



# Alaska Climate Change Strategy

Photo: J. Haderick

## Oil and Gas Technical Work Group Brief Description of Mitigation Options

### Suggested Revisions to Catalog Descriptions as of July 14, 2008, for Input to July 15, 2008 MAG meeting

*Some TWG members provided suggested revisions to this document after it had been posted to the MAG website on July 10, 2008. This document contains those suggestions marked in italics. The TWG has not discussed these revisions.*

*(Note: This listing will be fleshed out during the Technical Work Group process. Technical Work Group members are encouraged to provide input to the Technical Work Group facilitators on existing policies and programs, where relevant. Recently enacted policies and programs in Alaska will be listed where relevant in the policy options catalog notes. Additional details will be added to this document under each of the option descriptions, as they are developed.)*

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## OG-1 Overarching Policies

### 1.1 *Ensure the Growth of Alaska's Jobs and Economy*

*The policies and programs that are the result of Alaska's Climate Change analysis must ensure the growth of the Alaska economy. Policies and programs should encourage new capital investment in Alaska and new industries. Encouraging energy efficiency and new technologies will attract quality jobs that can support our families for years to come. We must frame the State's GCC carefully to not increase the cost of living, or create a regulatory environment that delays capital investments or creates disincentive for investment altogether.*

### 1.2 *Avoid Redundancy and Conflicting Federal GHG Program with other programs*

*The EPA will propose new GHG regulations in 2009 with the final rule promulgated in 2010. New federal regulation rulemaking will result in lower GHG through PSD or other permitting regulations.*

*Alaska should support and prepare for the federal GHG program. Redundant programs will result in conflicting requirements, higher costs, and ambiguity. Alaska should not create duplicative or conflicting requirements.*

### 1.3 **Incentives to Reduce GHG Intensity of Fossil Fuel Production**

Advanced fossil technologies produce fewer CO<sub>2</sub> emissions per unit output as the result of more efficient generating technologies and in this case refer to technologies that are not fully commercial. Incentives may be in the form of direct subsidies, tax credits, or assistance in securing financing and/or off-take agreements. *Permit streamlining will be a necessary strategy or incentive to the oil and gas industry.*

### 1.4 **Reduce Energy Demand for Fossil Fuels in Residential, Commercial, Industrial (non-oil and gas), Electric, and Transportation Sectors**

Incentives or requirements for consumers of fossil fuels to reduce their energy demand would help to reduce emissions from combustion of fossil fuels and reduce the energy consumption and emissions from fossil fuel producers. This option will likely also be considered in Energy Supply/Energy Demand TWG and in the Transportation and Land-Use TWG. Oil and Gas TWG want to ensure this option is considered and share any information with other TWGs

### 1.5 **Gap Analysis of Research and Development (R&D) Opportunities, Including R&D for Low-GHG Fossil Fuel Technologies**

R&D funding can be targeted toward a particular technology or group of technologies as part of a state program with a mission to build an industry around that technology in the state and/or to set the stage for adoption of the technology for use in the state. For example, an agency can be established with a mission to help develop and deploy specific energy production technologies. R&D funding can also be made available to any renewable or other advanced technology [*Some TWG members suggest deleting the following: through an open bidding procedure (i.e., driven by bids received rather than by a focused strategy to develop a particular technology).*] Funding can also be given for demonstration projects to help commercialize technologies that have already been developed but are not yet in widespread use. Funding could be provided to increase collaboration between existing institutions for R&D on technologies. *Through collaboration with USDOE, Alaska Energy Authority, Alaska businesses and others, R&D funding could be*

*conducted or facilitated based on a careful gap analysis on unique Alaska issues with a scope and scale that is reasonable achievable.*

### **1.6 Evaluate Market-Based Mechanisms for GHG Emissions (GHG Cap-and-Trade or Tax/Emissions Fee, and Federal Regulations )**

*There are three principal ways to place a value on carbon: a carbon tax, a cap and trade system, and federal regulations. All require an economic analysis and evaluation of consequences.*

