COOK INLET

CHALLENGES & OPPORTUNITIES

House Energy Committee
January 30, 2013

Dan Sullivan, Commissioner
Joe Balash, Deputy Commissioner
Paul Decker, Division of Oil & Gas
Alaska Department of Natural Resources
www.dnr.alaska.gov

ALASKA DEPARTMENT OF NATURAL RESOURCES

Outline

Part I: Cook Inlet Overview & Challenges, Strategic Considerations, & Development History

Part II: Overview of Cook Inlet Resources

Part III: State's Actions Regarding Cook Inlet

Part IV: Recent Cook Inlet Activity

Part V: Moving Forward

Part I

Cook Inlet Overview & Challenges, Strategic Considerations & Development History

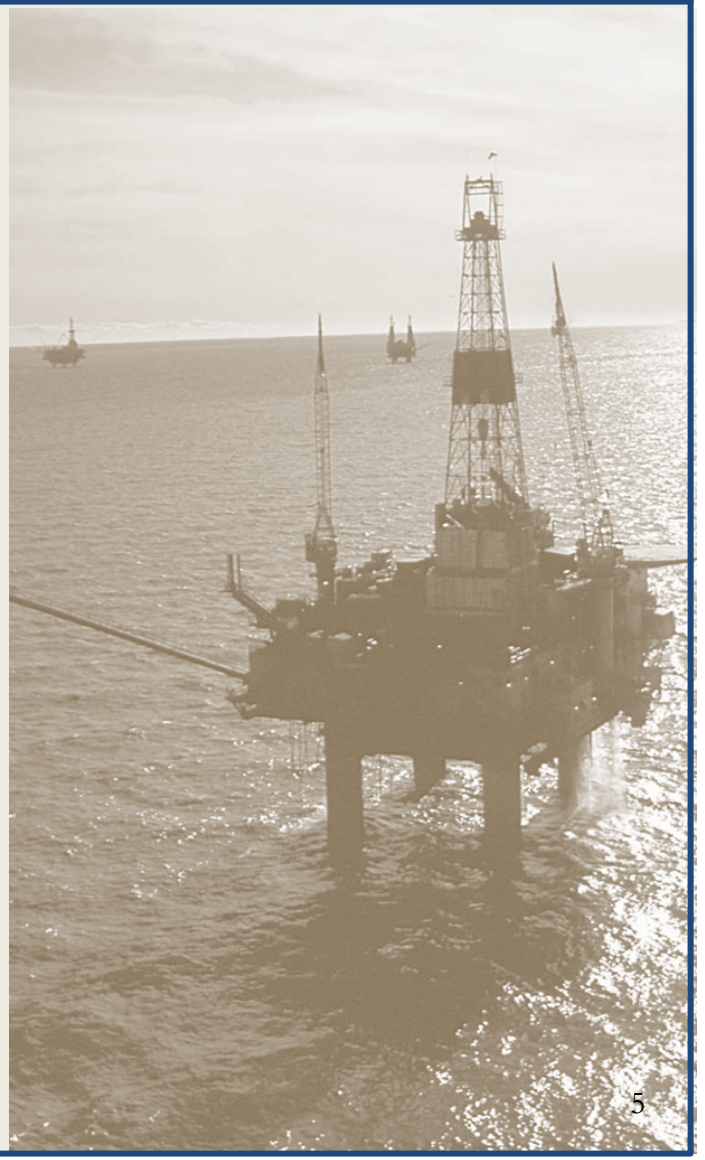
Cook Inlet
- Overview & Challenges -

- Cook Inlet basin supplies Anchorage and nearby communities with natural gas—the principal source of energy for heating and electric power generation
- Cook Inlet oil and gas industry has been a cornerstone of Southcentral Alaskan jobs and energy supply since statehood
- Cook Inlet is a maturing oil and gas basin. While there are legitimate concerns about possible contractual shortfalls of natural gas supplies in 2014-15, there are still large volumes of gas to be discovered and developed in small to intermediate size fields
- Cook Inlet is currently witnessing a transition from larger producers (Chevron, Marathon) to mid-size and small companies (e.g., Hilcorp, Apache, Nordaq) who specialize in reworking wells and discovering additional resources in maturing oil and gas fields
- Generally we see this as a positive trend—but transitions can slow actions and increase uncertainty
- There are several different stakeholders in the Inlet: producers, explorers, utilities, regulators, state, and feds
    - Few other places in the U.S. have so many utilities for such a small population
    - Regulated units can produce unintended consequences
    - Conflicting interests of players can result in inaction—current challenges and problems have been years in the making
    - Conflicting interests of players can affect the transparency, liquidity, and competition needed for markets to function effectively.

