

Day 2: Policy Options for Alaska

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Overall framework for analysis

In preparing this seminar and selecting examples and comparisons, it is assumed that Alaska wishes to take the necessary steps to achieve the following objectives:

- A throughput through the pipeline of 1 million barrels per day
- Export of gas of at least about 3 Bcf/day

It is likely that Alaska has sufficient heavy oil and oil shale resources to achieve these goals. The realization depends on the international oil and gas prices. The total level of capital investment over the next two decades would have to be about \$ 150 billion in order to achieve these goals.

Overall framework for analysis

Type of development start prior to 2022	Gov Take at \$ 100/bbl	Significant development probability
Existing Operatings	70 - 75%	Certain
Infill Wells	70 - 75%	Certain
New light oil fields	60 - 65%	Certain
Heavy Oil > 15 API	55 - 60%	Probable, depending on oil price
Heavy Oil <15 API	45 - 55%	Low
Shale Oil	45 - 55%	Fair, depending on pilot project
N Am gas Line	45 - 55%	Very Low
LNG - 3 Bcf single project	45 - 55%	Very Low
LNG - 1 Bcf by pipe	45 - 55%	Low
LNG - 1 Bcf by icebreaker	45 - 55%	Fair, if technically possible
LNG - 1 Bcf, pipe subsidized	45 - 55%	High
GTL - low gas price	45 - 55%	Low
GTL - high gas price	45 - 55%	Fair, with low feed price

Achieving the Alaska goals would require a wide range of fiscal structures targeted at the various opportunities.

Overall framework for analysis

The Alaska objectives could be achieved through two different “architectures” for the production tax:

1. A variation of the current production tax with incentives to achieve the development of the various resources, or
2. A simple flat production tax and with added fiscal features to ensure Alaska captures the optimal government take for each resource.

The first concept could result in “negative government take” problems as will be discussed during session 2.

Since Alaska so far opted for option 1, most of the discussion will be centered on this option. Also a “hybrid” between option 1 and 2 is possible.

Policy Options for Alaska

During the second day of this seminar, the following matters will be discussed:

- **Alternatives to HB110/HB17**
- **Alternatives to the 40% credit and BOE concept**
- **Dealing with negative incremental production tax and other issues.**
- **Making heavy oil and shale oil economic**
- **Making natural gas economic**
- **Implementation of new terms**

Session 1

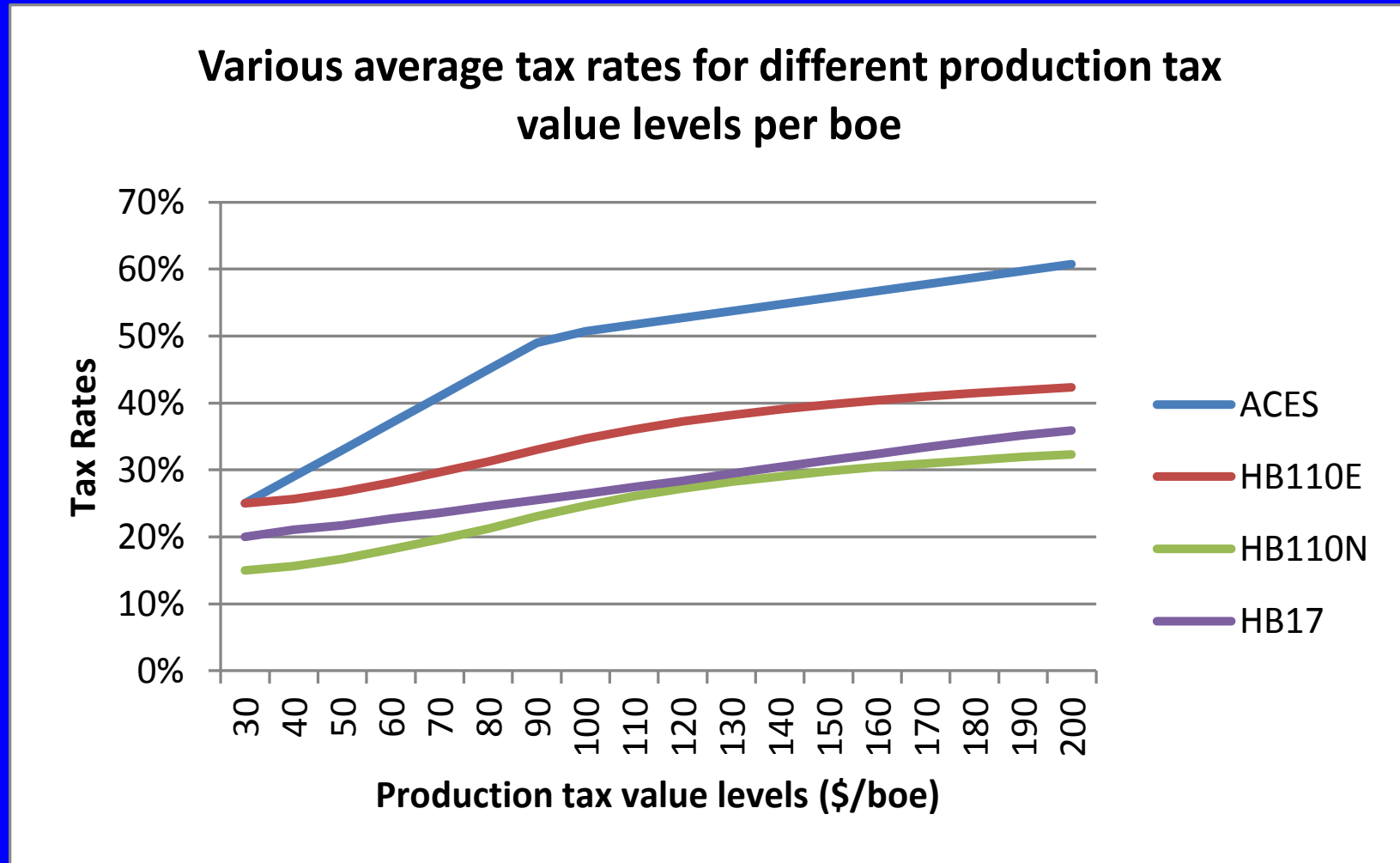
Alternatives to HB110/HB17

The discussion of Alternatives for HB110/HB17 will deal with the following matters:

- **Analysis of HB110/HB17**
- **Alternatives for the existing operations**
- **Alternatives for new operations**
- **Separating “Old” and “New” production, encouraging infill drilling**

Alternatives to HB110/HB17

Analysis: PPT rates



The bracketing procedure creates a significant lowering of the average PPT rates. The HB 110 N rates apply only for 7 years from the start of production for new production.

