Oil and Gas Technical Work Group
Brief Description of Mitigation Options

(Note: This listing is incomplete and 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.)

OG-1 Overarching Policies

1.1 Research and Development (R&D), 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 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.

1.2 Incentives to Reduce GHG Intensity of Fossil Fuel Production

Advanced fossil technologies produce fewer CO_2 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.

1.3 Market-Based Mechanisms to Establish a Price Signal for GHG Emissions (GHG Cap-and-Trade or Tax/Emissions Fee)

Establishing a price on greenhouse gas emissions (or carbon dioxide specifically) is considered essential in order to reduce greenhouse gas emissions. Presently the cost of emitting carbon dioxide into the atmosphere is free. With a cost attached to carbon emissions, emitters would have a strong incentive to modify their practices and economic inefficiencies inherent in the present system would be addressed, leading to a reduction in GHG emissions.

There are two principal ways to place a value on carbon: a carbon tax or a cap and trade system.

A GHG tax (also referred to as emissions fee), or specifically a tax on CO_2, would be a tax on each ton of CO_2 (equivalents) emitted from an emissions source covered by the tax. A CO_2 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 power plants or refineries). Taxed entities would pass some or all of the cost on to consumers, change production to lower emissions, or a combination of the two. As the suppliers respond to the tax, consumers would see the implicit cost of CO_2 emissions in products and services, and would adjust their behavior to purchase substitute goods and services that result in lower CO_2 emissions. CO_2 tax revenue could be used in a variety of ways such as payroll or income tax reductions or policies and programs to assist in decreasing CO_2 emissions. CO_2 tax revenue could also be directed to helping the competitiveness of industries or assisting communities most affected by the tax.

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_2). 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 otherwise be.

For every ton of CO_2 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”[1] is addressed, etc. Further emissions reductions are achieved by decreasing the number of allowances over time. 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.

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.

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

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.[2]

1.4 Expand Protocol for Required GHG Reporting (new)

TWG members noted that the federal government, through EPA, will provide rule-making on reporting GHG emissions and did not want TWG to duplicate work. The federal system may have some gaps in required GHG reporting – for example, only apply to facilities over a certain size. If gaps in federal reporting are significant, there may be opportunity for recommendations for GHG reporting for Alaska. This option consists of monitoring and reviewing federal rules for protocols and suggesting expansion if needed.

1.5 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

OG-2 Carbon Capture and Storage or Reuse in Operations: Incentives, Support or Regulation

2.1 CO_2 capture in O&G operations (separated from 2.2)

Capturing carbon dioxide goes hand-in-hand with sequestration; however, the policies in incentivize or require capture would be different from the policies to incentivize sequestration. Carbon capture policies would account for both removing CO2 from fuel gas combustion and removing CO_2 from gas prior to injecting it into the pipeline. The process of carbon capture is well established in the chemical industry and forms the basis for Integrated Gasification Combined Cycle electricity generating plants.

2.2 CO_2 storage or reuse in O&G operations (separated from 2.1)

Captured carbon dioxide can be either (1) sequestered permanently in a geologically sound reservoir or (2) reuse to aid in oil and gas extraction or as a feedstock for industrial processes, and perhaps eventually as a feedstock that when combined with water can be reformed into liquid fuels. Carbon sequestration has yet to be proven as a large-scale solution to GHG emissions.

CO2 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

[2] http://www.rggi.org/

-- 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 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.

2.3 CO_2 capture and storage or reuse (CCSR) in refineries

There are a number of ways in which CH_4 and CO_2 emissions can be reduced in the production of liquid fuels at oil refineries. These options include various efficiency measures including enhanced combined heat and power along with carbon capture and storage. Policy choices are the same as option 2.1.

2.4 CO_2 use for Enhance Oil Recovery (EOR)

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

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.

Policies to encourage EOR could include 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, financial incentives to capture CO_2 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.

OG-3 Fuel Production and Processing

3.1 Oil and Gas Production: Energy efficiency Incentives, Support, or Requirements

There are a number of ways in which energy consumption and CO_2 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.

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 or refineries achieve a certain CO_2 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.

3.2 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.

3.3 Reduce Fugitive Emissions at Refineries (new)

Effective regulations or incentives could help reduce fugitive emissions of greenhouse gases at refineries. Policies could account for various technologies either in use or in development worldwide and the co-benefits of reducing GHG fugitives, such as air quality improvements, reduced safety risks, and resource efficiency benefits.

3.4 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. Similarly, solar thermal, geothermal and ground source may be appropriate technologies to meet heating demand.

3.5 Low-GHG fuels in refineries

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.

3.6 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.

3.7 Reduce flaring

Gas facilities that flare on a routine basis 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.

3.8 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.

3.9 Oil and Gas Production: Incentives, Support, or Requirements for Reducing Fugitive 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 4 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 can prevent the waste of valuable product.

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_2 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.

OG-4 Fuel Delivery

4.1 Natural Gas Transmission: Incentives, Support or Regulations to Reduce Fugitive Emissions

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

4.2 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.

4.3 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.

4.4 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.

4.5 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.