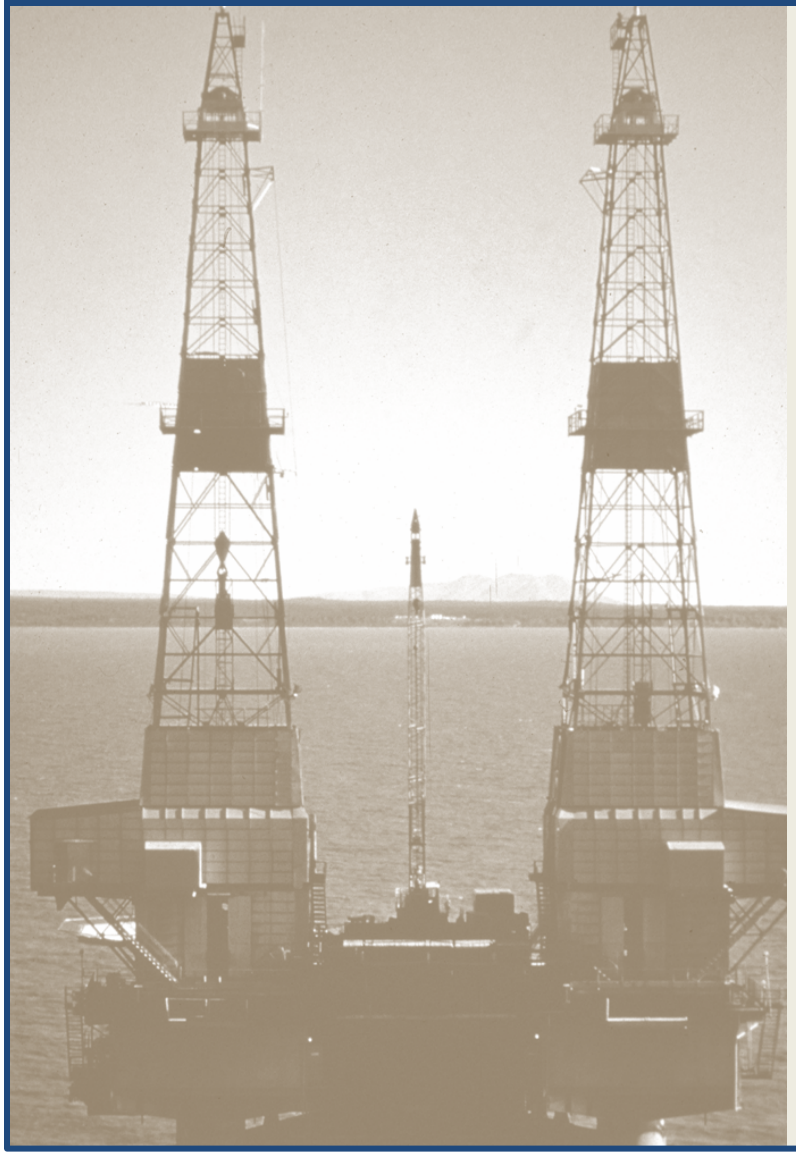
Cook Inlet

- Strategic Considerations/Goals -

- Most critical goal is energy security for Alaskans—keeping lights and power on
- All stakeholders working together is key to addressing challenges and taking advantage of opportunities
  - Complex problems with many variables
  - Narrow definition of interests can make solutions in the long-term public interest more difficult to achieve
- Isolated nature of power generation in Alaska requires focus on self-sufficiency and redundancy
- Must address immediate energy security concerns while focusing on long-term implications of actions taken
  - More Cook Inlet production, more jobs for Alaskans, and expediting gasline from the North Slope are all strategic goals for the State
  - Must keep in mind as near-term decisions are made so as not to undermine these
- In short: Goal is to get supply chasing demand, not demand chasing supply



Cook Inlet
- Development History -



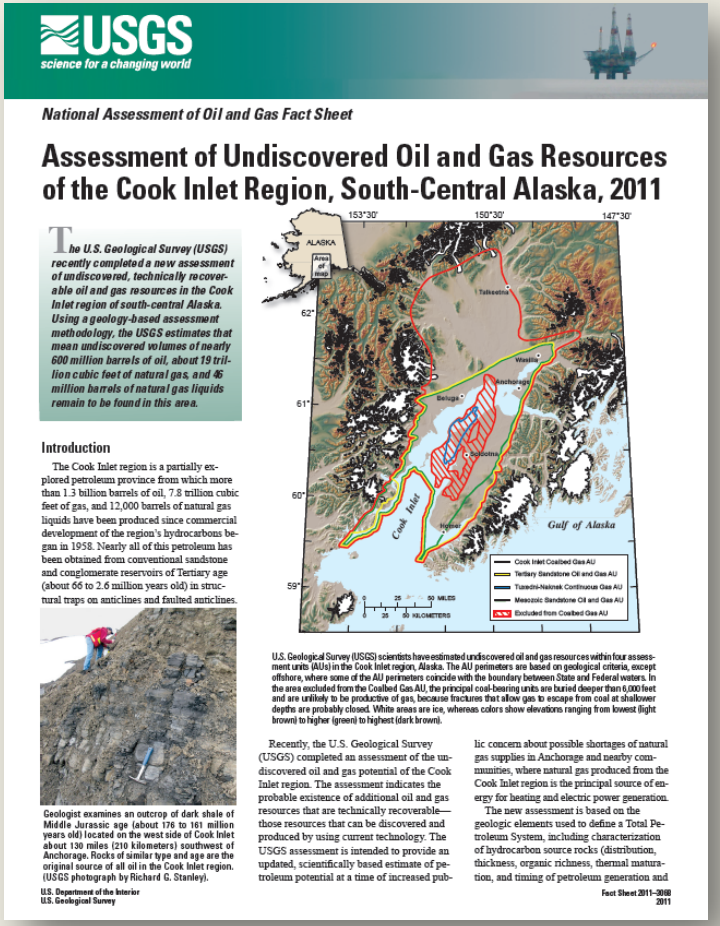
- Oil discovered at Swanson River in 1955; production began in 1958 and is still ongoing
- Gas discovered at Deep Creek and Kenai Gas field in 1958 and 1959 respectively; still in production
- So much gas that US LNG exports were pioneered here and industrial fertilizer manufacturing occurred in Kenai
- Historic production volumes of basin:
  - 1.3 billion barrels of oil
  - 7.8 trillion cubic feet of gas
  - 12,000 barrels of natural gas liquids
- 43 years of exporting LNG to Japan (approximately 2.5 trillion cubic feet); have never missed a shipment
  - Only place in the U.S. exporting LNG
  - Strategic implications of this for the big gasline are important

Part II

Overview of Cook Inlet Resources

Cook Inlet
- USGS Oil & Gas Estimates-

- USGS estimates (2011) that significant undiscovered volumes of hydrocarbons remain to be found in Cook Inlet
- Mean estimates of additional undiscovered resources that are technically recoverable include:
  - 19 trillion cubic feet of natural gas
  - 600 million barrels of oil
  - 46 million barrels of natural gas liquids
- These are very large volumes, even if they are not contained in large fields
- Terms can be confusing but matter in this context, e.g., "undiscovered," "reserve," "resource," "under contract"
- All assessments of undiscovered oil and gas are probabilistic to account for uncertainty
- Important issue of peak deliverability



USGS
science for a changing world

National Assessment of Oil and Gas Fact Sheet

Assessment of Undiscovered Oil and Gas Resources of the Cook Inlet Region, South-Central Alaska, 2011

The U.S. Geological Survey (USGS) recently completed a new assessment of undiscovered, technically recoverable oil and gas resources in the Cook Inlet region of south-central Alaska. Using a geology-based assessment methodology, the USGS estimates that mean undiscovered volumes of nearly 600 million barrels of oil, about 19 trillion cubic feet of natural gas, and 46 million barrels of natural gas liquids remain to be found in this area.

U.S. Geological Survey (USGS) scientists have estimated undiscovered oil and gas resources within four assessment units (AUs) in the Cook Inlet region, Alaska. The AU perimeters are based on geological criteria, except offshore, where some of the AU perimeters coincide with the boundary between State and Federal waters. In the area excluded from the Coalbed Gas AU, the principal coal-bearing units are buried deeper than 6,000 feet and are unlikely to be productive of gas, because fractures that allow gas to escape from coal at shallower depths are probably closed. White areas are ice, whereas colors show elevations ranging from lowest (light brown) to higher (green) to highest (dark brown).