Alternatives to HB110/HB17

The Arctic study include a base case for oil as follows:

- **500 million barrels**
- **Field life 18 years**
- **Peak production 140,000 bopd**
- **Start field production in year 12 of cash flow**
- **\$ 15 per barrel capital costs and \$ 10 per barrel operating costs for a total of \$ 25 per barrel**

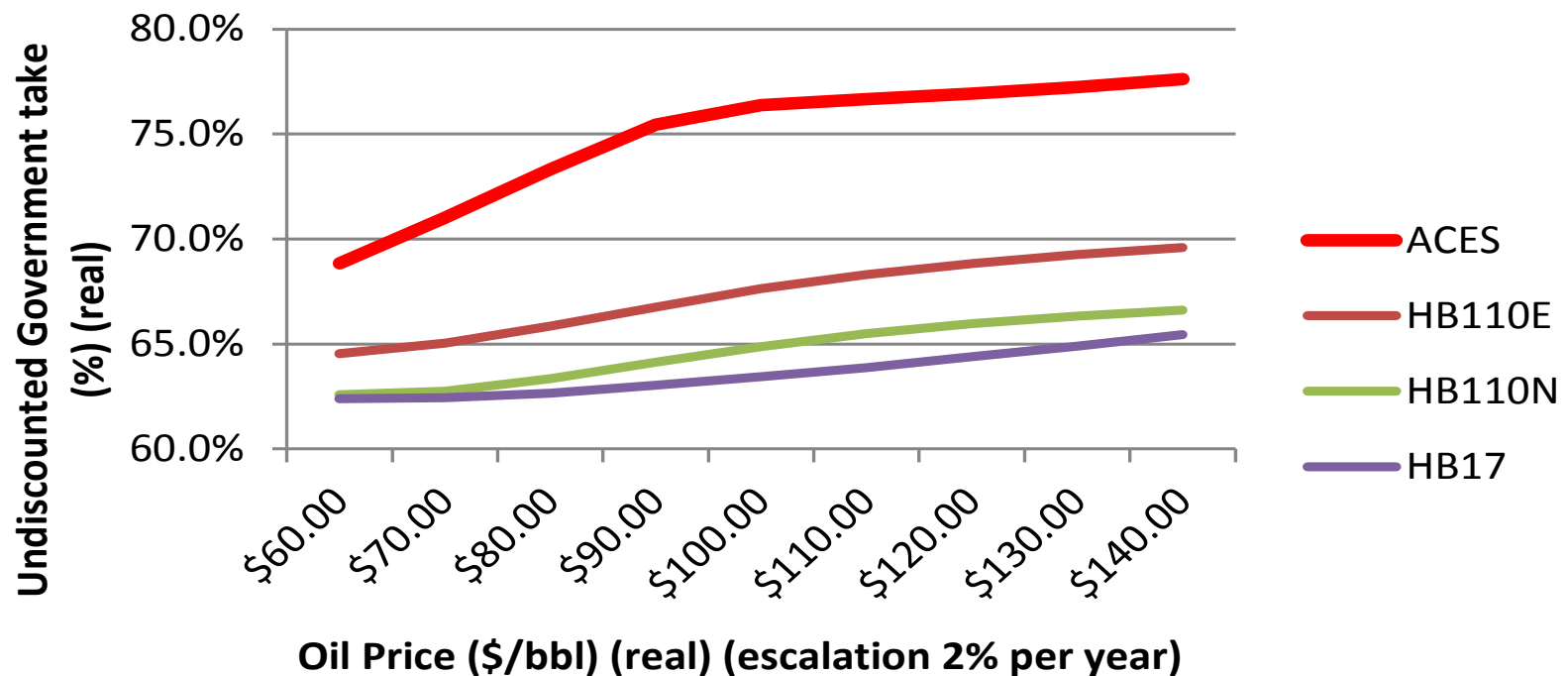
The Base Case is adjusted to Alaska with:

- **TAPS tariff: \$ 5.**

Alternatives to HB110/HB17

Analysis: PPT rates

Chart 5.1.3.1-2B GT0 of various proposals for the PPT in Alaska (country incremental, Base Case Oil)

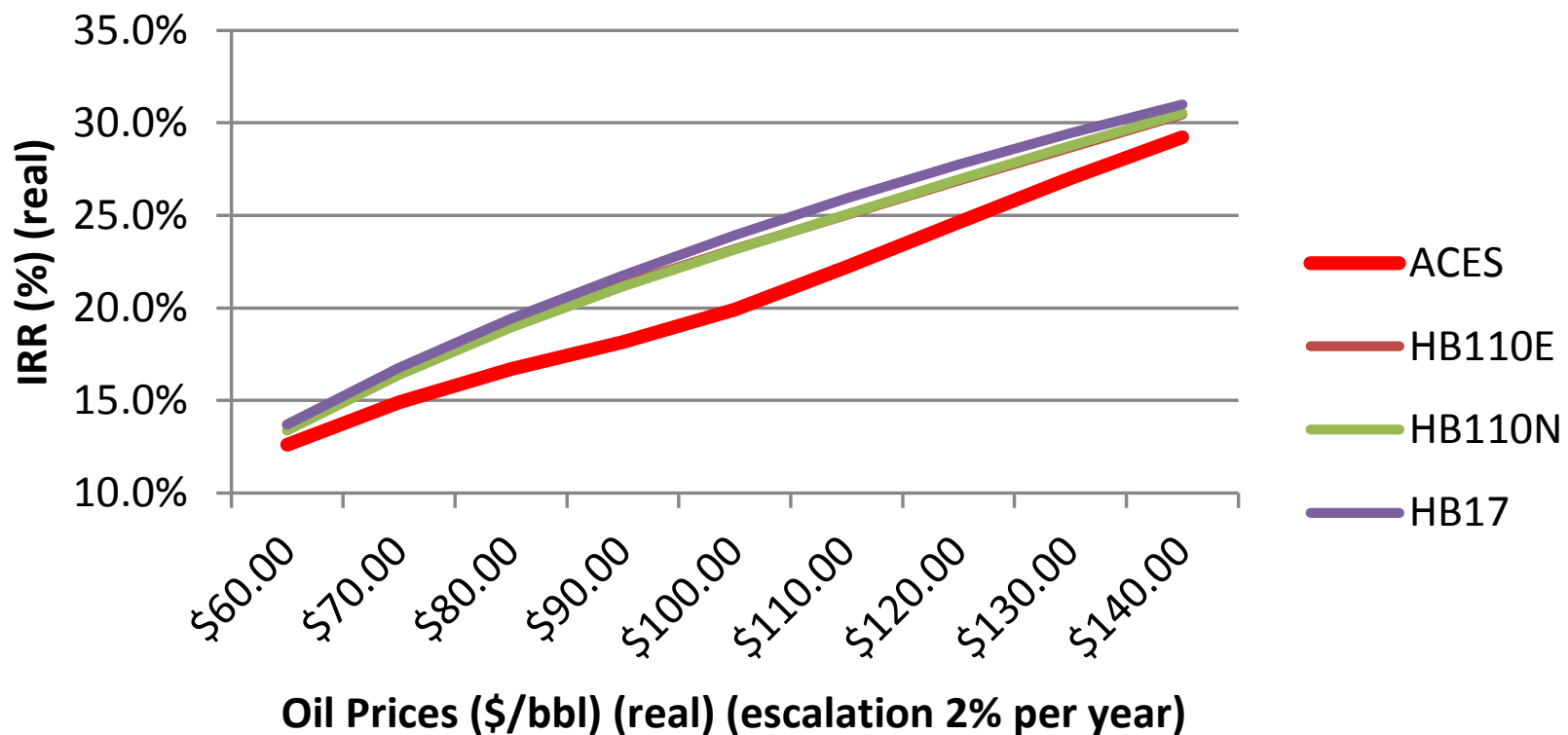


At \$ 100 per barrel, the government take of ACES would be 76.4%, for HB 110 (Existing) 67.6%, for HB 110 (New) 64.9% and for HB 17 63.4%.

