

DNR-DOG Study: Preliminary Engineering and Geological Evaluation of Remaining Cook Inlet Gas Reserves

Background:

1. Over the past year, there has been widespread concern over whether there is enough gas in the Cook Inlet basin to continue to meet the energy demands of south-central Alaska.
2. On June 5, 2009 the director of the Division of Oil and Gas informed the House Resources Committee that the division had begun a study to refine its annual Cook Inlet gas forecast by re-examining engineering data and by including—for the first time—a geological and geophysical assessment of the producing gas fields in the region. Almost the entire Resources Section staff was devoted to this effort.
3. This work has just been completed in a report to be transmitted from the division to the Commissioner of Natural Resources.

Study Methodology:

1. Reservoir engineering and geological analyses were undertaken independently of one another to evaluate the volumes of gas remaining in existing fields.
2. Engineering Assessment: All 28 of the currently producing Cook Inlet gas fields were evaluated by applying decline curve analysis (DCA) and material balance (MB) engineering methods to publicly available production data obtained from the AOGCC.
3. Geological Analysis: the study team selected four gas fields judged to have the greatest remaining potential: Beluga River, North Cook Inlet, Ninilchik, and the McArthur River Grayling gas sands. A deterministic, mathematical mapping methodology was used to analyze pay and potential pay thickness for numerous producing horizons. Comparison of geologically based recoverable gas with cumulative production yields estimates the remaining recoverable gas in the four fields

Study Results:

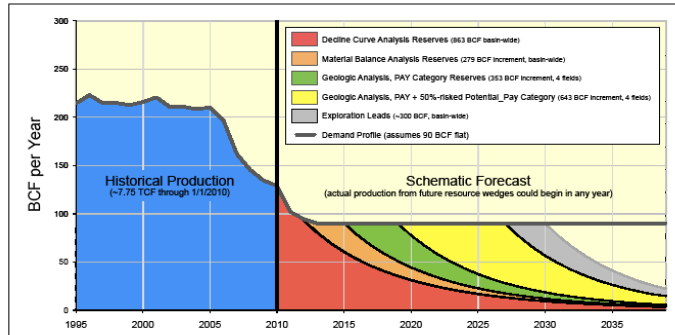
1. Using DCA engineering techniques, the total remaining proved, developed, producing gas reserves from all 28 producing fields in the Cook Inlet are estimated at **863 Bcf**.
2. Based on MB methods combined with DCA yields total remaining probable gas reserves of 1,142 Tcf, i.e., an increment of **279 Bcf** over PDP reserves.
3. Geologic analysis yielded an incremental potential above DCA/MB reserves of **353 Bcf** in high-confidence pay intervals. This is the difference between 860 Bcf and 1,213 Bcf for the four fields listed in the first row of the attached table.
4. Another **643 Bcf** of gas are assigned to a lower confidence pay category. These incremental volumes are the difference, for the four gas fields, between the remaining recoverable gas estimated in geologically-identified high-confidence pay and high confidence plus 50% risked potential pay calculations, 1,213 Bcf and 1,856 Bcf of gas, respectively, and the sum of the decline curve analysis and material balance sum, 860 Bcf.

	Engineering Analyses		Geologic Analyses	
	Decline Curve Analysis	Material Balance	Geologic, PAY category only	Geologic, PAY + 50%-risked Potential Pay
Sum 4 Fields	697	860	1,213	1,856
Sum Other Fields	166	282	not analyzed	not analyzed
Total	863	1,142	--	--

Notes: All values in Bcf. Other fields are 24 remaining Cook Inlet producing gas fields (see Table 2).

Study Results—Cook Inlet Gas Forecast:

1. This chart illustrates the possible use of the incremental gas reserves listed above to meet the demand requirements of the Cook Inlet region.
2. Each reserve category is drawn as a wedge; the actual production date of a given wedge is schematic and could start in any year.
3. The demand for gas is assumed to be a constant 90 Bcf per year (equal to domestic utility use and not including LNG exports beyond 4/11).
4. The most conservative wedge in red represents future production of PDP reserves (863 BCF) identified by DCA alone.
5. The orange wedge represents production of additional probable reserves (279 BCF) identified as the difference between MB and DCA.
6. The green wedge corresponds to the incremental production that could be achieved in just the four large fields through development of technically recoverable gas that is not reflected in the engineering analyses because it is not currently in communication with producing wellbores (353 Bcf).
7. The yellow wedge represents the additional untapped gas in those four fields, risked at 50 per cent (643 Bcf).
8. Finally, a more speculative gray wedge illustrates potential future production from contingent gas resources that await confirmation, delineation, and development, estimated at 300 Bcf. The DOG did not independently develop an estimate of undiscovered gas resources but instead relied on USGS and USDOE reports. A new USGS undiscovered gas resource estimate study is underway with results available within about a year.



Notes:

1. The study did not examine “deliverability” of the gas production and pipeline system to supply the market in times of high seasonal or peak demand. DOG forecasts only annual average gas production rates.
2. With each increment, more investment in drilling, compression, and field infrastructure will be required.