Introduction

The Cook Inlet region is a partially explored petroleum province from which more than 1.3 billion barrels of oil, 7.8 trillion cubic feet of gas, and 12,000 barrels of natural gas liquids have been produced since commercial development of the region's hydrocarbons began in 1958. Nearly all of this petroleum has been obtained from conventional sandstone and conglomerate reservoirs of Tertiary age (about 66 to 2.6 million years old) in structural traps on anticlines and faulted anticlines.

Geologist examines an outcrop of dark shale of Middle Jurassic age (about 176 to 161 million years old) located on the west side of Cook Inlet about 130 miles (210 kilometers) southwest of Anchorage. Rocks of similar type and age are the original source of all oil in the Cook Inlet region. (USGS photograph by Richard G. Stanley).

Recently, the U.S. Geological Survey (USGS) completed an assessment of the undiscovered oil and gas potential of the Cook Inlet region. The assessment indicates the probable existence of additional oil and gas resources that are technically recoverable—those resources that can be discovered and produced by using current technology. The USGS assessment is intended to provide an updated, scientifically based estimate of petroleum potential at a time of increased public concern about possible shortages of natural gas supplies in Anchorage and nearby communities, where natural gas produced from the Cook Inlet region is the principal source of energy for heating and electric power generation.

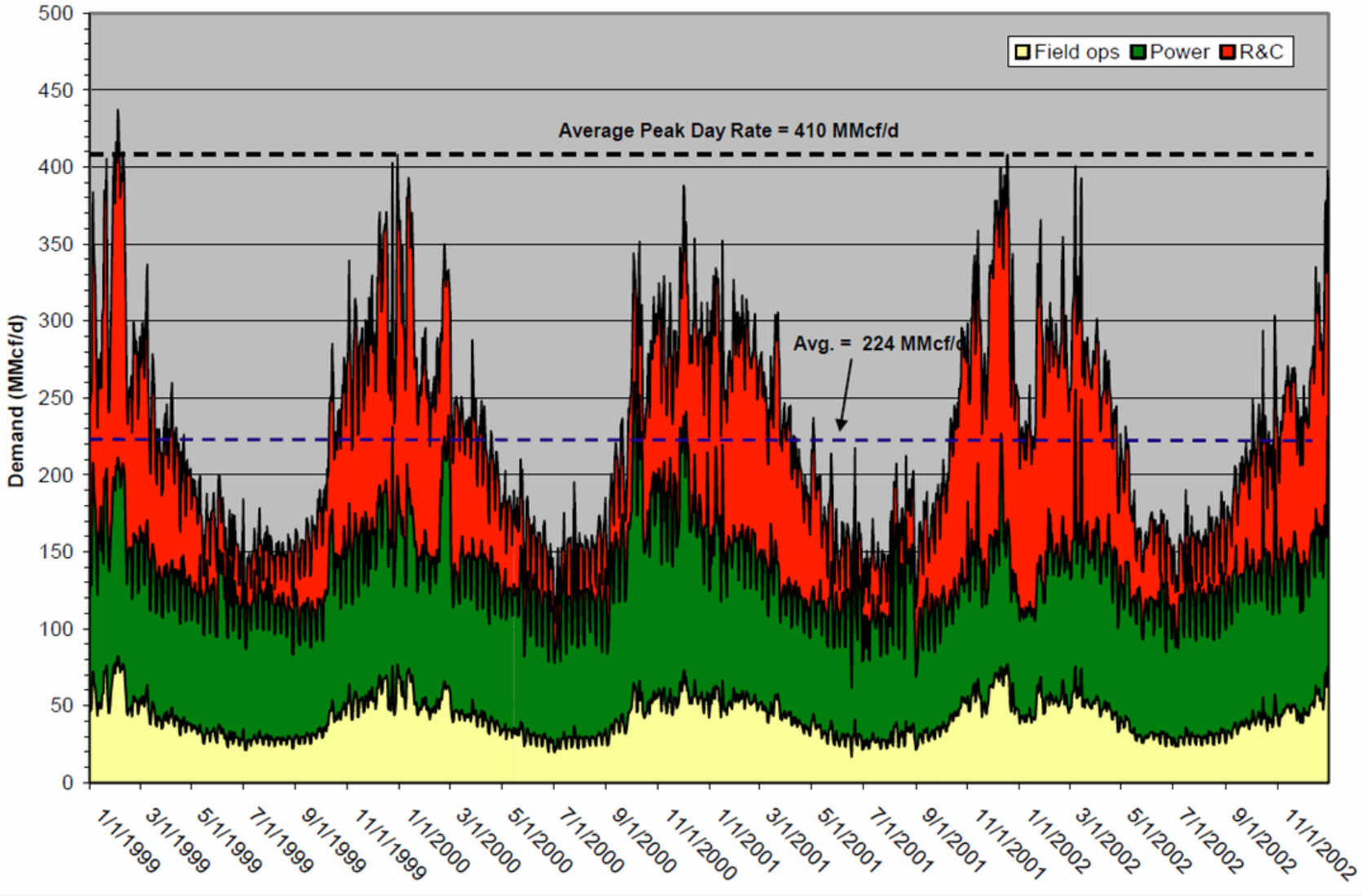
The new assessment is based on the geologic elements used to define a Total Petroleum System, including characterization of hydrocarbon source rocks (distribution, thickness, organic richness, thermal maturation, and timing of petroleum generation and

U.S. Department of the Interior
U.S. Geological Survey

Fact Sheet 2011–3068
2011

Cook Inlet

- Seasonal Swings in South-Central Daily Demand -



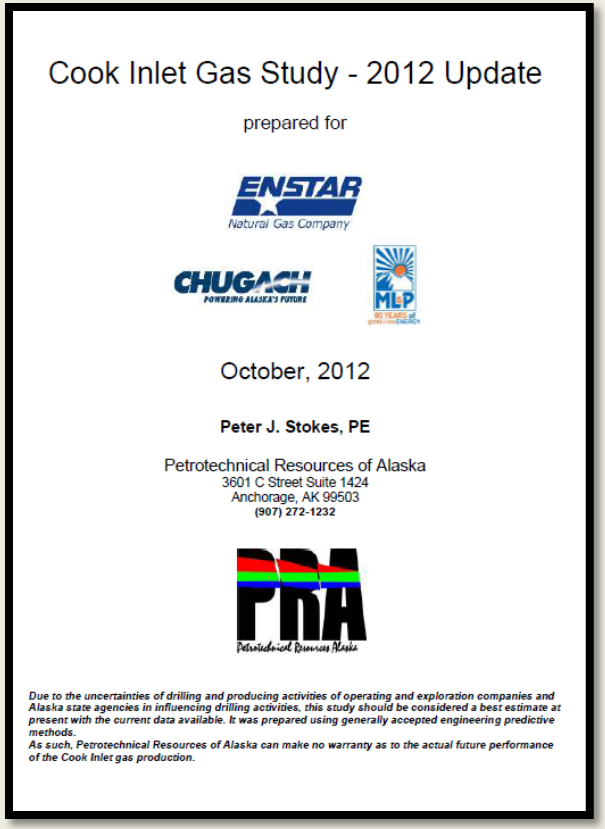
Cook Inlet
- DNR, Division of Oil & Gas -