Alternatives to HB110/HB17

Analysis: PPT rates

Chart 5.1.3.1-3 IRR of various proposals for the PPT in Alaska (country incremental, Base Case Oil)

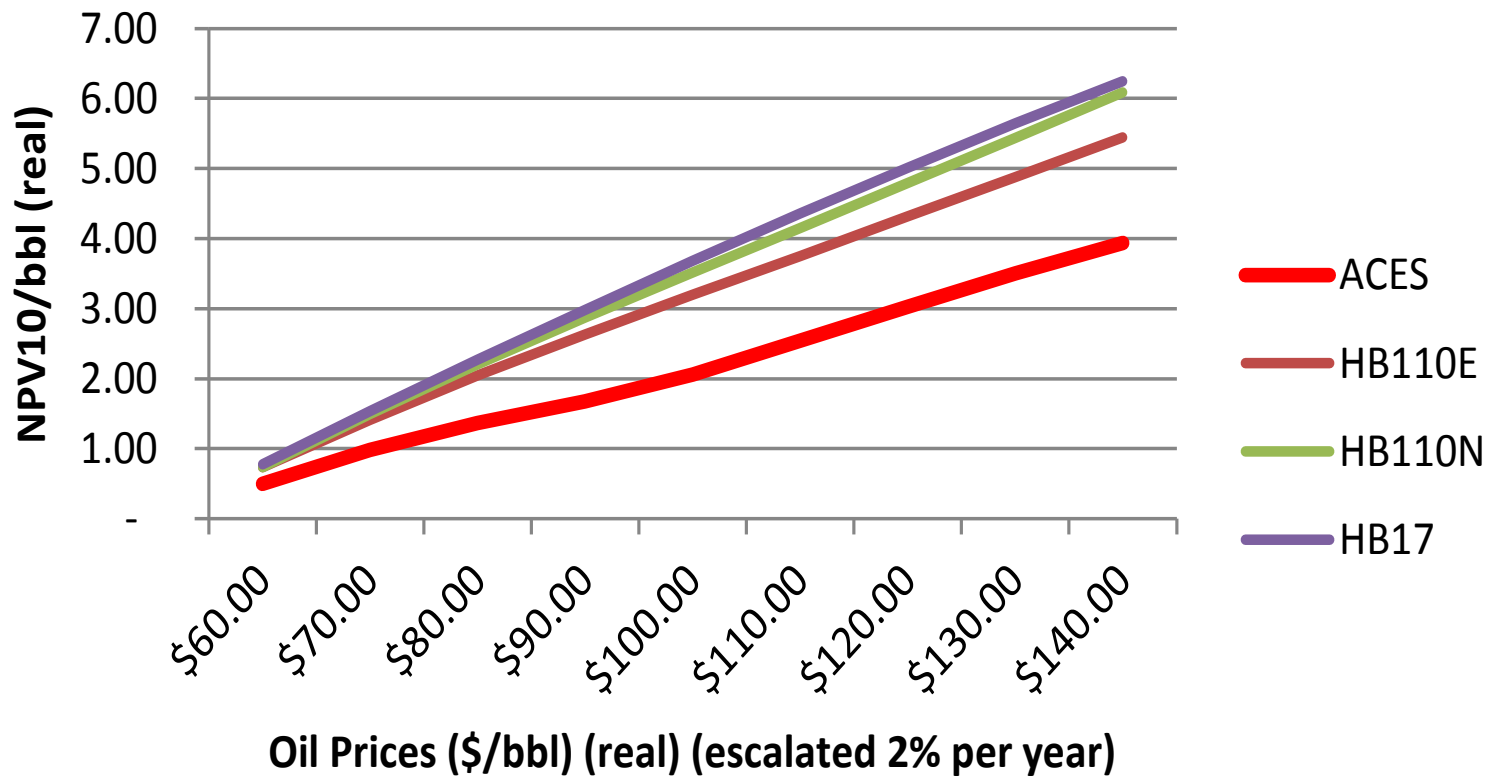


At \$ 100 per barrel, the IRR for ACES would be 19.9%, for HB 110 (existing) and (new): 23.2%, for HB 17: 23.9%

