

Arctic Energy Office U.S. Department of Energy

Spur Line Analysis Alaska Natural Gas Needs and Market Assessment

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Alaska Natural Gas Needs and Market Assessment



National Energy Technology Laboratory



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<http://www.netl.doe.gov/index.html>

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Overall Study Objective

- **Develop an estimate of potential Spur Pipeline demand in South Central Alaska**
- **Estimate natural gas demand in Central Alaska (Fairbanks area)**
- **Provides inputs to a second study**
 - engineering specifications of the pipeline.
 - socio-economic impacts.

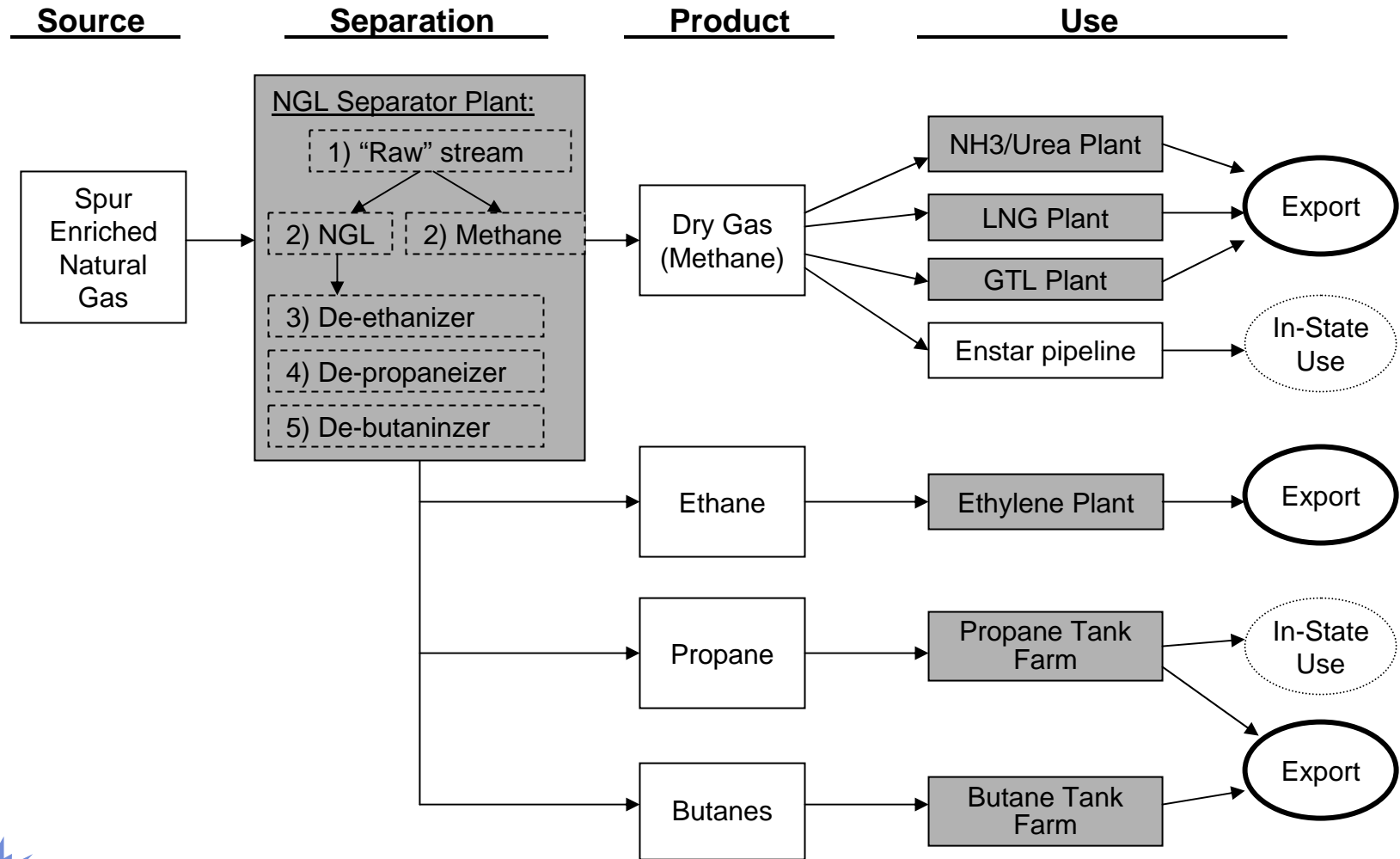


