Alaska North Slope Natural Gas

The Alaskan Propane Project

- In-state Use
- Fleet Services
- Export

Presentation to Rural Energy Conference
September 29, 2011

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Propane – Alaska’s Alternative Energy Solution

* **Short term** and shovel ready – can be up and running with deliveries by this winter
* Propane as a “bridge fuel” until the gas pipeline is operational
* Lower costs of the facility can enhance economics – optimized feed stream (under discussion)
* ANDGA’s project can be a bridge to the gas pipeline
* Propane as the ‘long-term’ opportunity for rural Alaska
* **Propane as a value added export industry in the long-term**
* Fills the need as an alternative solution to those areas where the Gas Pipeline will *never reach*
Propane on the North Slope can come in various quantities, under several timeframes and offer alternative fuel solutions TODAY.

Currently 500 barrels of day of propane production goes underutilized (Prudhoe Bay refrigeration plant).

Opportunity exists to expand that quantity and deliver tangible results this winter.

Need Concurrence from the Producers and the Operator-BP!
Alaska Private Sector Consortium Members

* Pacific Propane Gas Association
* ANGDA
* AMERIGAS, Suburban, Crowley
* ROUSH Clean Tech
* Native Corporations
* Distributors, Marketers
* Stakeholders (Users)
Founded in 1961, the Pacific Propane Gas Association represents propane marketers and related businesses throughout Alaska, Hawaii, Oregon and Washington. PPGA maintains its core principles of education, safety and training to promote high standards of practice in the propane industry and to help its members compete in the energy marketplace.
Propane – Alaska’s Sustainable Alternative Fuel Solution for Rural Alaska
Applications for Propane

* Rural/Interior Alaska home heating, Cooking, etc
* Fleet Service applications- Propane Autogas
* Larger Scale Export Opportunity
Why Use Propane/LPG for Local Heating, Cooking and DG Fuel?

- Easily transportable
- Easily adapted into home heating, water heater applications
- High energy density, liquid form
- Easily stored in bottles, ISO containers
- Not a ground contaminant
- Self pressurizing gas, no pumps
- Clean burning
- Efficient
- Substantial supplies
- Readily available
Ford F-250

- 2 ROUSH Propane Auto Gas vehicles here in Alaska now
- One in Denali Park
- Other at BP for fleet operation potential on the North Slope
Why Propane Autogas?

* Reduces Environmental Impact
  * 60% reduction in carbon monoxide
  * 24% reduction in greenhouse gas emissions
  * 20% reduction in nitrogen oxide

* Reduces Operating Expenses
  * Propane is historically 30% - 40% less expensive per gallon than gasoline
  * Extends engine life & oil change intervals

* Reduces Dependence on Foreign Oil
  * 97% of domestic demand comes from North American production
Residential and Commercial Product Launches

Q2 2011
Q3 2011
Q4 2011
Q1 2012
Q2 2012
Q3 2012
Q4 2012
Q1 2013
Q2 2013
Q3 2013

2011
2012
2013
New Propane buses at Glacier (built to look old as historic replicas that were also fueled on propane years ago).
Renewable Hybrid Power Generator at U.S. Botanical Garden
Propane Genset at Denali National Park Hybrid Solar, Wind and Water Turbine System
Distributed Generation

- CHP Systems
  - Long life and low maintenance

- PERC Partners
  - Climate Energy: 1.2kW 1.8kW+ backup (Honda)
  - Marathon Engine Systems: 2.5kW, 5kW
  - Yanmar: 5, 10, 25, 35 and 300kW for propane
Medium Sized Full CHP System

- These systems provide electricity 24/7 plus water & space heating
- 10kW System available for larger locations mid-summer
- Start planning now
- 5kW large home system available late summer
- Sound small but we combine these systems with battery/inverter systems for 10x performance
- AC available also with conventional unit plus standard genset
Generac 6kw hd hybrid system genset

- High continuous power output
- Long life, low speed
- Very quiet
- 500 hour maintenance
- Affordable (~$3,800)
Very Large Systems Available Also

- This is a Marriott hotel in HI
- Has two 420 kW Cat gensets
- Can do this now for any size location
- Provide electricity, heat and AC also
- Prime power plus redundant back-up
- High efficiency
- Low CO2, tax incentives
- Site uses 800,000 gallons of propane per year (over 2,000 gals/day)
Blue Bird Propane Vision
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Kauai Marriott Propane CHP Site
Blue Bird Propane Vision
Propane originating at drill rigs, gas plants, and refineries is distributed throughout the United States and elsewhere in the world via:

- Pipelines
- Cargo Ships
- Rail Cars
- Intermodal (ISO) Containers
- Transport Trucks (Class A)
- Bobtails (Class B)
Propane Sourcing to Alaska

- Propane from Edmonton, Canada is brought via rail down to **Prince Rupert where it is loaded on the aqua train and brought to an Alaskan Port (usually Whittier)** where it is offloaded and transported by Alaska Railroad to different parts of the state serviced by the railroad.

- **Propane is also purchased at refineries near the coastal parts of Washington State** and are brought up on cargo ships.

- The third source is the only in-state source and that is the **Teso Kenai Refinery in Nikiski.**
Some ships are designed for the sole purpose of carrying large quantities of propane while other cargo ships carry propane in addition to other cargo.
Intermodal (ISO) Containers

These containers are approved to be carried on cargo ships with other containers of freight and can have a capacity of as much as 13k gallons.
According to Purvin & Gertz Inc. there are almost 16 million propane railcars in the United States.

Railcar capacity is roughly 30k gallons
The Bullet Line Route follows the Highway Route South to Fairbanks, then the Fairbanks Spur Route into Anchorage.

Proposed Gas Pipeline Routes

TransCanada and Denali Projects both follow the Highway Route from the North Slope to Alberta.

Propane fills the gap until a pipeline is built and after a pipeline is built.
**Gas Pipeline considerations for NGLs**

* The “gas conditioning” facility to reduce CO₂ to meet pipeline specifications is very expensive (40- to 50-% of the total project cost) and sets the critical path timeline

* Mainline proposals have very low tariffs because of economies of scale and sponsors offering incentives to anchor shippers (approximately 30% discount)

* **NS gas is rich in NGL’s and offer a major In-State opportunity for manufacturing**
  
  - C₂ Ethane  7.2%  200,000 bpd
  - C₃ Propane  3.7%  100,000 bpd
  - C₄ Butane  0.7%  25,000 bpd

* Gas value-added manufacturing plants cost several $B and the investment decision would have to be made simultaneous to a any gas supply pipeline sanction decision
Specific advantages include:
- Favorable logistics costs versus Alberta production for Asian markets
- Favorable logistics costs versus Asian production for US West Coast markets
- Competitive logistics costs versus USGC for US West Coast markets

Cook Inlet has advantaged logistics to the US West Coast and Asia due to its location in the middle of the great circle route, with the potential for additional backhaul freight rate reductions to Asia.

>3,000 vessel passages/ year
Projected Growth of Propane Demand

Based on Northern Economics Report to APP and Denali

Barrels per Day (Mid-point)

- Year 1 to 5
- Year 10 to 15
**The Alaska Propane Project**

- Can deliver Propane to rural communities this winter
- Prepares villages for the transition to propane vs Diesel/Ultra Low Sulfur Diesel
- Propane can be utilized today for fleet services application on the North Slope and Statewide
- The challenge of bringing Alaska’s resources to market is huge….Current dynamics may be favorable

**Alaska is uniquely positioned to Asian markets** for export opportunities
- There are vast natural resources that need to further explored and developed – these resources need to be brought to market