Alternatives to HB110/HB17

Analysis: PPT rates

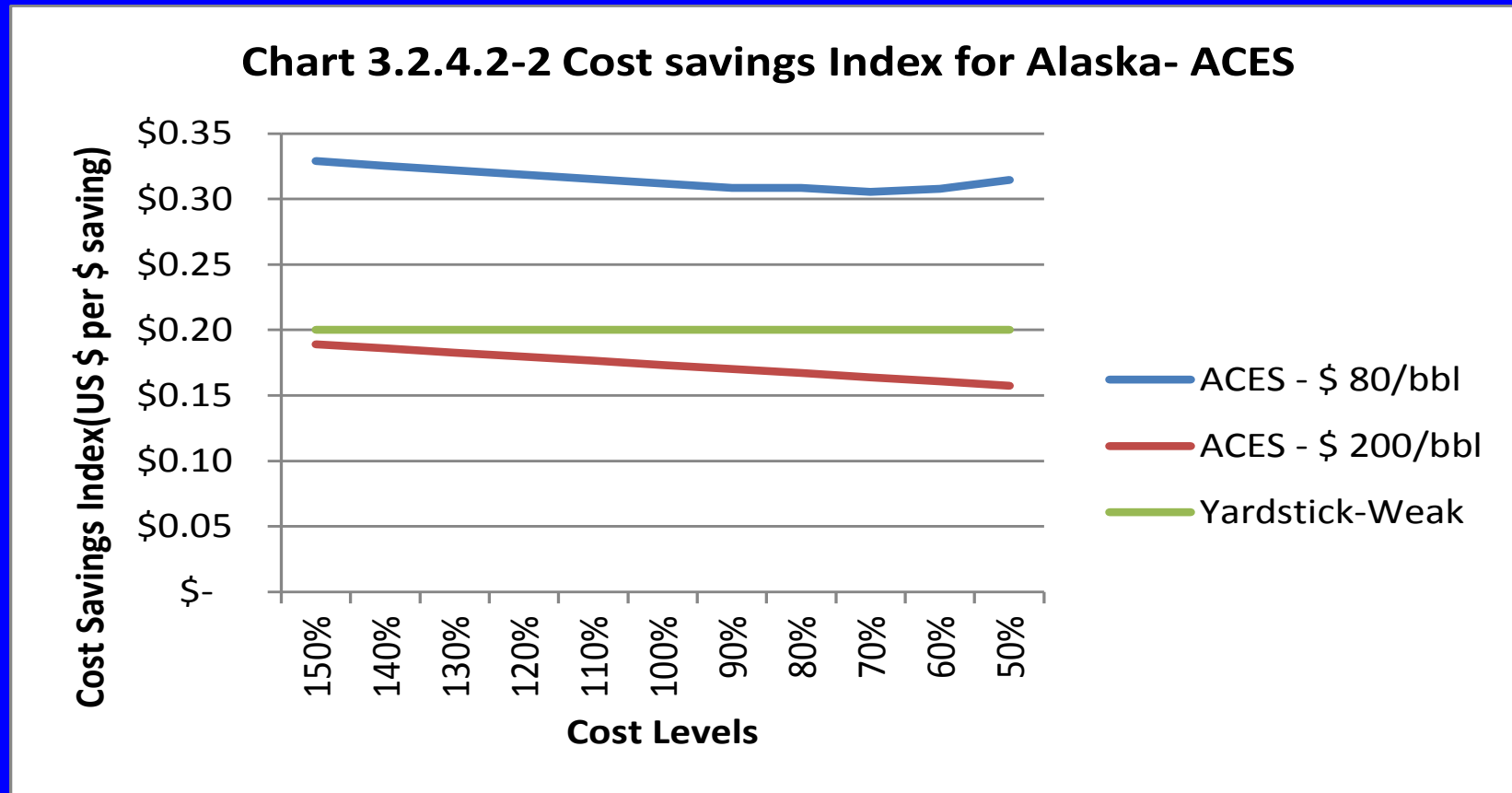
Chart 5.1.3.1-4 NPV10/bbl of various proposals for the PPT in Alaska (country incremental, Base Case Oil)



At \$ 100 per barrel, the NPV10/bbl would be \$ 2.54 for ACES, \$ 3.75 for HB 110 (existing), \$ 4.15 for HB 110 (New) and \$ 4.36 for HB 17.

Alternatives to HB110/HB17

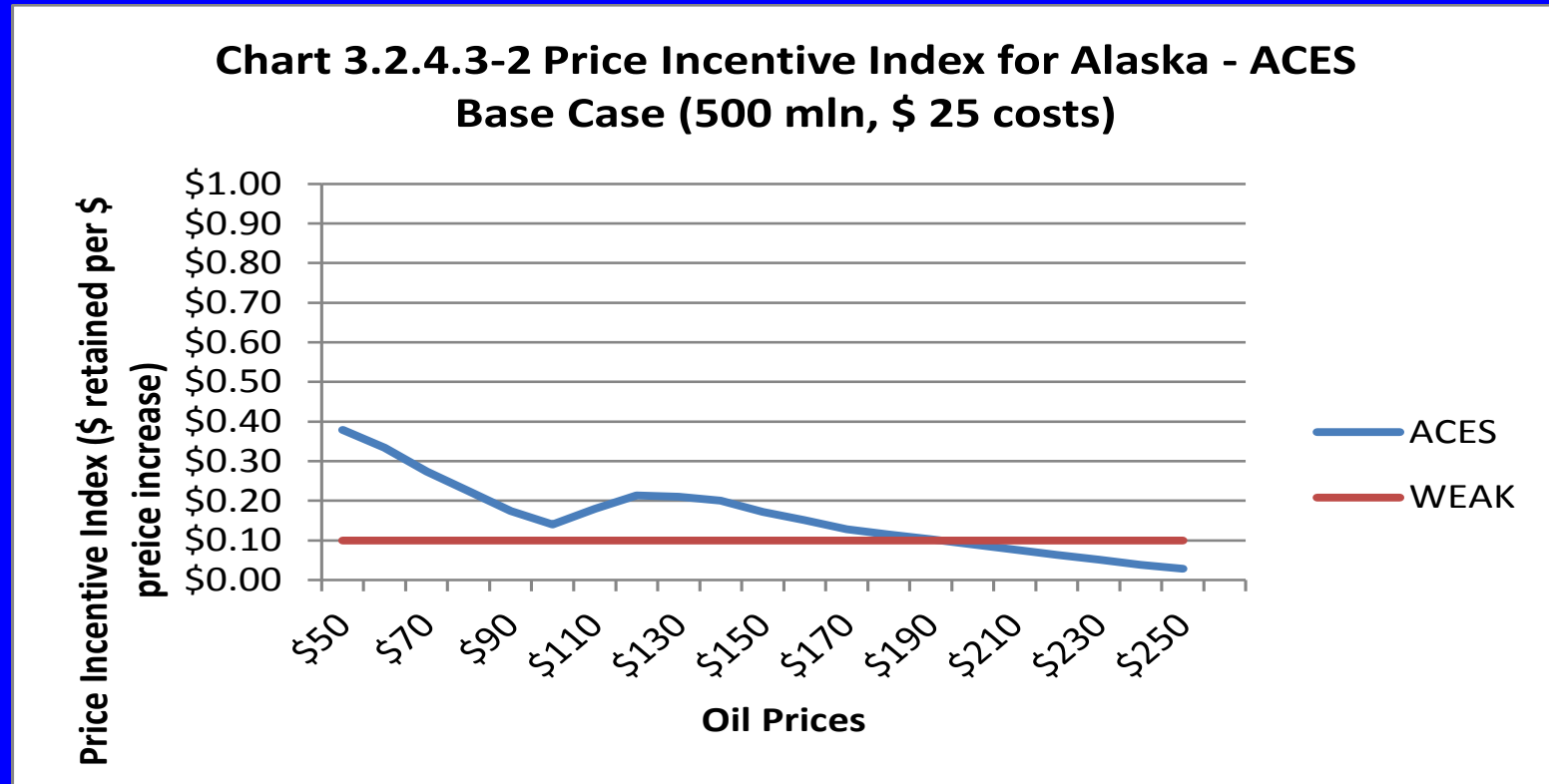
Analysis: PPT rates



For ACES, the combined PPT and CIT rates at high prices become so high that the cost savings index by international standards becomes very low (below \$ 0.20 per \$). This tends to lead to “gaming” of the tax returns and lack of interest in being cost efficient.

Alternatives to HB110/HB17

Analysis: PPT rates



For ACES, at high prices, the combined tax rate becomes so high that there is the price incentive performance becomes very weak by international standards. This leads to lack of interest in achieving the highest prices on an arms length basis and strong incentives to try to “transfer price”.