- DNR, Division of Oil and Gas (DOG), is primarily concerned with managing the gas resource in its entirety, including undiscovered resources, discovered non-producing resources, and producing reserves
- Utilities have a laser focus on the volume of gas available for contracts
- Producers are focused on delivering the contracted gas in the most efficient way possible
- DOG estimates for Cook Inlet gas incorporate decline curves, material balance, and geologic volumetric analysis
- PRA estimates focus on producing reserves from decline curve analysis alone

Cook Inlet

- Petrotechnical Resources of Alaska (PRA) Study -

- In 2009, ENSTAR, Chugach Electric and ML&P commissioned PRA to study Cook Inlet supplies from existing fields; in 2012, PRA updated the study
- Good solid product and analysis
- PRA report uses a decline curve analysis – a commonplace engineering technique that examines historical gas production rates and extrapolates forward, forecasting for how production rates will decline in years ahead
  - However, this assumes no further drilling or other redevelopment work
- Based on the PRA report, predicted gas supply decline curve drops below the anticipated demand level in 2014-15, with the supply shortfall increasing year-on-year after that
- This is and should be a concern for all



Cook Inlet Gas Study - 2012 Update

prepared for

ENSTAR Natural Gas Company

CHUGACH POWERING ALASKA'S FUTURE

MLP

October, 2012

Peter J. Stokes, PE

Petrotechnical Resources of Alaska
3601 C Street Suite 1424
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PRA Petrotechnical Resources Alaska

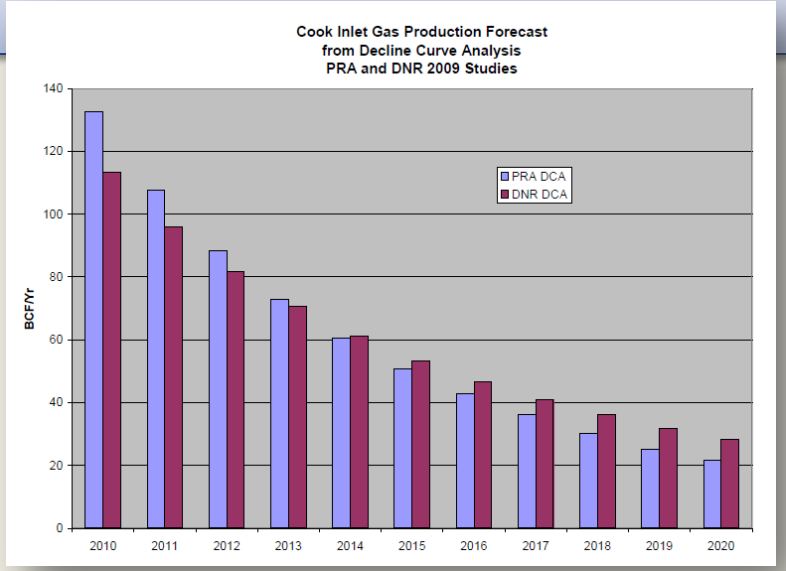
Due to the uncertainties of drilling and producing activities of operating and exploration companies and Alaska state agencies in influencing drilling activities, this study should be considered a best estimate at present with the current data available. It was prepared using generally accepted engineering predictive methods.
As such, Petrotechnical Resources of Alaska can make no warranty as to the actual future performance of the Cook Inlet gas production.

Cook Inlet

- Petrotechnical Resources of Alaska (PRA) Study -

Review of PRA Estimates

- The PRA report relies on decline curve analysis, which is complicated in a non-steady state production environment
- The DOG in 2009, 2011, and 2012 reviewed augmented decline analysis with both material balance analysis and geologic volumetric mapping of four major fields
- The basin wide material balance analysis identifies 32% more gas reserves than decline analysis alone, and the geologic volumetrics mapping identifies even more possible undeveloped gas
- Additional reserve potential exists in other currently producing fields and in recent discoveries



- In addition, the State has very limited information on any exploration activity within Native or federal lands; however, there are several publicly reported discoveries and new developments occurring on this acreage

Cook Inlet

- Petrotechnical Resources of Alaska (PRA) Study -

Material Balance Analysis Explained:

- This approach uses the change in reservoir pressure over time to estimate how much gas is contained in the parts of the field that are in pressure communication with the wells
- Basin wide, DNR's material balance analysis identified 32% more gas reserves than the decline curve analysis in the existing developed field areas
- Reserve estimates now being quoted by the utilities do not include material balance work

"Behind Pipe" Volumes:

- PRA's study only accounts for production from active completions
- As discussed in DNR's 2009, 2011 and 2012 studies, well logs indicate that existing Cook Inlet fields have nonproducing gas volumes behind pipe or in geologically isolated portions of the reservoir
- These nonproducing volumes cannot be observed by either decline curve or material balance analysis because both approaches are based on production data