*Establishing a price on greenhouse gas emissions is one methodology of reducing greenhouse gas emissions. A GHG tax (also referred to as emissions fee), or specifically a tax on CO<sub>2</sub>, would be a tax on each ton of CO<sub>2</sub> (equivalents) emitted from an emissions source covered by the tax. A CO<sub>2</sub> tax could be imposed upstream based on carbon content of fuels (e.g., fossil fuel suppliers) or at the point of combustion and emission (e.g., typically large point sources such as Title V facilities). Taxed entities would pass some or all of the cost on to consumers, change production to lower emissions, or a combination of the two. *If for competitive reasons businesses cannot pass on their costs, Alaska risks losing business to entities with more favorable conditions. The costs of goods and services in Alaska would be increased. Emission fees programs similar to the one already in place could be used to fund technology development, feasibility studies, pilot programs, etc.**

*A cap and trade system utilizes a more indirect approach to placing a value on carbon. It is a market mechanism in which GHG emissions are limited or capped at a specified level, and those participating in the system can trade allowances (an allowance is a permit to emit one ton of CO<sub>2</sub>). [Some TWG members suggest deleting the following: By allowing trading, participants with lower costs of compliance can choose to over-comply and sell their additional reductions to participants for whom compliance costs are higher. In this fashion, overall costs of compliance are lower than they would be without trading.] Numerous and credible economic studies consistently show cap and trade programs have high impact to economic costs including higher energy prices, increased unemployment and higher costs for households.*

*For every ton of CO<sub>2</sub> released, an emitter must hold an allowance. The total number of allowances issued or allocated is the cap. The government can assign a certain amount of allowances to emission sources, hold back allowances for distribution to developing sources (e.g., new entrants), auction some or all of them or provide a combination of these options. Participants can range from a small group within a single sector to the entire economy. The compliance obligation can be imposed “upstream” (at the fuel extraction or import level) or “downstream” at points of fuel consumption.*

*Among the important considerations with respect to a cap-and-trade program are: the sources and sectors to which it would apply; the level and timing of the cap; how the level of the cap may change over time, if at all (e.g., through a specifically declining cap); how allowances would be distributed; how new market entrants are accommodated, how “leakage”<sup>1</sup> is addressed, etc. Consideration must be given on who would be allowed to participate in a statewide cap and trade program including entities outside the cap. Framing a cap and trade program must include provisions to curb gaming, profiteering, or all unintended consequences.*

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<sup>1</sup> Emissions “leakage” can occur, for instance, if production is shifted to higher-emitting sources not included within the cap.

*Alaska must consider the high administrative burden of a comprehensive and complex cap and trade program. To achieve the reductions in GHG emissions will require tremendous investment in capital projects. Capital projects investing in Alaska would be delayed due to the complexity of implementing a cap and trade system with the existing regulatory permitting requirements.*

*Currently, there are a number of barriers in Alaska that are hindering investment and development as a result of significant and costly permitting delays. The barriers include the State's ability to attract and retain a qualified workforce; anticipated workload as a result of increased demand for domestic energy resources; increased workload as a result of implementation of anticipated cap and trade federal regulation; and a significant reduction in workforce as a result of aging population.*

*An economy-wide cap and trade is largely untested. The European Union (EU) system includes only nuclear energy, while the Northeast States' Regional Greenhouse Gas Initiative (RGGI), is limited to power plants. The Western Climate Initiative (WCI) is still in the design phase.*

[Some TWG members suggest deleting the following: The Western Climate Initiative, (WCI) is an effort by 7 states (Washington, California, Oregon, Arizona, New Mexico, Utah, and Montana) and three Canadian provinces (British Columbia, Manitoba, and Quebec), that aims to design "a regional market-based multi-sector mechanism, such as a load-based cap and trade program, to achieve the regional GHG reduction goal." The Western Climate Initiative is designed to be economy-wide (not just electricity sector). Final design of the WCI is due in August 2008, with current recommendations included on the website, <http://www.westernclimateinitiative.org/>. Alaska is an observer of the WCI.]