Alternatives to HB110/HB17

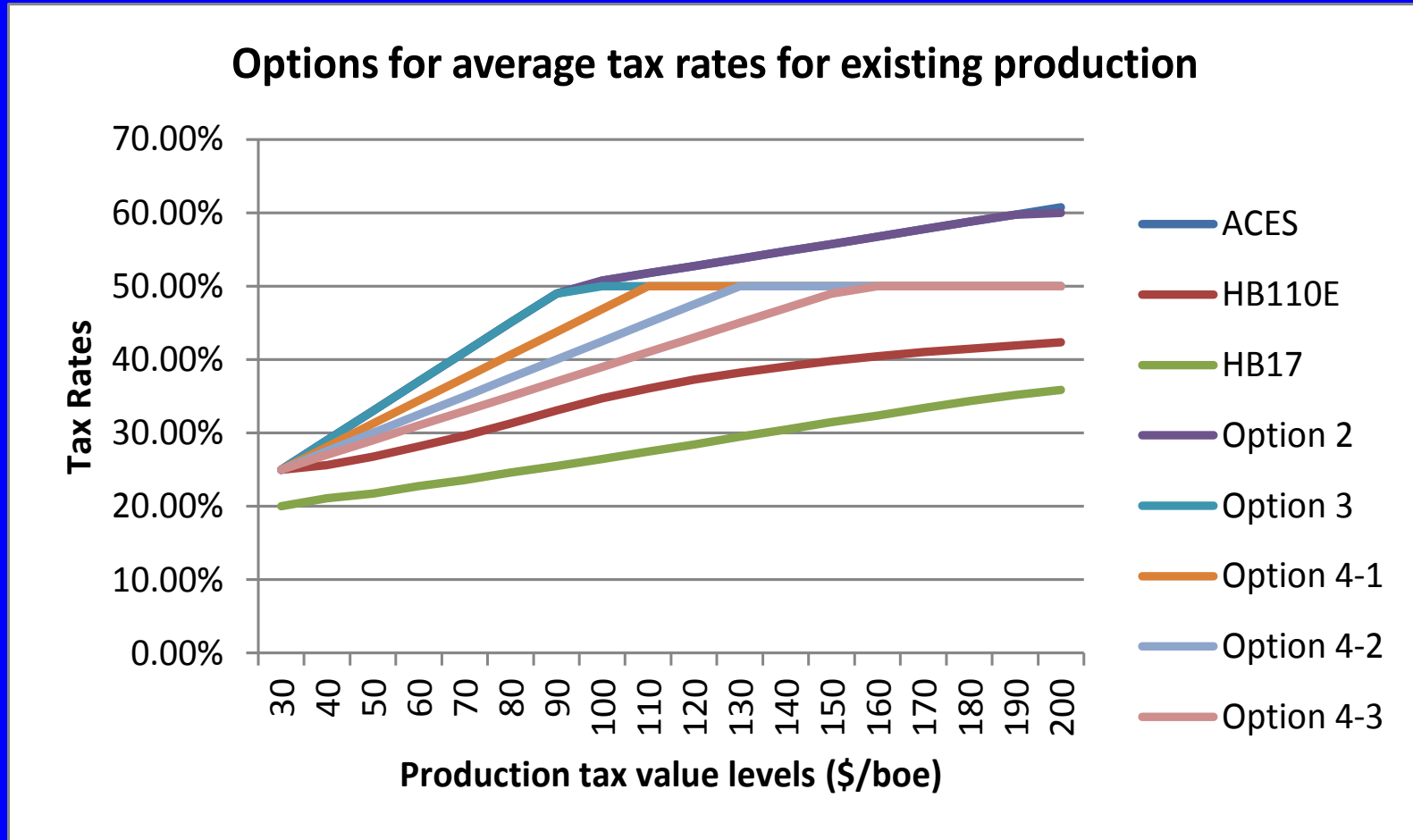
Production tax rates for existing operations

A wide range of options is possible for the production tax rates for the existing operations, as follows:

- 1) Leave rates unchanged**
- 2) Leave 0.4% per dollar increase over \$ 30 unchanged to \$ 92.50, but limit 0.1% per dollar increases to a maximum rate of 60%.**
- 3) Leave 0.4% increases unchanged, but cap the rate at 50% at \$ 92.50.**
- 4) Adopt lower per barrel increases to reach 50%:**
 - 1) 0.3125% to \$ 110**
 - 2) 0.25% to \$ 130**
 - 3) 0.2% to \$ 155**
- 5) Adopt brackets as proposed under HB 110**
- 6) Adopt brackets as proposed under HB17**

Alternatives to HB110/HB17

Analysis: PPT rates



Various options exist for the tax rates for existing production.

Alternatives to HB110/HB17

Production tax rates for existing operations

In considering changes to the PPT rates for existing operations the following matters need to be considered:

- The production tax should not have structural deficiencies.
 - This means option 1 is not recommended.
- The Study indicated that the ACES government take is not particularly out of line with other exporters and that there may be no need to make significant changes.
 - This means options 5 and 6 are not recommended.
- The need to attract significant new capital. An important factor in deciding on whether or not to make investments in Alaska is the experience of companies already in Alaska. An improvement in terms on existing operations is therefore an incentive for new investors to come in.
 - Option 2 would likely be perceived as a improvement that is relatively minor and would therefore not have a desired impact on encouraging new investment.
 - Options 3 and 4 are therefore recommended. Further research would be required to provide the background information for these options.

Alternatives to HB110/HB17

Options for new operations

The options for new operations are:

- 1. Do not change the rate for new operations from the improved rate as suggested in previous slides for existing operations**
- 2. Create lower rates for new operations with a separate ring fence:**
 - 1. Have a strong rate drop with a time limit on the new rates and after the time limit merging with the rates for existing operations, or**
 - 2. Have a less strong permanent rate drop with no time limit**
- 3. Establish an allowance, for new production:**
 - 1. Have a strong allowance with a time limit on the new allowance, for instance \$ 10 per barrel for new production for the first 7 years of production, or**
 - 2. Have a less strong permanent allowance with no time limit, for instance \$ 6 per barrel for new production.**

Note: the amounts under option 3 are examples not proposals.

Alternatives to HB110/HB17

Options for new operations

Option 1: Do not change rate from improved rate for existing operations.

A significant benefit of having a single rate system is that it does not require the definition of “new production”. Separating “old” and “new” production requires special administrative attention.

Lowering the government take slightly as suggested in the previous slides may also encourage more investment in new operations.

Alternatives to HB110/HB17

Options for new operations

Option 1: (continued):

The major investments by Repsol are a sign that some large companies are interested in investing in Alaska even under current ACES terms.

However, Repsol is somewhat of a special case. Repsol concentrated operations in the 1990's and 2000's on Latin America. Experiences have been rather negative in Argentina, Bolivia and Venezuela. Repsol has therefore established a policy to diversify to OECD nations.

Example: Argentina levies currently an export duty on oil of 100% over \$ 60.90 per barrel. Compared to Argentina, Alaska looks good.

Alternatives to HB110/HB17

Options for new operations

Option 1 (continued):

If Alaska wants to slow down the decline of light oil production, it is very likely that stronger incentives are required to stimulate broader interest in investments by current and new operators in new oil light production from smaller and more costly fields.