Cook Inlet

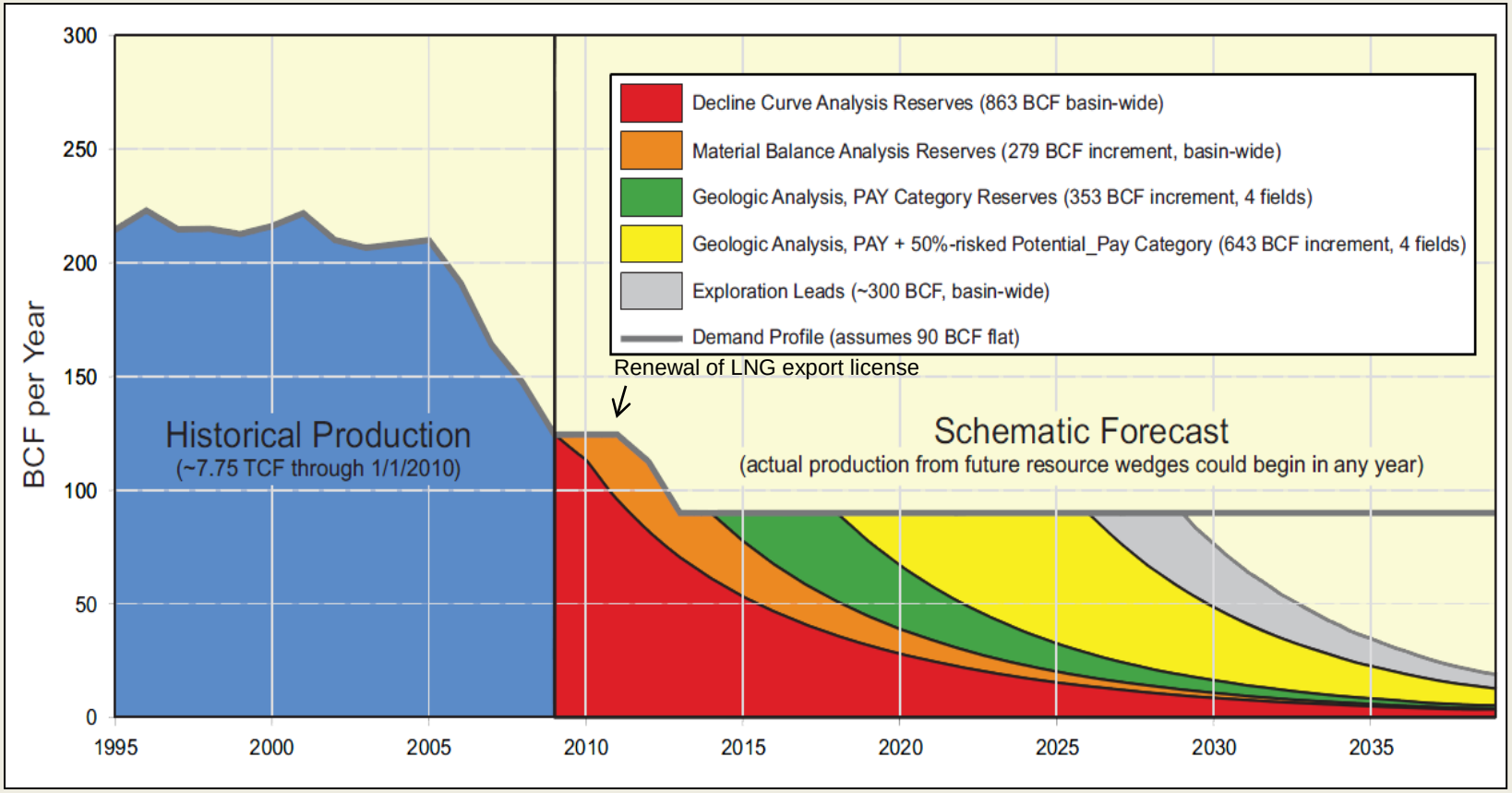
- Petrotechnical Resources of Alaska (PRA) Study -

- The fact that PRA predicts a shortfall in gas production under contract within the next few years is a cause for concern, but should not be construed to mean that gas resources in the Cook Inlet basin have been depleted
- It reflects the fact that not enough new wells are being drilled to keep pace with the declining production from existing wells
- Because the Cook Inlet basin is isolated from the gas spot market, the amount of gas available for delivery at any given moment is largely a function of sales contracts
  - Operators have no commercial reason to drill for more gas until they can contract it for sale
  - Classic chicken and egg dilemma
- Recent USGS resource assessments and other studies predict that the basin still holds large quantities of undiscovered, technically recoverable gas
- Hundreds of millions of dollars in investment by companies is further important evidence of a basin with significant hydrocarbon potential
- New gas production will need to be added from a combination of development drilling in existing fields and exploration drilling to bring new prospects online

Cook Inlet
- DNR, Division of Oil & Gas -

Cook Inlet Natural Gas Reserves and Resources: Hypothetical Production Forecast

(Assumes substantial investment in redevelopment activity in existing fields + some exploration success but does not include wild-cat drilling that is going on today)

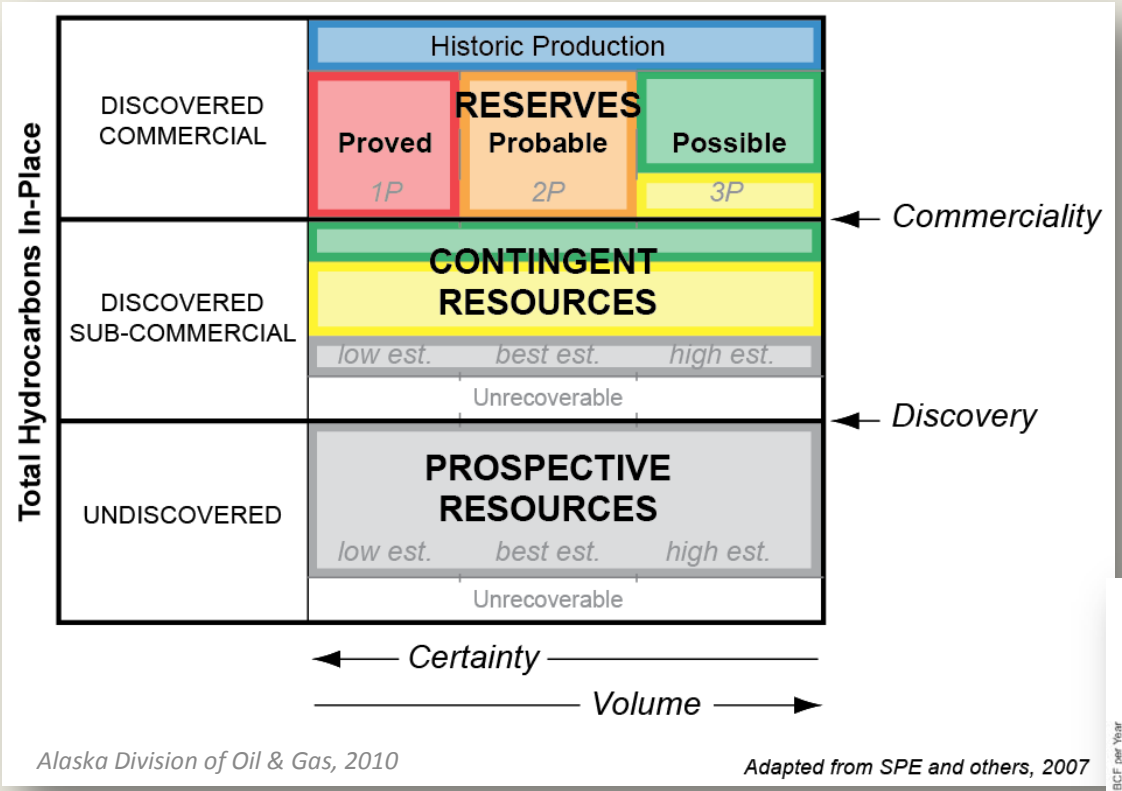


← *Past* *Present* *Future* →

Alaska Division of Oil & Gas, 2010 (modified after Hartz and others, 2009)