There is one regional GHG cap-and-trade system in the US in the process of being implemented in the United States, and another under likely development. The cap-and-trade system designed by the Northeast States' Regional Greenhouse Gas Initiative (RGGI), an effort by the states of Connecticut, Delaware, Maine, Maryland, New Hampshire, New Jersey, New York, Rhode Island, and Vermont, will begin operation in 2009 and is limited to power plant emissions.<sup>2</sup>

Further emissions reductions are achieved by decreasing the number of allowances over time *possibly resulting in a negative impact to Alaska's economic growth*. Other questions include what if any offsets would be allowed; over what region the program would be implemented (e.g., nationally, regionally, etc.); and whether compliance with the cap could be achieved given "leakage" from non-participating states and facilities located on tribal lands not subject to the cap. Thus, the effectiveness of a cap-and-trade system is correlated with the extent and scope of its coverage. Further issues to consider include which GHGs are covered; whether there is linkage to other trading programs; banking and borrowing of allowances; credit for early reductions; what, if any, incentive opportunities may be included; use of revenue accrued from permit auctions, if any; and provisions for encouraging energy efficiency.

*Another method for limiting GHG emissions is through federal regulations. Under the Clean Air Act the EPA has limited the emissions of criteria pollutants through the New Source Review Program. Hazardous Air Pollutants are controlled under the National Emission Standards for Hazardous Air Pollutants. The EPA has mandated New Source Performance Standards for categories of emission sources that also effectively control and limit emissions. The upcoming GHG regulations will also control and reduce GHG emissions.*

<sup>2</sup> <http://www.rggi.org/>

**OG-2 Prepare for Federal Requirements for GHG****2.1 Support Federal GHG Program**

*Alaska should support and prepare for the federal GHG program. The EPA will be proposing GHG regulations in 2009 and will finalize the rule in early 2010. An assessment of needs for permitting including timelines and agency staffing is critical. Timely staffing of agency personnel prior to rule implementation is a must. To avoid delays for GHG reduction projects the assessment and resulting recommendations should be completed prior to federal rule promulgation.*

**2.2 Support for Regional Tradeoffs Amongst GHG Emissions and Currently Regulated Pollutants**

*Several air pollutants are currently regulated in the state. There is a possibility that efforts to decrease GHG emissions may increase other pollutants. Balancing and integrating current regulations and permitting requirements are needed. An analysis will be needed to streamline permitting that includes incentives for reducing GHG emissions.*

**OG-3 Carbon Capture and Storage or Reuse in Operations: Incentives, Support or Regulation****3.1 Evaluate Incentives, Economics and Feasibility of CO<sub>2</sub> capture in O&G operations**

Capturing carbon dioxide goes hand-in-hand with sequestration; however, the policies to incentivize or require capture would be different from the policies to incentivize sequestration. Carbon capture policies would account for both removing CO<sub>2</sub> from fuel gas combustion and removing CO<sub>2</sub> from gas prior to injecting it into the pipeline. Carbon capture has not been demonstrated in Alaska and would require a pilot program and feasibility program before consideration.

**3.2 Evaluate Incentives, Economics and Feasibility of CO<sub>2</sub> storage or reuse**

Captured carbon dioxide can be either (1) sequestered permanently in a geologically sound reservoir or (2) reused to aid in oil and gas extraction (see option 3.3). Carbon sequestration has yet to be proven as a large-scale solution to GHG emissions. *Furthermore, carbon capture has not been demonstrated in AK and would require a pilot program and feasibility program before consideration.*

CO<sub>2</sub> storage will need to consider requirements and feasibilities (it is not a given that sequestration is physically nor economically feasible), such as

- Biologic Sequestration
- Geologic Sequestration ERG and EOR; Depleted Fields; Saline reservoir;
- Liability issues, both Short and Long term; O&G resource destruction; Pore-space ownership; 99% containment / wellhead leakage; migration into Aquifer, Etc.
- Transportation issues
- Current capture technologies
- Surface facility requirements, Stainless steel pipe, compression facilities, etc.
- wellbore requirements
- Injection rate requirements

Policies to encourage carbon storage or reuse could include [*Some TWG members suggest deleting the following:* a state agency or department within an existing agency tasked with promoting carbon storage or reuse, evaluation studies to identify geologically sound reservoirs,] R&D funding to improve carbon storage or reuse technologies, financial incentives to store or reuse carbon, and/or mandates – coupled with technical feasibility and cost and investment recovery mechanisms, if appropriate – to store or reuse carbon.