This means Option 1 is not recommended.

Alternatives to HB110/HB17

Options for new operations

Option 2 and 3:

It is likely that Alaska could encourage the exploration and development of **one billion barrels of additional light oil**, if improved terms were offered. The one billion barrels would consist of new discoveries, discovered but undeveloped fields and increases in recovery factors through infill drilling on existing production.

The development of another billion barrels could result in stabilizing the Alaska light oil production for the next 20 years or so at about 500,000 barrels per day. So it seems worthwhile to introduce more attractive terms for such new production.

Alternatives to HB110/HB17

Options for new operations

Option 2: Lower production tax rates.

Dropping the rate will require the creation of a ring fence for new investments. This means for the duration of the incentive, the tax payer would have to submit two tax returns: one for the existing operations and one for the new operations. This has a number of inherent disadvantages:

- **Strong audit control would be required in order to ensure that companies would properly allocate costs and revenues, otherwise companies could shift profits simply to the new operations by declaring less cost for new operations and more costs for existing operations. Cost allocation is difficult to audit.**

Alternatives to HB110/HB17

Options for new operations

Option 2: (Continued:)

- **Investors would not be able to benefit from the tax deductions against existing income. Yet, this is the main incentive to re-invest in new operations. So, existing operators would have little incentive to make new investments even with the lower rates.**

Conclusion: The ring fencing option is not particularly attractive from a government and industry point of view.

Alternatives to HB110/HB17

Options for new operations

Option 3: An allowance

Under the Allowance system one can simply maintain a single production tax calculation. No ring fences are necessary.

As indicated before two options are possible:

- **A strong allowance for a limited period of time for each new investment.**
- **A more modest permanent allowance**

Alternatives to HB110/HB17

Options for new operations

Option 3: An allowance

Having a stronger allowance for a limited time has the following impacts:

- **It creates higher IRR and NPV10 values for the same undiscounted government take or 5% discounted government take.**
- **This system is therefore more attractive for smaller companies and new investors to Alaska.**
- **However, it is also somewhat more difficult to administer, since timing needs to be established for the start of all new production.**
- **It may also exacerbate some of the “negative discounted government take” problems to be discussed later today.**
- **It discourages further incremental investments.**

Alternatives to HB110/HB17

Options for new operations

Option 3: An allowance

An allowance for an unlimited period of time is recommended.

Further research would be required to establish a reasonable amount for the allowance and possible adjustments to the allowance, such as adjustment for inflation. The allowance may be based on a formula rather than a fixed number.

The new allowance could create a drop in government take of about 10%, as proposed approximately under HB110 for new production and HB 17.

Alternatives to HB110/HB17

Old and New Production

Two simple ways to determine “old” and “new” production, which are widely internationally accepted, are:

- **The decline curve method**
- **The new non-producing lease method**

More difficult methods are:

- **The new investment method**
- **The new approved program method**

Alternatives to HB110/HB17

Old and New Production

Decline curve method.

With the decline curve method Alaska would establish the average production for each company in 2011. An exponential decline curve would be established per company. For instance one could use 5% per year for all companies. Any production over the decline curve per company would qualify as “new”. For new investors, all production would be automatically “new”.

The main advantage of the method is that it goes to the essence of the problem in Alaska. It also strongly stimulates investment by new companies. It is easy to administer. The main disadvantage is that existing companies may be rather differently affected and this will result in opposition from some of the companies.

Note: the 5% decline is merely an example.

Alternatives to HB110/HB17

Old and New Production

New non-producing lease method.

Another simple method is to consider “new” production, as production from leases which were not in production prior to December 31, 2011.

The main advantage of the method is that it is easy to administer and is a well established international practice. It would encourage new investment in new leases with fields which maybe more expensive.

The main disadvantage is that the method would discriminate against new production that can be achieved by increasing recovery factors from existing fields through infill drilling or EOR projects. Increasing recovery factors from existing fields is an effective and economic method to slow down production decline.

Alternatives to HB110/HB17

Old and New Production

New investment method.

A simple definition of “new” production would be that it would be any production resulting from investments made after the promulgation of the law amending ACES.

The main advantage is that it would be “fair” among companies, but it would be very difficult to administer.

For instance: What would be the “new” production from a further investment in water injection? If an infill well is drilled, what part of the production is “new” and what part is merely accelerated existing production? If equipment is de-bottlenecked what is the “new” production as a result?

Another inherent disadvantage is that existing producers would have maintained a certain level of investment anyway. So with this method they would receive new terms for what they were planning to do regardless.

Alternatives to HB110/HB17

Old and New Production

New approved program method.

In principle it is possible for existing producers to make specific comprehensive proposals to the Alaska Government for new investments that will increase production from existing fields. This would relate to programs that would be in excess of ongoing investments.

These programs could include:

- The drilling of new more expensive deeper or shallower reservoirs,
- Enhanced recovery projects
- Horizontal well drilling projects in thin reservoirs,
- Extensive new infill drilling, or
- Any application of new technology.

DNR would establish the base line production above which production would be considered “new” on a year by year basis, based on reservoir and other studies.

Alternatives to HB110/HB17

Old and New Production

New approved program method (continued).

The main disadvantage of the method is that it make take considerable time to do and review the various studies and for the administration to sign off on the “new” production.

The advantage is that it would be a strong stimulus for existing operators to consider strongly new investment in their fields where such investments result in “new” production.

Alternatives to HB110/HB17

Summary on Allowance

It is recommended that new production would be subject to an unlimited single allowance. “New” production would be the higher off:

- New production from programs specifically approved by the administration, and**
- New production above a pre-determined decline curve**

Production from non-producing leases would automatically be “new” production.

Summary on HB110/HB17

The combination of production tax rates escalating from 25% at \$ 30 per barrel to 50% combined with allowances for new production can be developed in such a manner that:

- Alaska retains high revenues from existing production, and**
- Strong incentives are provided for the development of new production, in particular for new entrants in Alaska.**