Methodology

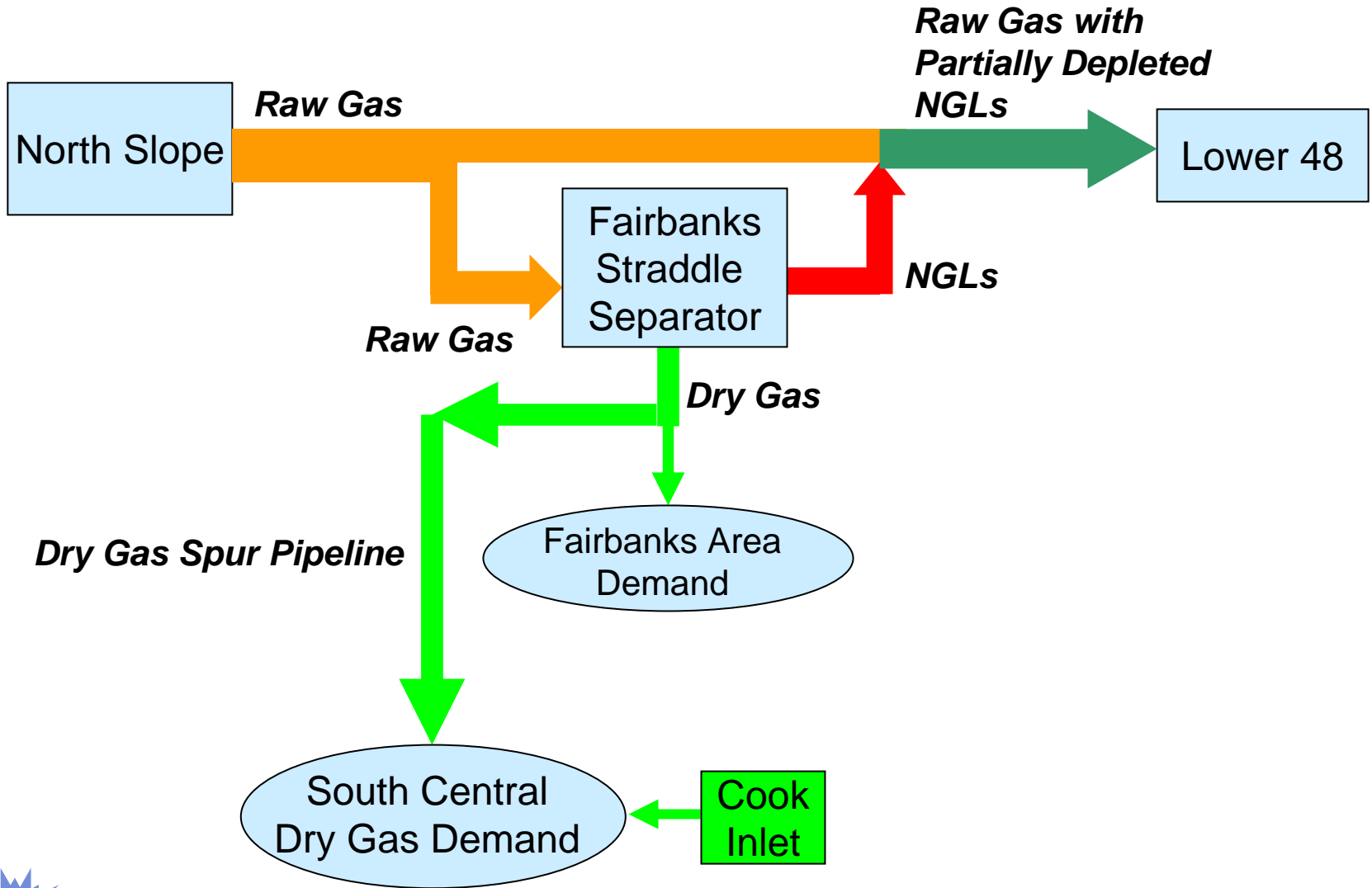
- **AGP from ANS to Chicago: 4.5 – 6 Bcf/d, dense phase gas, in operation by 2015**
- **Spur pipeline scenarios:**
 - Dry gas line – Residential/commercial, power generation, LNG, ammonia-urea, gas-to-liquids
 - Dense phase line containing NGLs: All of the above and petrochemicals and propane
- **Financial modeling to estimate economically viable demand**
 - Determine the maximum price each sector can pay and be viable in South Central Alaska
- **Fairbanks area demand independent of a spur pipeline**



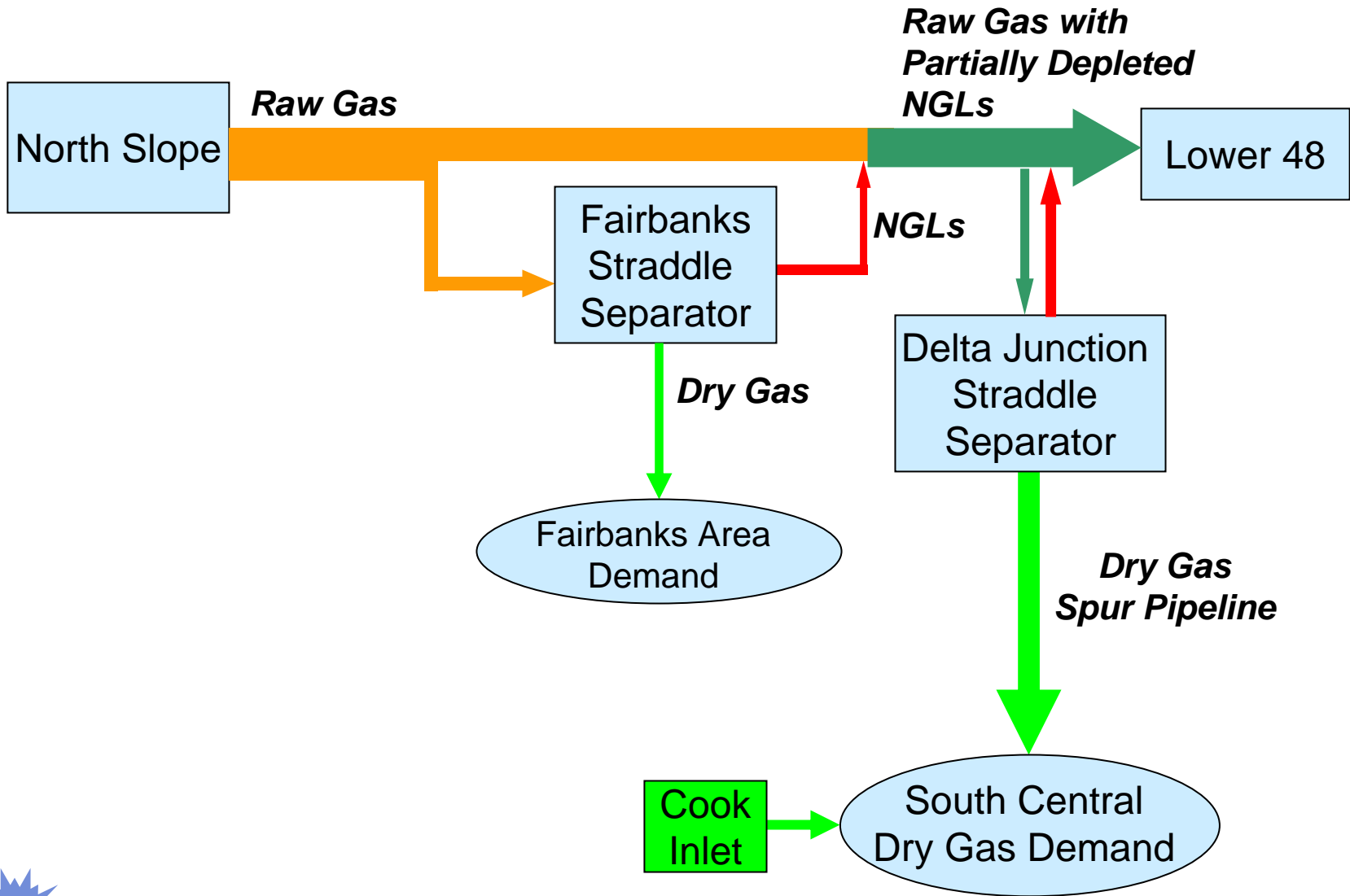
Alaska Spur Pipeline Potential Products and Uses. Shaded boxes represent potentially large capital investments.



