumption. Distributed generation may eventually become a realistic option in Southcentral, as the costs of the technology continue to fall.

- **Conservation.** If Alaskans conserved more natural gas and electricity, they could save anywhere from 3.0 to 7.5 bcf of gas a year, according to estimates of Dunmire Consulting. Conservation measures include things like upgrading residential and commercial appliances and improving weatherization of houses and businesses. Some analysts believe Alaskans won't be motivated to conserve until prices of residential and commercial heat and electricity increase.

The foregoing are some of the options which have been considered, but in the near-term LNG and natural gas storage are likely to have the greatest impact on deliverability of energy to Southcentral Alaska.

LIQUID NATURAL GAS (LNG):

There is currently pending before the US Department of Energy, Office of Fossil Energy, an application to extend the existing export license allowing the export of Cook Inlet natural gas⁶. The decision on this application will significantly affect the future of natural gas usage in the region, in ways perhaps we cannot yet fully appreciate.

As noted above, importation of LNG is also an option for bringing new supplies of gas to Cook Inlet; and, smaller near-market LNG facilities could, in the future, serve to help meet demand in peak periods.

NATURAL GAS STORAGE:

Gas storage will assume an increasing role in helping satisfy peak demands for natural gas in Southcentral Alaska. Some producers have already taken the responsible step of identifying and permitting natural gas storage reservoirs and facilities; and, in 2007, the Alaska legislature gave AOGCC the authority and responsibility to regulate underground storage of natural gas in Alaska⁷.

CONCLUSION:

During the preceding 40 years, residents of Southcentral Alaska have enjoyed abundant natural gas at low prices. Unfortunately, demand is now starting to run ahead of supply. Opinions differ on how much natural gas may yet be found in Cook Inlet and on the best ways to stimulate exploration for new suppliers.

Whether large current users of Cook Inlet gas such as the LNG plant on the Kenai Peninsula can keep operating in the face of shrinking supplies and rising prices makes the future market for gas uncertain. However, residential and commercial demand for both heating and gas-generated electricity are expected to keep growing.

Uncertainty also surrounds future sources of gas supply (including gas from the North Slope) and the feasibility of developing alternative sources of energy to help offset

some of the demand for natural gas. Many of the alternatives considered have long lead times and unpredictable costs.

One thing is clear; Southcentral Alaska must find additional supplies of gas, or ways to offset demand. Otherwise, the region could soon experience large-scale shortages⁸.

FOOTNOTES

¹ The Alaska Oil and Gas Conservation Commission is an independent quasi-judicial agency of the State of Alaska, which has among its statutory responsibilities, the prevention of waste of natural gas. In a series of Conservation Orders the AOGCC acted to halt the unauthorized flaring of gas and waste of this valuable resource. See: AOGCC Conservation Orders 26, 32, 61, 94, 95, 95A, 100, 102, 102B, 102D, 102E, 103, 103A, 104, 104A, 105, 105A, 105B, 105C, 114, 119 and 120. See *also*, Journal of the Section of Natural Resources Law, American Bar Association, Vol. III, No. 4, November 1970, p.p. 694-701.

² Southcentral Energy Forum summary, prepared by Institute of Social and Economic Research, University of Alaska Anchorage and AOGCC, September 20-21, 2006.

³ Memorandum of Agrum USA Inc. dated October 11, 2007, In The Matter of ConocoPhillips et. al., Docket No. 07-02-LNG, before the US Department of Energy, Office of Fossil Energy.

⁴ Southcentral Alaska Natural Gas Study, prepared for the U.S. Department of Energy, June 2004.

⁵ For an excellent discussion of these options see Report by Dunmire Consulting, dated March 30, 2006. See also detailed transcripts of presentations by interested parties on the AOGCC's website: www.aogcc.alaska.gov. Additional information may also be obtained at the following websites:

Agrum Inc.: www.agrium.com/home.jsp

Alaska Department of Natural Resources: www.dnr.state.ak.us

Division of Oil and Gas: www.dog.dnr.state.ak.us

Alaska Department of Revenue, Tax Division: www.tax.state.ak.us

Alaska Natural Gas Development Authority: www.angda.state.ak.us

Alaska Oil and Gas Association: www.aoga.org

Alaska Oil and Gas Conservation Commission: www.aogcc.alaska.gov

Anchorage Chamber of Commerce: www.anchoragechamber.org

Anchorage, Municipality of: www.ci.anchorage.ak.us/homepage/index.cfm

Aurora Power: www.aurorapower.com

Benchmark Oil and Gas: www.benchmarkoil.se

BP: www.bp.com

Chevron: www.chevron.com

Chugach Electric Association: www.chugachelectric.com

Conoco Phillips: www.conocophillips.com/index.htm

Cook Inlet Regional Citizens Advisory Council: www.circac.org

Dunmire Consulting, Carolyn Dunmire: dunmire@fone.net
ENSTAR Natural Gas Company: www.enstarnaturalgas.com
Kenai Peninsula Borough: www.borough.kenai.ak.us
Matanuska-Susitna Borough: www.matsugov.us
Municipal Light and Power: www.mlandp.com
National Energy Technology Laboratory:
www.netl.doe.gov/technologies/oil-gas/index.html
Pioneer Natural Resources: www.pioneernrc.com
Regulatory Commission of Alaska: www.state.ak.us/rca
Science Applications International Corporation: www.saic.com
Stormcat Energy: www.stormcatenergy.com
U.S. Department of the Interior, Minerals Management Service:
www.mms.gov/alaska/re
Usibelli Coal Mine: www.usibelli.com/index.html
Information on Coal to Liquids and Fischer-Tropsch refining processes:
www.aidea.org
Cook Inlet Energy Supply Alternatives Study available at:
www.angda.state.ak.us
Kenai Peninsula Borough information on Cook Inlet oil and gas:
www.cookinletoilandgas.org

⁶ Id., note 4.

⁷ Chapter. 54 SLA 1970. See also, Opinion of the Solicitor, US Department of the Interior, dated July 22, 2005, BLM.AK.3686, discussing who has the right to lease a reservoir for underground storage of natural gas.

⁸ Id., note 2.