Session 2

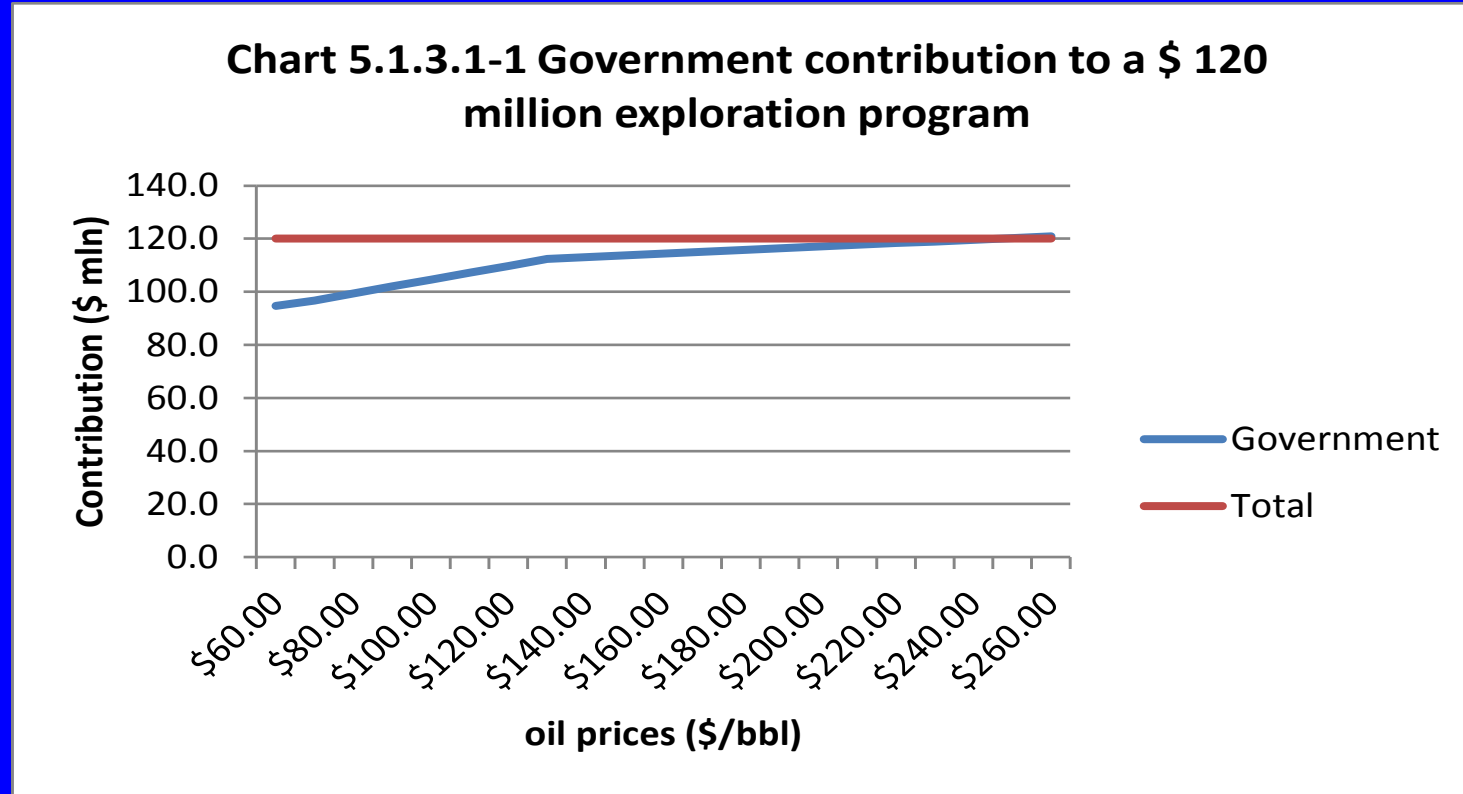
Alternatives to 40% tax credit, the BOE concept, negative government take and other issues

Session 2 will deal with the following matters:

- **Analysis of 40% tax credit**
- **Alternatives to 40% tax credit**
- **Analysis of BOE concept**
- **Alternatives to BOE concept**
- **Analysis of negative incremental government take**
- **Alternatives to negative incremental government take**
- **Other issues**

Alternatives to 40% tax credit

Analysis: Tax Credits for current producers under ACES



Existing producers under ACES are entitled to the 40% tax credit as well as all normal deductions of the exploration expenditures. This means that at \$ 111 per barrel, the Alaska contributes 90% of the exploration costs. At \$ 245 per barrel Alaska contributes 100%.

Alternatives to 40% tax credit

Analysis: Tax Credits for new entrants

New entrants in Alaska which are in a loss carry forward position can earn 40% credits for the exploration expenditures and only 25% credits for the loss carry forwards.

This means that under the current system Alaska pays:

- **90% through tax deduction and tax credits for existing producers and a high percentage during development, and**
- **65% through the tax credits during exploration and 45% during development.**

The assistance in exploration expenditures for existing producers is excessive from an international perspective under current prices and a system that actually results in contributing 100% at a certain price level is seriously deficient.

It can therefore be recommended to re-align the support for exploration.

Alternatives to 40% tax credit

Alternatives: Re-alignment – Option 1

The simplest way to re-align the significant difference between existing producers and new entrants would be to:

- **Limit the tax credits for exploration and development investment to 20% and not consider special tax credits for exploration.**
- **Increase the loss carry forward credit for conversion of loss carry forward to 45%.**

This concept would create approximately a level playing field between existing producers and new entrants.

Alternatives to 40% tax credit

Alternatives: Re-alignment – Option 2

An alternative would be to:

- **Retain the 40% tax credit for exploration, but only for companies which are not taxable and are in a loss carry forward situation, and**
- **Retain the 25% loss carry forward credit.**

This alternative is less attractive because:

- **It is more complex to administer since exploration and exploration costs now need to be separated and monitored**
- **It provides an incentive for new entrants to explore, but a little incentive to develop and produce oil and gas fields relative to existing producers.**

It would be more difficult for smaller companies to attract the capital that would be required for large scale development in case of significant discoveries.

Alternatives to 40% tax credit

Alternatives

Together with the changes in the production tax rates proposed earlier, it is likely that Option 1 would create a very significant and broad interest by new companies for investment in Alaska.

Therefore, this concept is recommended.

Alternatives to BOE concept

Analysis: BOE concept

**Table 5.1.3.1-1 Incremental Gas Economics for ACES in Alaska
(Country Incremental, Real)**

	Oil only	Oil + Gas	Incremental
Oil production (mln bbls)	500	500	0
Gas production (Bcf)	0	10000	10000
Oil price (\$/bbl) North Slope	100	100	100
Gas Price (\$/MMBtu) North Slope		1.0	1.0
Gross Revenues (\$ mln)	50000	60000	10000
Total Production (Mln BOE)	500	2167	1667
Capital Expenditures (\$ mln)	7500	11000	3500
Operating Expenditures (\$ mln)	5000	7500	2500
Divisible Income (\$ mln)	37500	41500	4000
Royalties (\$ mln)	6250	7500	1250
Property Tax, other	852	1504	652
Production Tax Value	30398	32496	2098
Production Tax Value per BOE	60.80	15.00	-46
PPT (\$ mln)	15186	6900	-8286
Corp Income Tax (State) (\$ mln)	1466	2474	1008
Total State Revenues (\$ mln)	23754	18378	-5376
Corporate Income Tax (Fed) (\$ mln)	4942	8340	3398
Total Government Revenues (\$ mln)	28696	26719	-1977
Undiscounted Government Take	76.50%	64.40%	-49.3%
IRR	21.10%	19.30%	17.3%

The BOE concept would result in massive government revenue losses on oil production if incrementally also gas would be developed. This does not make any sense. It is clear that Alaska would not accept such unnecessary losses. This in turn impedes gas project development.