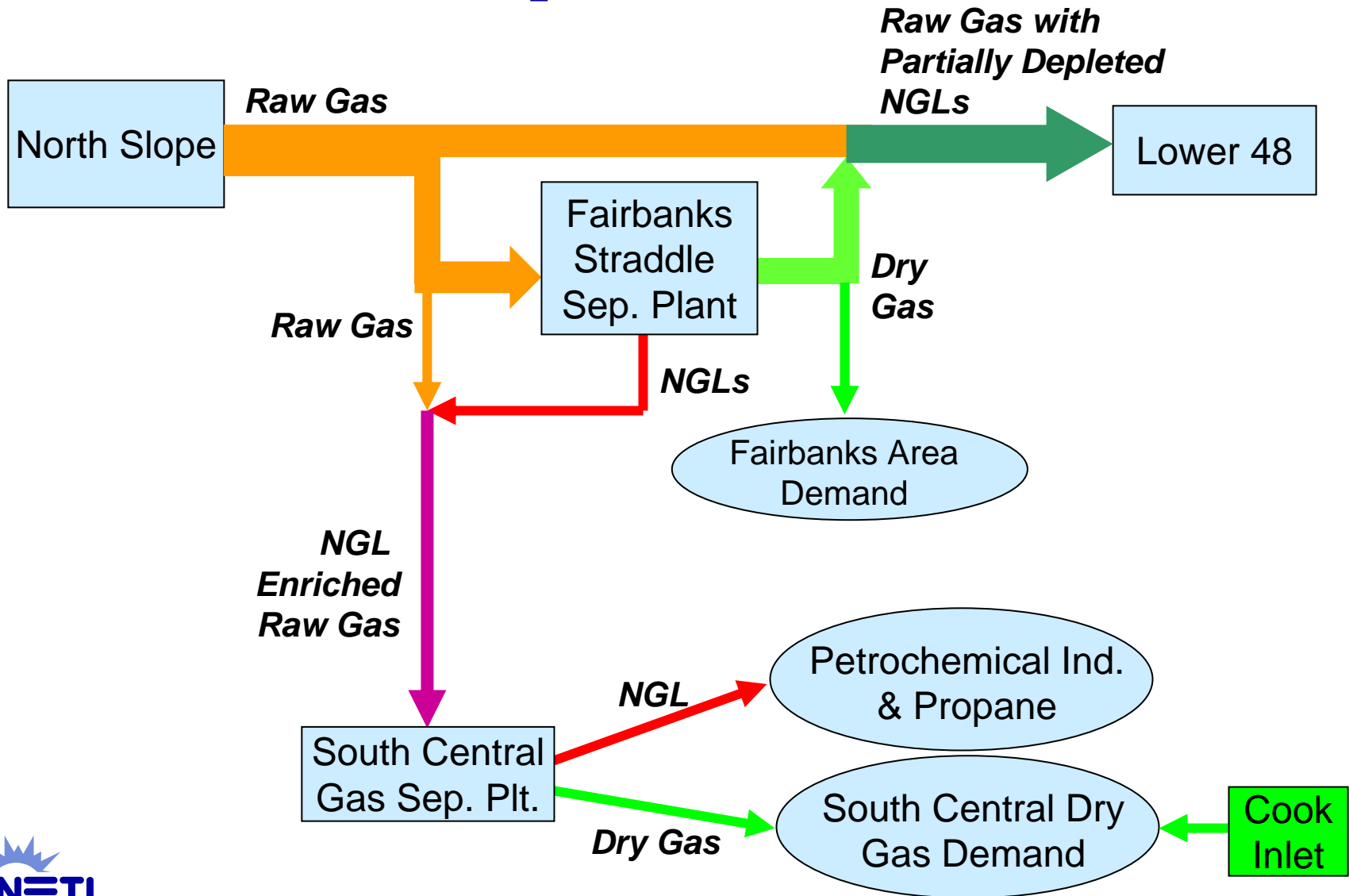
Dry Gas Spur from Fairbanks



Dry Gas Spur from Delta Junction



Dense Phase Spur Line from Fairbanks



Study Assumptions

- All large gas-intensive industries scaled as world class
- 12% discount rate, over a 20 year project life
- 2005\$
- 4.5 – 6.0 Bcf/d AGP becomes operational in 2015
- ANS wellhead price is determined by Lower 48 gas prices minus AGP Tariff
- Fairbanks gas price = ANS price + AGP tariff to Fairbanks
- South Central Alaska price = ANS price + AGP tariff to Fairbanks + spur pipeline tariff
- Future gas demand in the Fairbanks region is not included in spur pipeline capacity estimates
- South Central natural gas supply = **Existing** Cook Inlet natural gas reserves only