### **3.3 Evaluate Economics and Feasibility CO<sub>2</sub> use for Enhance Oil Recovery (EOR) or Other Reuse in O&G Operations**

Captured carbon dioxide can be compressed and injected into an oil reservoir to increase the pressure of the reservoir and produce more oil.

Policies to encourage EOR could include [*Some TWG members suggest deleting the following:* a state agency or department within an existing agency tasked with promoting EOR, evaluation studies to identify candidate reservoirs,] R&D funding to improve EOR technologies, *pilot studies*, financial incentives to capture CO<sub>2</sub> for EOR – coupled with technical feasibility and cost and investment recovery mechanisms, if appropriate. A policy would also consider financing and cost recovery mechanisms for the pipeline network.

### **3.4 Evaluate Economics and Feasibility CO<sub>2</sub> capture and storage or reuse (CCSR) in refineries**

There are a number of ways in which CO<sub>2</sub> emissions can be reduced in the production of liquid fuels at oil refineries. This option considers the application of carbon capture and storage in refineries. Policy choices are the same as option 3.2.

### **3.5 Support EPA Development of UIC rules for CO<sub>2</sub> injection**

*EPA is currently working on UIC rules that utilize CO<sub>2</sub> injection. We should support and consider implementing these UIC rules the EPA is developing and coordinate with the AOGCC.*

*Alaska's Enhanced Oil Recovery (EOR) well program is administered by the AOGCC. EOR wells are classified as Class II wells. Class II wells are not Geo-sequestration wells which are Class VI. Under the proposed UIC Class VI EPA program EOR wells would continue to operate under the delegated program (AOGCC) until such time that the Class II program no longer approves the operation for enhanced oil recovery. During that time, the operator will not get credit for geo-sequestration, as long as the well is an "EOR" well.*

*Once the well is no longer a Class II EOR well, then the well could be a candidate for becoming a Class VI well managed by the EPA program.*

*It's an "either one or the other" deal. As written now, Carbon credits will apply to Class VI and not Class II EOR. Alaska needs to lobby EPA to get both the benefits of EOR and also receive GHG carbon credits while the well is a Class II EOR well.*

[*Some TWG members suggested deleting the following:* The following information was provided to the Oil and Gas TWG from EPA, regarding *Upcoming Underground Injection Control (UIC) regulations to Address Class II Wells*

FYI, the state of Alaska has participated through the IOGCC on this process for about 3 years, and IOGCC representatives from (4) states have participated in this rule development with EPA

The geosequestration well type "Class VI" is proposed to be delegated to states that have the UIC programs (like Or/Wa/ Id). State of Alaska only has Class II wells (oil and gas related programs) and AK does not have the other wells Class I, 3,4,5,6. the EPA Direct Implementation program manages all wells except Class II in AK.

The rules are proposed such that Class II programs, such as AK's AOGCC are not impacted with the requirement to manage Geosequestration wells.

As proposed, those wells that utilize CO2 injection for enhanced oil recovery are not Geosequestration wells (Class VI) and would continue to operate under the delegated program (AOGCC Class II Enhanced oil recovery) until such time that the Class II program no longer approves the operation for enhanced oil recovery. During that time, the operator will not get credit for geosequestration, as long as it is "EOR" wells. Once the well is no longer a Class II EOR well, then the well could be a candidate for becoming a GS Class VI well managed by the EPA DI program.

It's an "either one or the other" deal.

There may be some discussion in the future as to whether or not the operator gets "carbon credits" ..... As written now, Carbon credits will apply to Class VI.... and not Class II EOR.

Some states may want to lobby for operators to get both the benefits of EOR and also receive carbon credits while the well is a Class II EOR well.]

## OG-4 Fuel Production and Processing

### 4.1 Oil and Gas Production: Incentives, Support, or Requirements for Improving Energy Efficiency

*Process improvements at existing facilities should be studied to determine the level of opportunity that may be available.*

There are a number of ways in which energy consumption and CO<sub>2</sub> emissions in the oil and gas industry can be reduced, through existing technologies including (1) new efficient compressors, (2) optimize gas flow to improve compressor efficiency, (3) improve performance of compressor cylinder ends, (4) capture compressor waste heat, (5) replace compressor driver engines, and (6) waste heat recovery boilers. Geothermal sources may also help avoid fossil energy consumption at operations.