Cook Inlet
- Reserves and Resources Nomenclature -

Categorization of Cook Inlet gas volumes identified by DNR

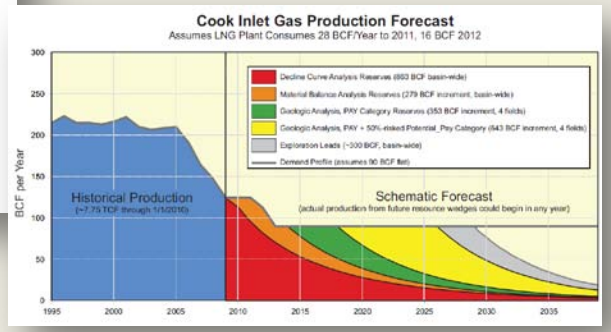


Alaska Division of Oil & Gas, 2010

Adapted from SPE and others, 2007

Important to note distinction between "resource" and "reserve" when discussing gas supplies:

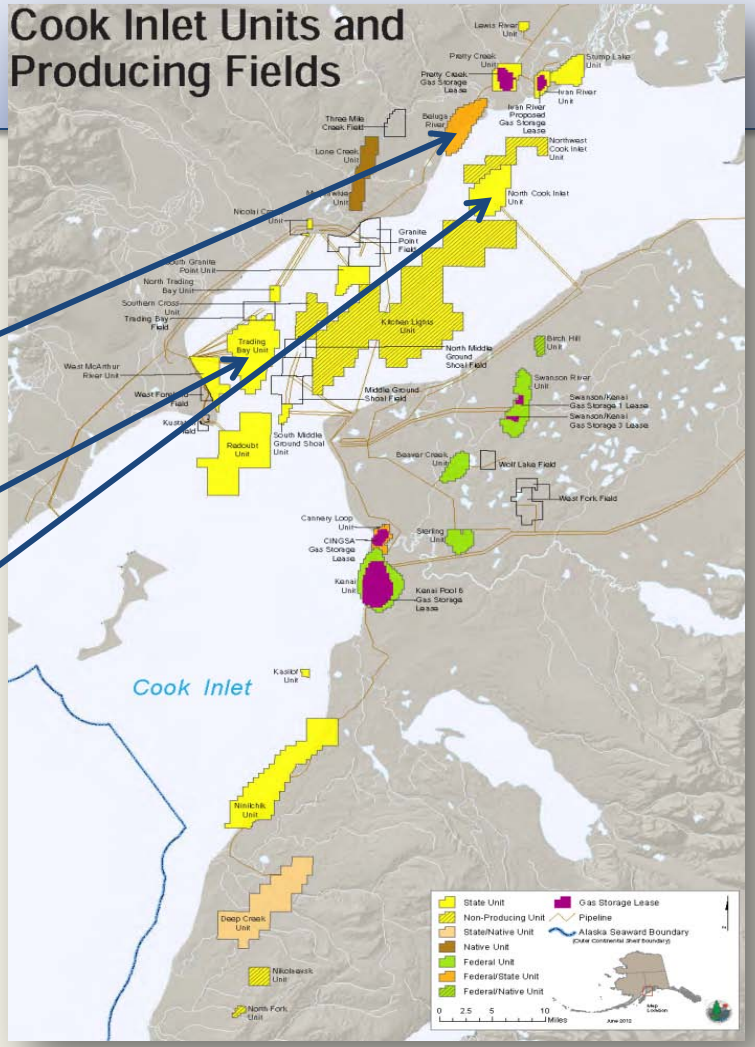
- **Reserves** = oil and gas volumes that have been confirmed by drilling and are known or expected to be economically producible
- **Resources** = much broader term, and includes volumes that have not yet been proved by drilling, as well as volumes that have been discovered but whose commerciality is not yet established



Cook Inlet
- DNR, Division of Oil & Gas -

Cook Inlet Gas Estimates, DOG, December 2012

- **~ 1.1 TCF** estimated remaining producible reserves in 28 fields
- **~ 355 BCF** in undeveloped gas resources in 3 primary fields
  - Beluga River Unit (BRU) (233 BCF)
  - Trading Bay Unit (TBU) Grayling Gas Sands (72 BCF)
  - North Cook Inlet Unit (NCIU) (50 BCF)
- Recent drilling has proven new reserves in existing fields
- Current production from these wells: 1.0-7.0 MMCF/D



PART III

State's Actions Regarding Cook Inlet

STATE *of* ALASKA
- ACTIONS REGARDING COOK INLET -

- Recognizing energy security challenges in Cook Inlet, the State has taken a number of focused actions—some are directly within DNR's authority and responsibilities, others are more tangentially related
- Aggressive use of all tools available to increase investment, exploration, and production
  - Primary focus of DNR—optimal way to address Southcentral energy challenges
  - Best way to advance the State's interests
  - Most directly inline with DNR's authority and responsibilities

- Marketing resource potential, leases, tax and investment incentives to potential investors, explorers, and developers
  - Legislative 2010 actions very attractive and are working
  - Ex. Hilcorp, Apache meetings about investment and 2011 lease sale
  - Capital, expertise, proven track record

STATE *of* ALASKA
- ACTIONS REGARDING COOK INLET -

- Use of unit applications and lease terms as leverage to encourage new exploration and investment while maintaining vigilant regulatory oversight
- Support exploration through AIDEA—developed financing of a jack-up rig
- Ensuring stream-lined permitting that moves projects forward in a timely manner
  - Some Federal foot dragging remains a problem
  - Intervene/advocate when necessary on obstacles
  - Make RCA process less uncertain
- Gather and publish new geologic information
- Advocating for and fast-tracking additional storage capacity through CINGSA
  - Critical to additional winter energy supply
  - Provides year-round market for additional sales
  - OPMP coordination and RCA advocacy brought this project on line very quickly
- Re-orienting RAPA outlook to ensure public interest is defined as a balance between price and security of supply for Alaskans
  - Legislation has helped with RCA
- Working to expedite permitting to bring local, non-gas power generation on line
  - Present: Eva Creek
  - Future: Healy Clean Coal, UCG, Hydro