Study Assumptions

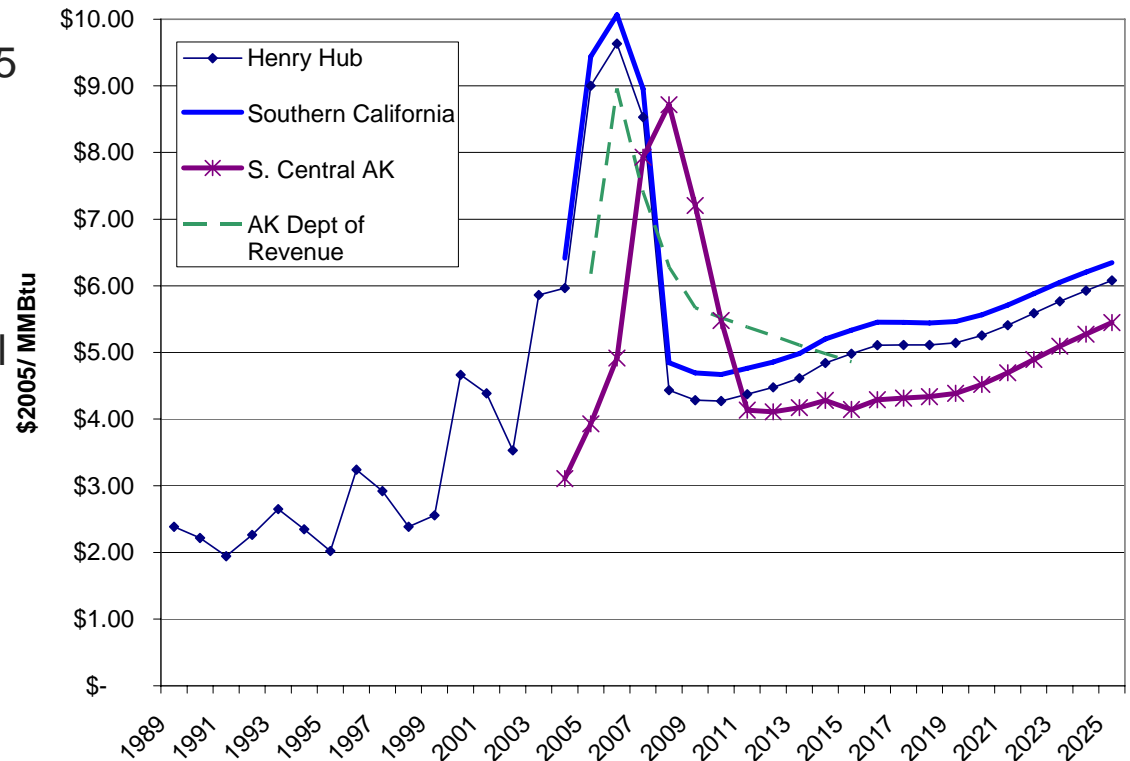
Price Forecast

- Use EIA forecasts of gas prices in the Lower 48

- Natural Gas Price 2015 – 2025
- Henry Hub =
- \$7.76/MMBtu (Nominal)
\$5.41/MMBtu (2005\$)
- World Oil Price = \$66.20/BBI (Nominal), \$46.17/BBI (2005\$)

- Sensitivity cases:

- High gas price (base +\$2.00/MMBtu)
- Low gas price (base - \$2.00/MMBtu)
- High gas and high oil price
- High oil price case



Tariff Estimates

EIA gas price in Chicago, 2015-2035 (\$/MMBtu) (2005\$)	AGP Tariff ANS to Chicago 4.5 Bcf/d (\$/MMBtu) (2005\$)	ANS Wellhead price (\$/MMBtu) (2005\$)	AGP Tariff ANS to Fairbanks 4.5 Bcf/d (\$/MMBtu) (2005\$)	Spur Pipeline Tariff Fairbanks to South Central (\$/MMBtu) (2005\$)	
				350 MMcf/d 20-in. line	1.3 Bcf/d 30-in. line
\$5.00-\$6.00	\$2.30	\$2.70 - \$3.70	\$0.55	\$0.82	\$0.98
Delivered price			\$3.25 - \$4.25	\$4.00 - \$5.00	\$4.20 - \$5.20