*Projects that reduce fuel consumption by right sizing large capacity sources that are now oversized could be evaluated. Aggregating power generation to a single location is another possibility. Combined heat and power (cogeneration) has little opportunity at Alaska oil fields. Waste heat is typically used for heating rooms and not power generation.*

Policies for such technologies can include [regulations or] incentives to promote advanced technologies for new or existing processing plants or refineries. [Some TWG members suggest deleting the following: A technology regulation might require that new processing plants or refineries achieve a certain CO<sub>2</sub> emission rate per unit of output. Technical assistance to

companies looking to evaluate best options could also be provided through a state policy.] Incentives may be in the form of direct subsidies, tax credits, or assistance in securing financing and/or off-take agreements. *Bringing these process improvements to fruition will require government cooperation including removing barriers, and timely permitting issuance.*

#### **4.2 Oil and Gas Production: Incentives, Support, or Requirements for Reducing Fugitive Emissions**

*Process improvements at existing facilities should be studied to determine the level of opportunity that may be available.*

*According to the EPA Advanced Notice of Proposed Rulemaking for GHG, methane accounts for approximately 8% of total GHG emissions. There are a number of ways in which fugitive emissions can be reduced in the oil and gas production. Fugitive emissions consists primarily of methane, a potent greenhouse gas; therefore, any reducing fugitive emissions during production and processing leads to direct GHG emissions savings (see section 5 below for options on reducing fugitive emissions during transmission and distribution). In addition to reducing GHG emissions, stopping these fugitive emissions may be economically beneficial because it may reduce operating costs if the emissions can be returned to the fuel gas system. The current lack of major sales from the North Slope confounds the potential benefit of methane reduction.*

Policies for such technologies can include [regulations or] incentives to promote advanced technologies for new or existing processing plants or refineries. [A technology regulation might require that new processing plants achieve a certain CO<sub>2</sub> emission rate per unit of output.] Incentives may be in the form of direct subsidies, tax credits, or assistance in securing financing and/or off-take agreements. [Technical assistance to companies looking to evaluate best options could also be provided through a state policy.] *Bringing these process improvements to fruition will require government cooperation including removing barriers and timely permitting issuance.*

#### **4.3 Improve Energy Efficiency/cogeneration in refineries**

Improving energy efficiency at refineries has the potential to lower GHG emissions, reduce energy and save money. Combined heat and power (cogeneration) is a key opportunity to capture and re-use waste heat, which leads to overall improvements in energy efficiency. Policies include technical assistances, financial incentives for technology changes, and identification plus removal of any barriers to selling excess heat or electricity to nearby buildings or industries.

#### **4.4 Reduce Fugitive Emissions at Refineries**

*According to the EPA Advanced Notice of Proposed Rule Making (ANPR) methane accounts for approximately 8% of total GHG emissions. Effective regulations or incentives could help reduce fugitive emissions of greenhouse gases at refineries. Policies could incentivize various technologies either in use or in development worldwide and account for the co-benefits of reducing GHG fugitives, such as air quality improvements and resource efficiency benefits.*

#### **4.5 Evaluate Economics and Feasibility of Low-GHG fuels in refineries**

*Where practical offer incentives to encourage the use of less carbon intense fuels for refinery processes. [Some TWG members suggest deleting the following: Refineries that currently consume coal or oil as fuel inputs can reduce emissions by transitioning to consumption of natural gas, geothermal or other fuels with lower GHG emissions. Policies include financial*

incentives or disincentives on particular fuels, technical assistances, or financial incentives for technology changes.]

#### **4.6 Renewable Energy Technologies for Oil and Gas Production**

Many oil and gas production facilities may be excellent candidates for the deployment of renewable energy technologies. Resources may be suitable for wind, solar PV, geothermal, tidal and small, low-impact hydro to meet electricity demand. [*Some TWG members suggest deleting the following:* Similarly, solar thermal, geothermal and ground source may be appropriate technologies to meet heating demand.]

#### **4.7 Energy Production, Distribution, and Sharing Agreements for Upstream Facilities**

Agreements between companies to share upstream facilities may be an effective way to reduce the GHG emissions associated with these activities. Whether the policy includes regulations or incentives, careful design and consideration of financial arrangements are critical.