STATE *of* ALASKA
- ACTIONS REGARDING COOK INLET -

- Expediting transactions that advance the State's interests
  - Hilcorp/Chevron deal
  - FTC/Consent decree
- Convener/Problem Solving
  - Not always directly within DNR/State authorities
    - Ex. Fall 2012 storage issues, FTC advocacy
  - Frequent meetings—from Governor on down—among all stakeholders within Cook Inlet—utilities, producers, explorers, regulators
  - Encouraging cooperation, transparency, and ideas for increasing Cook Inlet investment and production
  - But convening authority only goes so far – private sector contracts between producers/utilities are critical

Part IV

Recent Cook Inlet Activity

Cook Inlet
- Recent Activity -

- State efforts and incentives are having a strong, positive impact
  - Two years ago, conventional wisdom was that Cook Inlet was a dead basin
  - Now it is undergoing a significant exploration and investment renaissance
- Old and new players exploring and investing: Apache, Hilcorp, Armstrong, Linc, Buccaneer, Nordaq, Furie, Cook Inlet Energy, ConocoPhillips, CIRI
- Hundreds of millions invested in 2012

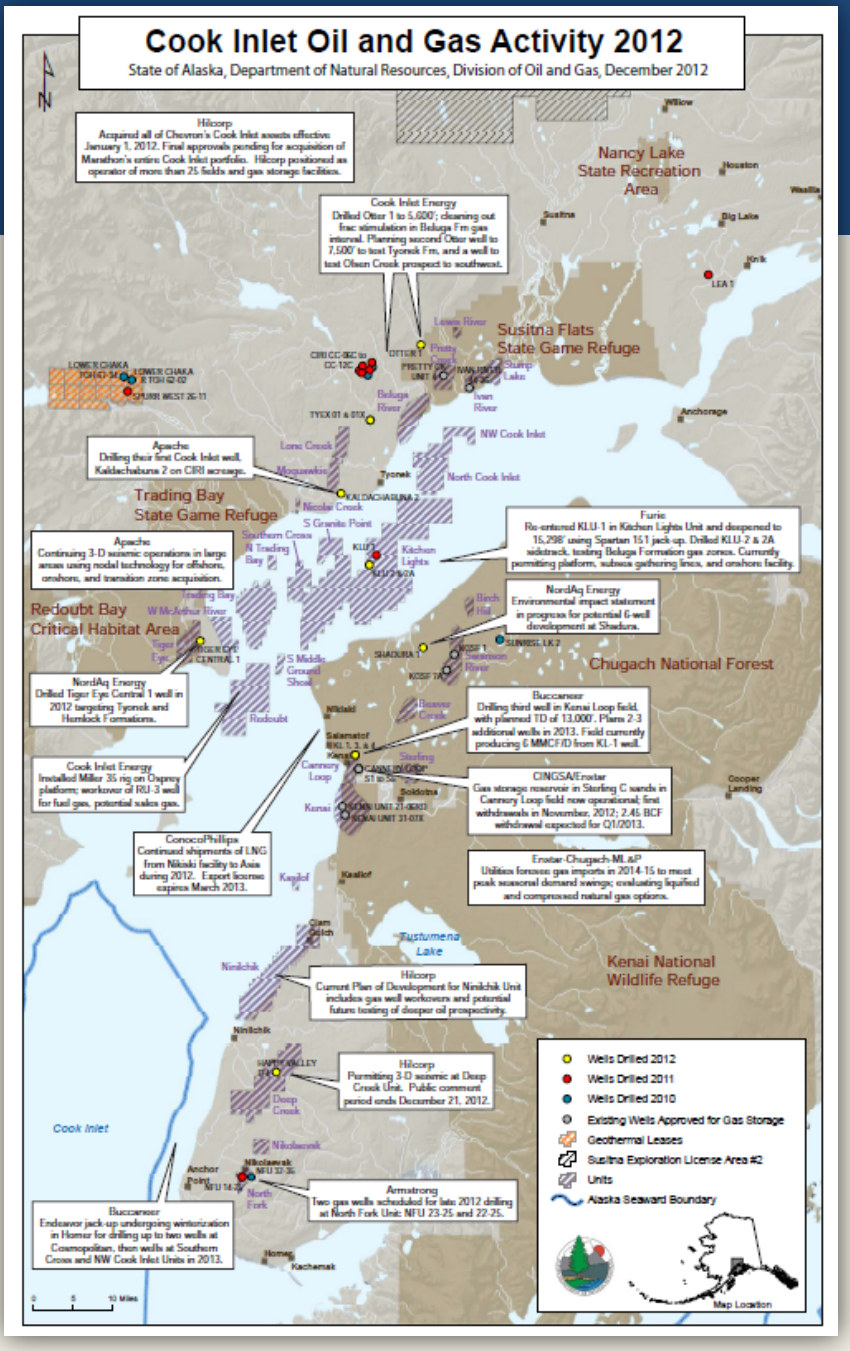
- Highly successful lease sales
  - In June 2011, the state received the highest number of Cook Inlet lease sale bids in 28 years, totaling over $11 million
    - Total tracts sold: 108
    - Total high bonus bids: $10,986,826.20
  - In May 2012, Cook Inlet lease sale bids totaled more than $6.8 million
    - Total tracts sold: 44
    - Total high bonus bids: $6,865,835

Cook Inlet
- Recent Activity -

- Dramatic increase in number of drill rigs in inlet – either idle, available or stacked
  - In November 2006, 9 rigs
  - In November 2009, 12 rigs
  - In November 2012, 17 rigs (includes 2 jack-up rigs)
- Companies shooting major 3-D seismic over large areas of the basin
  - Never previously done at this scale with this sophisticated technology
  - Presents huge opportunities for development
- New gas storage project on line; important for supply security and more steady year-round production, and peak availability
- Attractive price for gas relative to Lower 48 markets – but challenged by a relatively small market
- State continues to focus on safe, responsible development and operations

Cook Inlet
- Recent Activity -

- Diversity of players
- Oil vs. Gas – companies are indicating flexibility, but decisions will still be driven by commercial concerns
- New spending, capital investment, and well work-overs where big incumbents previously had no interest
- Jobs, jobs, jobs
- Need to move more exploration into production



Cook Inlet

- Renaissance -

EXPLORATION & PRODUCTION

PETROLEUM NEWS • WEEK OF JANUARY 13, 2013

Cook Inlet investment surges in 2012

After years of declining investment, several independents small and large are taking a shine to the scrappy but prolific basin

Petroleum News, January 13, 2013:

"Cook Inlet undoubtedly went through a renaissance in 2012.

"While dwindling supplies remain a concern, the year saw companies large and small making significant investments in the basin after years without exploration and only limited development. If the most ambitious companies were successful, the region would see increased oil and gas volumes some 55 years after production began."