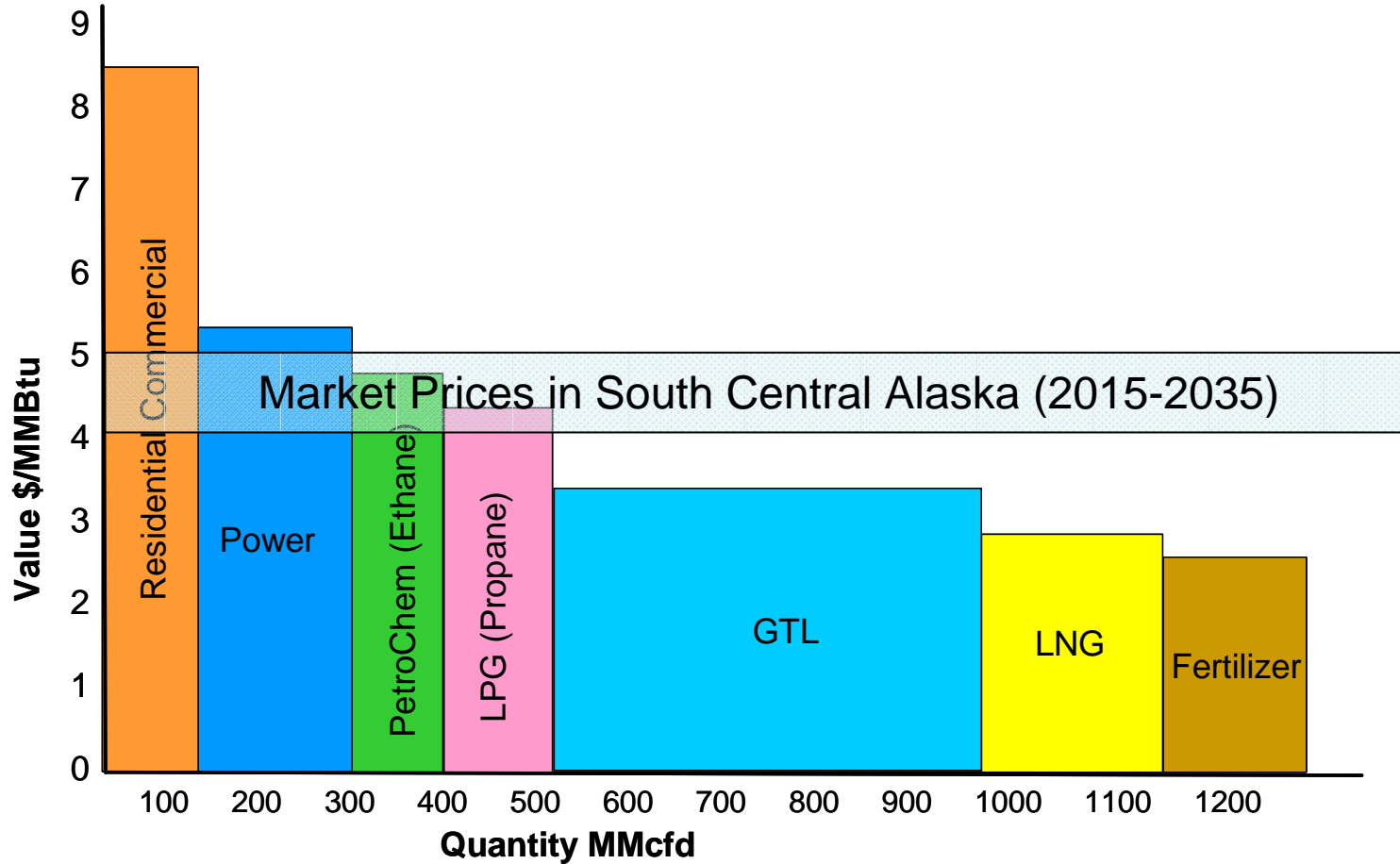
Potential Consumption and Prices by Sector

Potential Demand	Sector	Maximum Price \$/MMBtu* (2005\$)	Demand in 2025
Dry Gas Demand	Residential / Commercial	\$8.50	134 MMcf/d methane
	Power	\$5.20	131 MMcf/d methane
	Ammonia / Urea	\$2.79	145 MMcf/d methane
	LNG	\$3.20	212 MMcf/d methane
	GTL	\$3.20	480 MMcf/d methane
Total Potential Demand for Dry Gas			1,102 MMcf/d methane
Additional Wet Gas Demand	Petrochemicals	\$4.60	3 MMcf/d methane 75,000 bbl/d [118 MMcf/d] ethane
	LPG	\$4.20	63,000 bbl/d [96 MMcf/d] butane and propane, and 15,000 bbl/d [20 MMcf/d] pentane
Total Potential Demand w/Wet Gas			1,339 MMcf/d methane equivalent.