#### **4.8 Evaluate Feasibility and Economics of Reduce flaring**

*Oil and Gas facilities flare on a limited basis. AOGCC has the authority to implement regulations that ensure gas is not wasted. Monthly reports are generated and reviewed by the AOGCC. Flaring in oil and gas facilities is for safety and is not routine. Limited opportunity exists to reduce flaring beyond current levels.*

[*Some TWG members suggest deleting the following:* Gas facilities that flare could be required to only flare on a very limited basis. For example, clean-up operations may be subject to a maximum duration of flaring; subject wells could be tested “in-line” (i.e. where gas flows directly into the pipeline); and flaring during completion operations could be prohibited.]

Where new technologies are required, incentives and technical support could offset the cost of adopting new technologies.]

#### **4.9 [*Some TWG members suggest deleting this option* Low-GHG Hydrogen production incentives and support**

Hydrogen is not an energy source, but rather an energy carrier (like electricity). It must be produced from other energy resources, such as fossil fuels (coal, oil, gas), renewable electricity (wind, solar), renewable fuels (biofuels, LFG), or nuclear power. The net greenhouse gas implications of producing hydrogen depend on the energy resource from which it is produced.

Hydrogen can be produced from renewable fuels or nuclear energy with low greenhouse gas emissions. In order to produce hydrogen from fossil fuels with low greenhouse gas emissions, it would be necessary to do it in conjunction with CCS. Policies in support of this option would provide incentives to projects that help develop or deploy low-GHG hydrogen production.]

## **OG-5 Fuel Delivery**

### **5.1 Natural Gas Transmission and Distribution: Incentives, Support or Regulations to Reduce Fugitive Emissions**

*Creating incentives, energy efficiency, economic opportunity and environmental impact are needed. Permit streamlining is a necessary strategy to incentivize.*

There are a number of ways in which fugitive emissions during natural gas transmission can be reduced. Fugitive emissions consists primarily of methane, therefore, any reduction of fugitive emissions during production, processing, and transportation leads to direct GHG emissions savings.

*[Some TWG members suggest deleting the following: In addition to reducing GHG emissions, stopping these fugitive emissions may be economically beneficial because it can prevent the waste of valuable product (natural gas).]*

The EPA Natural Gas STAR program offers numerous methods of preventing fugitive emissions, including preventive maintenance: (improving the overall efficiency of the gas production and distribution system), reducing flashing losses (releases when pressure drops at storage tanks, wells, compressor stations, or gas plants), and changing and replacing parts and devices to reduce losses, among others.]

## **5.2 Natural Gas Transmission: Incentives, Support or Regulations to Improve Efficiency**

Key types of technologies to improve energy efficiency include: (1) compressor efficiency improvements, (2) waste heat recovery for compressors and boilers, and (3) replacement of gas-driven compressors with electrical generators.

### **5.3 Improve Energy Efficiency at oil transmission and distribution**

The option will consider technologies and practices that could be implemented at oil pipelines throughout Alaska to improve energy efficiency of operations. Policies to improve efficiency would consider compressors and other energy usage patterns of transmission and distribution system. *Due to recent implementation of a strategic reconfiguration program for TAPS these opportunities may be limited.*

### **5.4 Reduce Fugitive Emissions from oil transmission and distribution**

The option will consider technologies and practices that could be implemented at oil pipelines throughout Alaska to reduce fugitive emissions of operations.

*Reducing fugitive emissions from oil pipelines will not result in lower GHG emissions. VOC are not a GHG emission. Methane is recognized as a GHG emission, but is not likely to be emitted in significant quantities from a liquid pipeline. (Note: Alyeska Pipeline representation is needed on the O&G TWG.)*

### **5.5 Improve Energy Efficiency in Distribution System**

There may be significant opportunities for reducing GHG emissions from improving the energy efficiency of the gas distribution systems in Alaska. Working with local distribution companies, the State could consider financial benefits or other incentives for improving efficiency.

*Improving energy efficiency could include right sizing of fuel burning sources for current production forecasts. Financial benefits of improving efficiency would be considered. Evaluation is needed to study opportunities to reduce GHG emissions.*