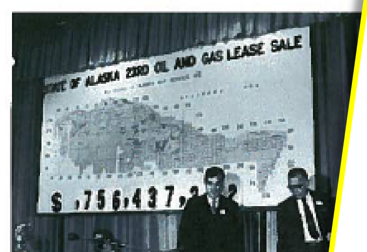
U.S. NEWS | AUGUST 27, 2011

New Energy Estimate Breathes Life Into a Declining Alaskan Oil Field

By RYAN DEZEMBER

A combination of state incentives and improved estimates of the amount of natural gas held in Alaska's storied Cook Inlet are prompting energy companies to take a fresh look at the state's original oil patch.

Alaska officials want to reverse a decline in ... the inlet, which is home to more than half the state's populat... generate production royalties.



Time & Life Pictures/Ge...

Energy producers are returning to Alaska's C... birthplace of the state's modern oil- and gas-exploration business, after fleeing for the North Slope's vast reserves. Above, Thomas E. Kelly, former state commissioner of natural resources, at a 1969 North Slope lease auction.

... reserves in the ... Slope, near Prudhoe Bay. The North ... home to the biggest oilfield in the U.S.

"It was just a flight of capital," said Joe Balash, Alaska's deputy commissioner of Natural Resources. "For a generation we've been living off Prudhoe Bay while we're sitting on what, by any other measure, is a world-class basin."

WSJ, August 27, 2011:

"A combination of state incentives and improved estimates of the amount of natural gas held in Alaska's storied Cook Inlet are prompting energy companies to take a fresh look at the state's original oil patch."

Part V

Moving Forward

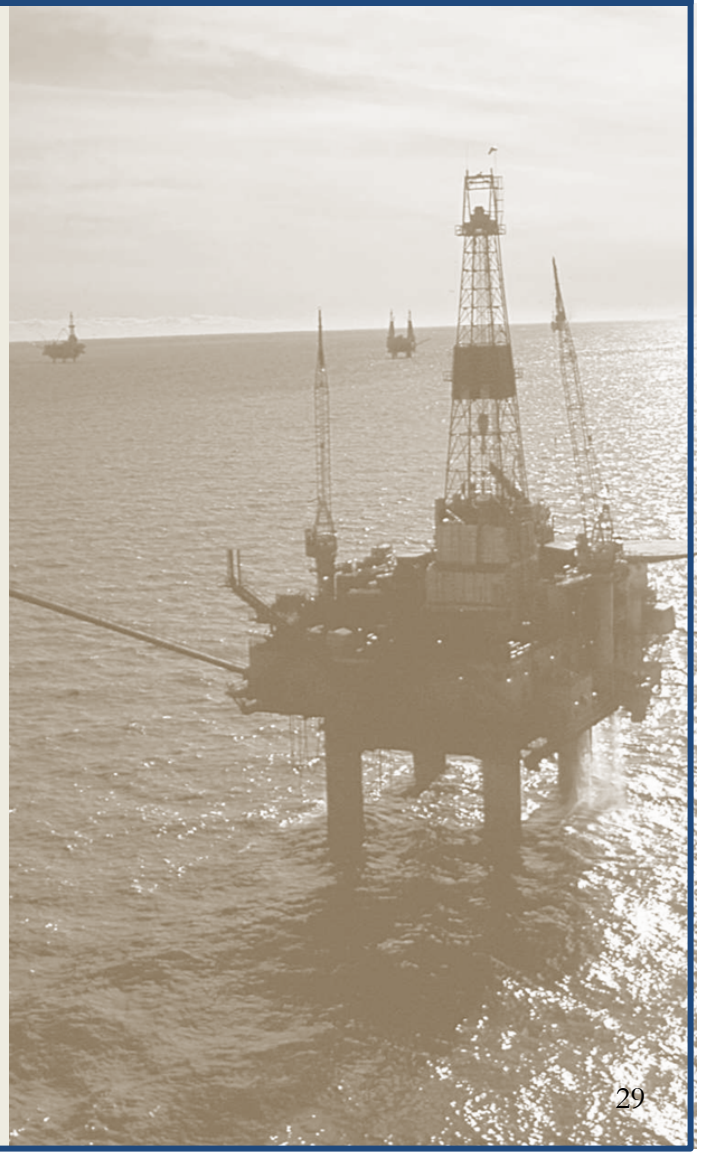
Cook Inlet
- Actions Moving Forward -

The renaissance is on, but challenges remain; the State's actions will focus on the following areas:

- Redouble efforts to continue increased investment and exploration with a particular focus on near-term increased production
  - Encourage behind the pipe production
  - Help decrease costs
  - Continue to look for ways to incentivize more Cook Inlet drilling
- Additional efforts could include:
  - Modernizing Cook Inlet information
  - Infrastructure development, particularly on west side of Cook Inlet
  - More gas storage
- Incentivize and support industrial-size markets, certainty, and opportunities to continue significant Cook Inlet investment and production
  - Complicated dynamic but critical
  - Potential industrial markets—Donlin, Agrium, LNG facility after residential and business demand is met
- Encourage utilities to work on all redundancy and "belt and suspenders" options for energy security
- Be ready to meet potential near- and intermediate-term supply shortfalls
  - More storage
  - North Slope LNG trucking initiative
  - Importing gas as a "last resort"

Cook Inlet
- Actions Moving Forward -

- Concerns regarding importing gas, particularly large volume, long-term contracts of LNG or CNG
    - Could stifle, undermine Cook Inlet renaissance
    - Could undermine Alaska jobs and employment of a local workforce
    - Importing gas from British Columbia validates and promotes one of the biggest competitors (BC gas) to an Alaskan large-diameter LNG export project
- Learn from history



Cook Inlet
- Learning from History: APL-5 -

- Contract between Marathon Oil Company and Enstar
  - Full requirements through 2016
  - Henry Hub Pricing
- RCA rejected the proposal
  - Opposed by RAPA
  - Opposed by other utilities as they feared "precedent pricing"
- Lessons learned:
  - Likely a lot of behind pipe resource in Cook Inlet
  - Without a long-term market to sell gas, companies will be reluctant to drill; this hurts Alaskans
  - Singular focus on price in short term can undermine security of supply and price in longer term
  - We all must work together

Conclusion

- Positive developments in 2012 with Cook Inlet Renaissance
- Concerns remain
- All agree that the best scenario is for more gas from the Cook Inlet and we need to help incentivize production there
- Must be prepared to react to numerous scenarios
  - Energy security is number one goal
  - But long-term implications of actions must be thoroughly examined
  - Long term energy security is also clearly achievable
- Most important for immediate future: All parties continue to work and cooperate on addressing these challenges together