* Average price between 2015 and 2025



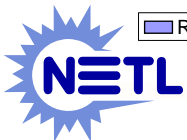
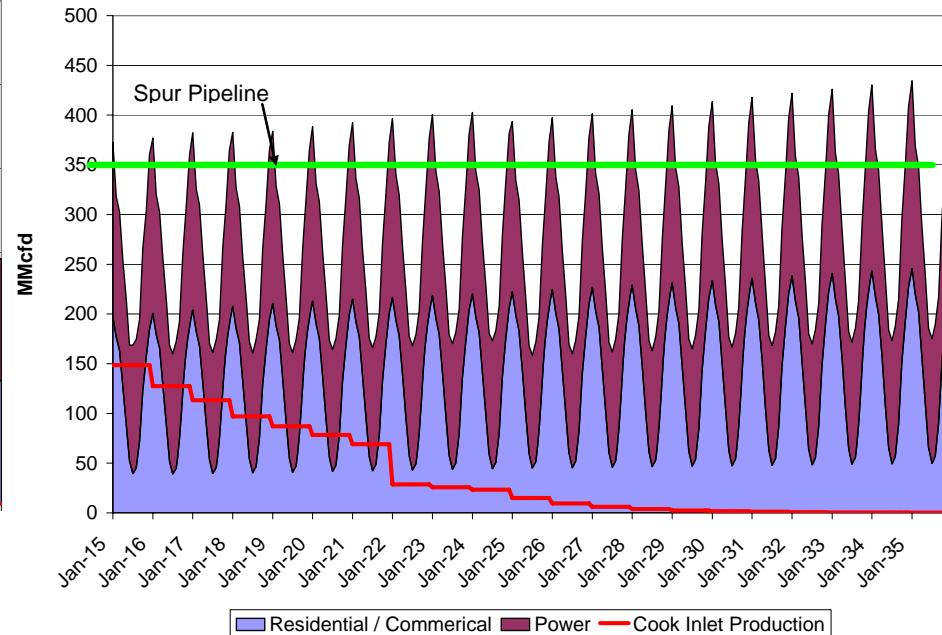
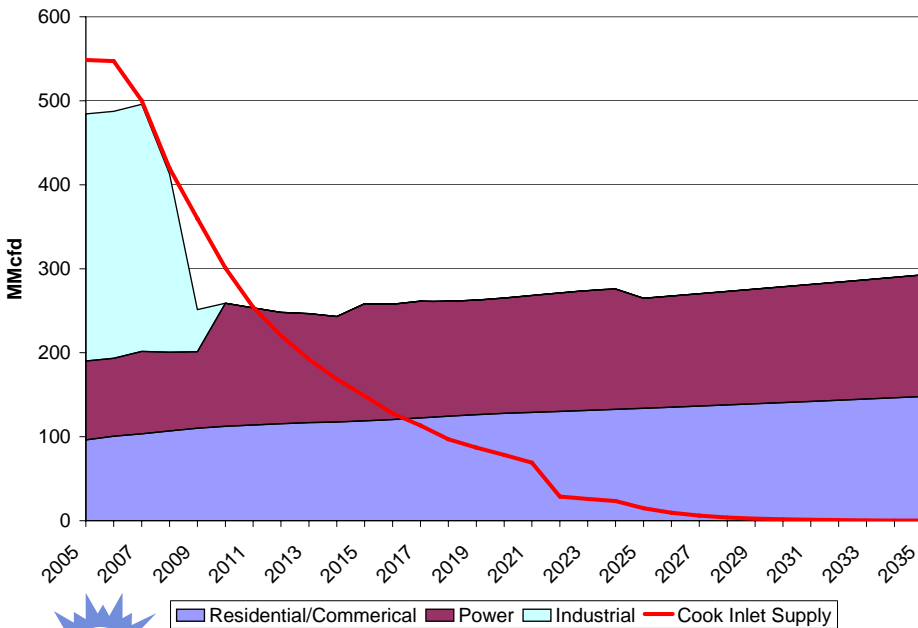
Base Price Scenario (2025 Snapshot)



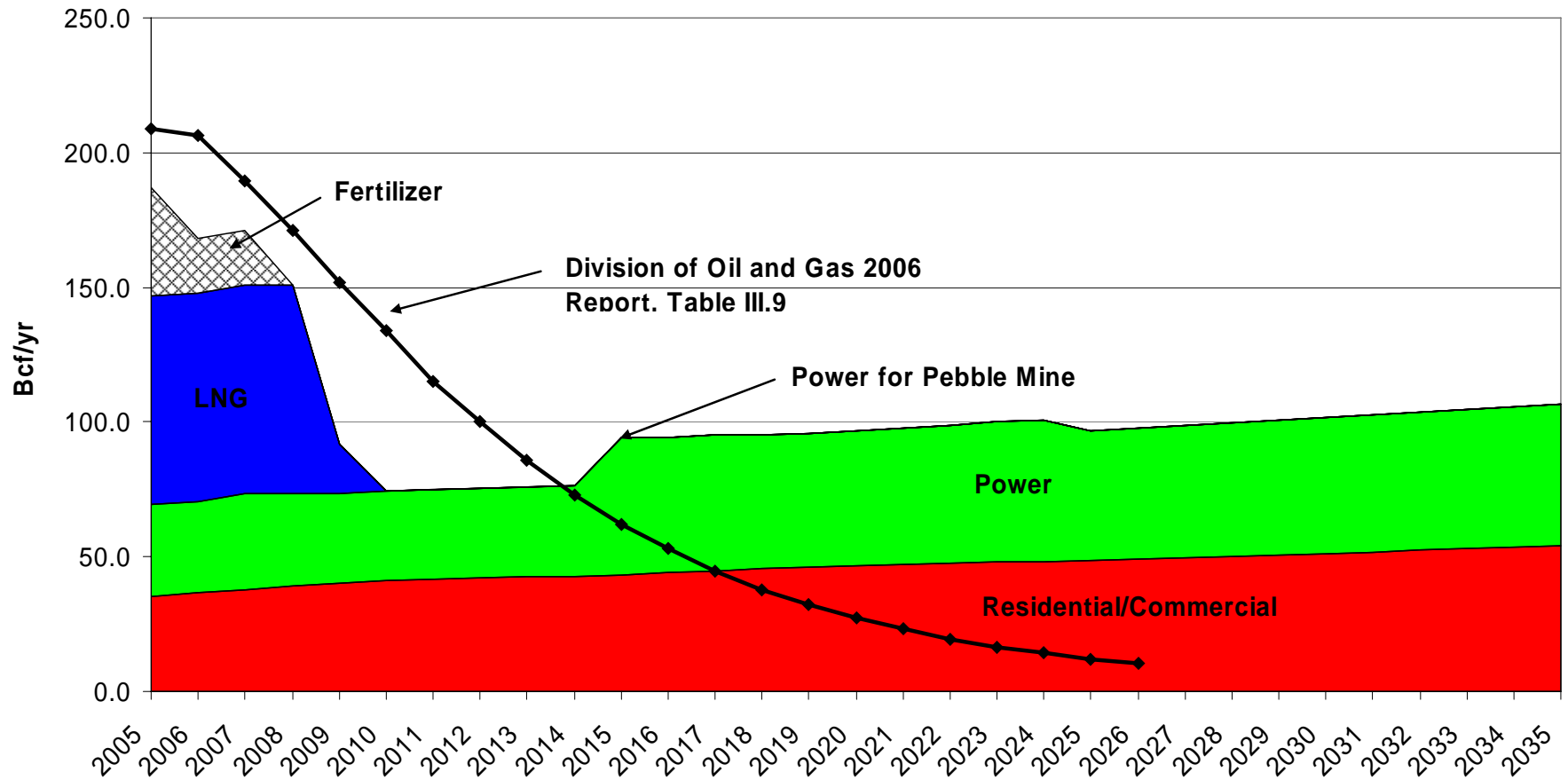
Study Conclusions

350 MMcf/d Dry Gas Pipeline – Least Speculative

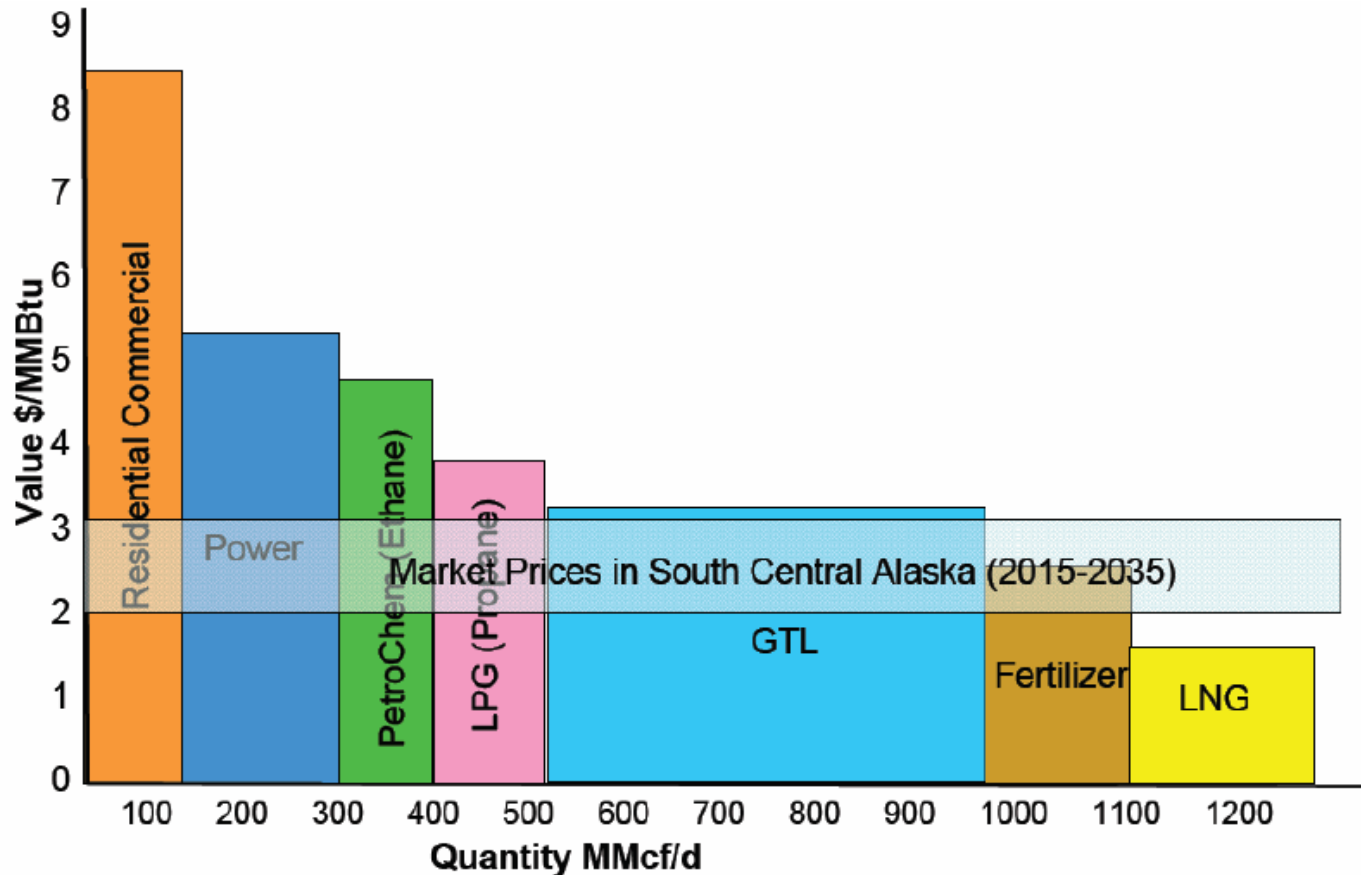
- Pipeline sized to run at high capacity all year.
- Satisfies gas demand from only residential/commercial, and power sectors
- Requires approximately 80 MMcfd of storage deliverability.



Supply (DOG 2006) & Demand (DOE– June 2006 Study)



Low Gas Price Case (Base-\$2.00/MMBtu)



Study Conclusions

#1. 350 MMcf/d Dry Gas Pipeline (residential/commercial & power) – Least Speculative

#2. 590 MMcf/d Dense Phase Gas Pipeline (Speculative)

- #1 dry gas
- Adds 75,000 bpd petrochemical industry, and
- 63,000 bpd Liquefied Petroleum Gas – LPG industry

#3. 1,000 MMcf/d Dry Gas Pipeline (More Speculative)

- Adds LNG at 212 MMcf/d
- Adds 480 MMcfd Gas-to-Liquids Industry (high uncertainty on price of product and capital costs (\$20,000/daily bbl))

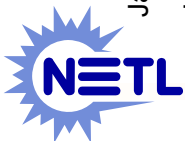
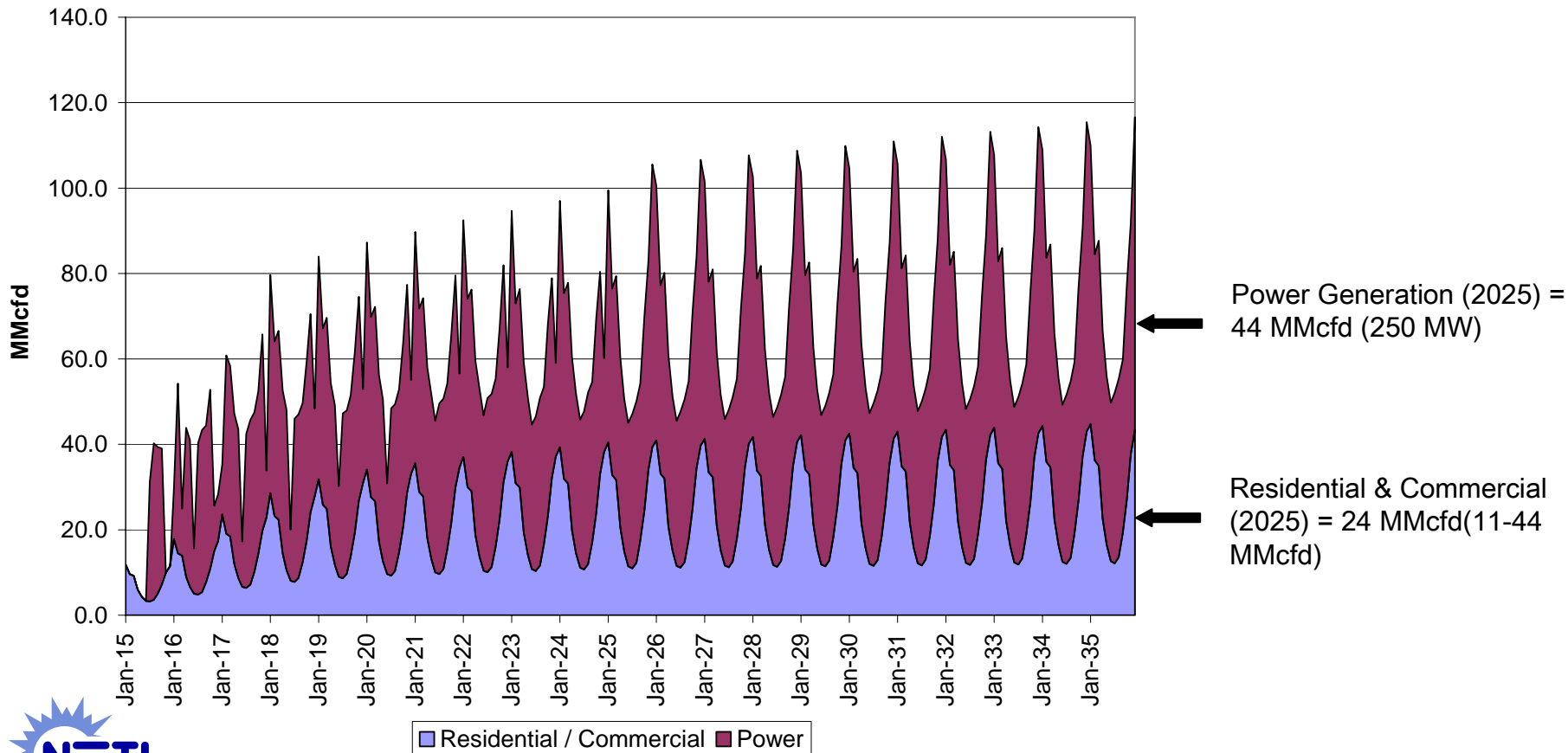
#4. 1,300 MMcf/d Dense Phase Gas Pipeline (Most speculative)

- #2 Dense phase line plus LNG and GTL



Central Alaska Gas Demand

Forecast Monthly Consumption – Residential, Commercial, and Power Generation



FUTURE ENERGY SUPPLY OPTIONS FOR SOUTH CENTRAL ALASKA

- **Cook Inlet conventional natural gas resources**
- **Unconventional gas; e.g., Coal bed natural gas (CBM)**
- **Import gas from outside South Central Alaska**
 - Spur gas pipeline to bring gas from North Slope (or other undeveloped basins)
 - Import LNG into Alaska
- **Other potential contributing factors**
 - Gas storage – offset season demand variations
 - Conservation and increased efficiency
 - Reduce industrial use (or convert to coal)
 - Power generation alternatives to offset NG use:
 - Coal, wind, geothermal, hydropower, biomass, etc.



Summary & Observations

- **Additional cost-benefit analysis comparing South Central Alaska options is needed:**
 - Increased/continued Cook Inlet oil and gas E&P
 - Spur pipeline
 - Coal gasification for industrial input and power
 - Coal power plants
 - Alternative power options
 - LNG imports
- **What is the optimum mix of supply options?**
 - Maintain Cook Inlet Oil and Gas industry
 - Maintain and expand industrial base (value added exports)
- **What if the lowest price gas in South Central is from LNG imports?**
 - Negative impact on economic growth?

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Announcements

GOM Hydrates JIP/DOE Drilling Data & Hydrate Tool & Protocol Development Workshop - This workshop will be held April 13th & 14th in Houston, Texas and is open to JIP members and others interested in the latest developments in the commercialization of naturally occurring gas hydrates. [Visit the workshop website for more information.](#)

New Natural Gas & Oil Funding Opportunities - There are four open solicitations targeting: Methane Hydrates; Advanced Detection and Imaging of Low Permeability Gas Formations; High Pressure and High Temperature Drilling; and Enhanced Oil and Gas Production through CO2 Injection. [NETL Solicitation Page](#)

Three New Transmission, Distribution & Storage Reports are now available. [Visit the Oil & Natural Gas Reference Shelf](#)

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