Alternatives to BOE concept

Alternatives to the BOE concept

There are three alternatives to the BOE concept:

- 1. Create separate ring fences for gas and for oil and establish different terms for gas.**
- 2. Calculate the consolidated production value and allocate this value to oil and gas, based on gross revenues and energy content, and apply the same scale to oil and gas.**
- 3. Follow option 2 but apply a different scale.**

Alternatives to BOE concept

Alternatives – Option 1

Creating separate ring fences for gas for gas projects which originate from Prudhoe Bay production would not be too complex, since modest new upstream development costs would be required for a new gas project.

However, development of gas projects from new gas-condensate fields or from new oil fields with associated gas production, would be rather complex. Allocation of costs would be difficult. This in turn would create possibilities for lowering the tax on oil or condensates through excessive deductions in the oil ring fence.

It is therefore that this option is not recommended.

Alternatives to BOE concept

Alternatives – Option 2

Alternative 2 maintains a single consolidated production tax calculation.

The calculation would take place in the following steps:

- 1. Calculate the consolidated production tax value for all of Alaska.**
- 2. Allocate the combined value: to oil (with condensates) and to gas based on the gross revenues from oil and from gas.**
- 3. Determine the production tax value per BOE for the oil production and apply this value to the applicable scale to obtain the production tax payable on oil.**
- 4. Determine the production tax value per BOE for gas production and apply this value to the applicable scale to obtain the production tax payable on gas.**

Alternatives to BOE concept

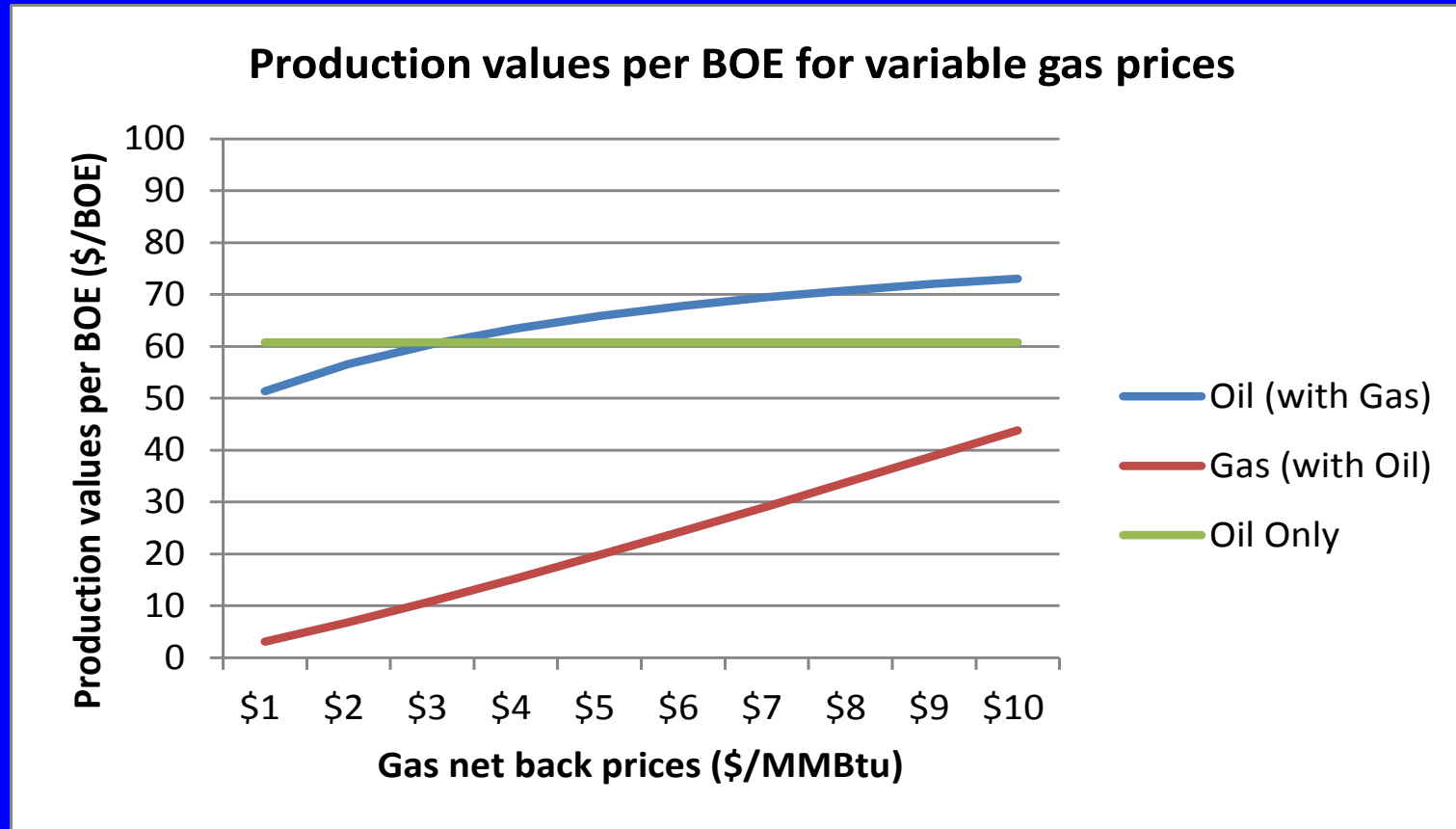
Alternatives – Option 2

	Oil only	Oil + Gas
Oil production (mln bbls)	500	500
Gas production (Bcf)	0	10000
Oil price (\$/bbl) North Slope	100	
Gas Price (\$/MMBtu) North Slope		1.0
Oil Revenues (\$ mln)	50000	
Gas Revenues (\$ mln)		10000
Total Revenues (\$ mln)		60000
Total Production (Mln BOE)	500	1667
Capital Expenditures (\$ mln)	7500	11000
Operating Expenditures (\$ mln)	5000	7500
Divisible Income (\$ mln)	37500	41500
Royalties (\$ mln)	6250	7500
Property Tax, other	852	1504
Production Tax Value	30398	30829
Production Tax Value per BOE Oil	60.80	51.38
Production Tax Value per BOE Gas		3.08

Previous example for a gas net back price of \$ 1 per MMBtu.

Alternatives to BOE concept

Alternatives – Option 2



Different production values for different gas net back prices.

Alternatives to BOE concept

Alternatives – Option 3

Alternative 3 maintains a single consolidated production tax calculation as under option 2 and the same procedure for determining the production values is being used.

However, in this case a specific sliding scale for gas will apply.

It should be noted that gas economics is very different from oil economics.

The same base 25% rate could be used. However, the increase in the gas rate might start at a lower level than \$ 30 per BOE, for instance \$ 20 per BOE. Also a somewhat steeper scale for gas could be used in order to increase the percentage at higher price levels.

This Option 3 is recommended. However, further research is required to determine the starting point and scale.

Analysis negative incremental Government take

Analysis: concept

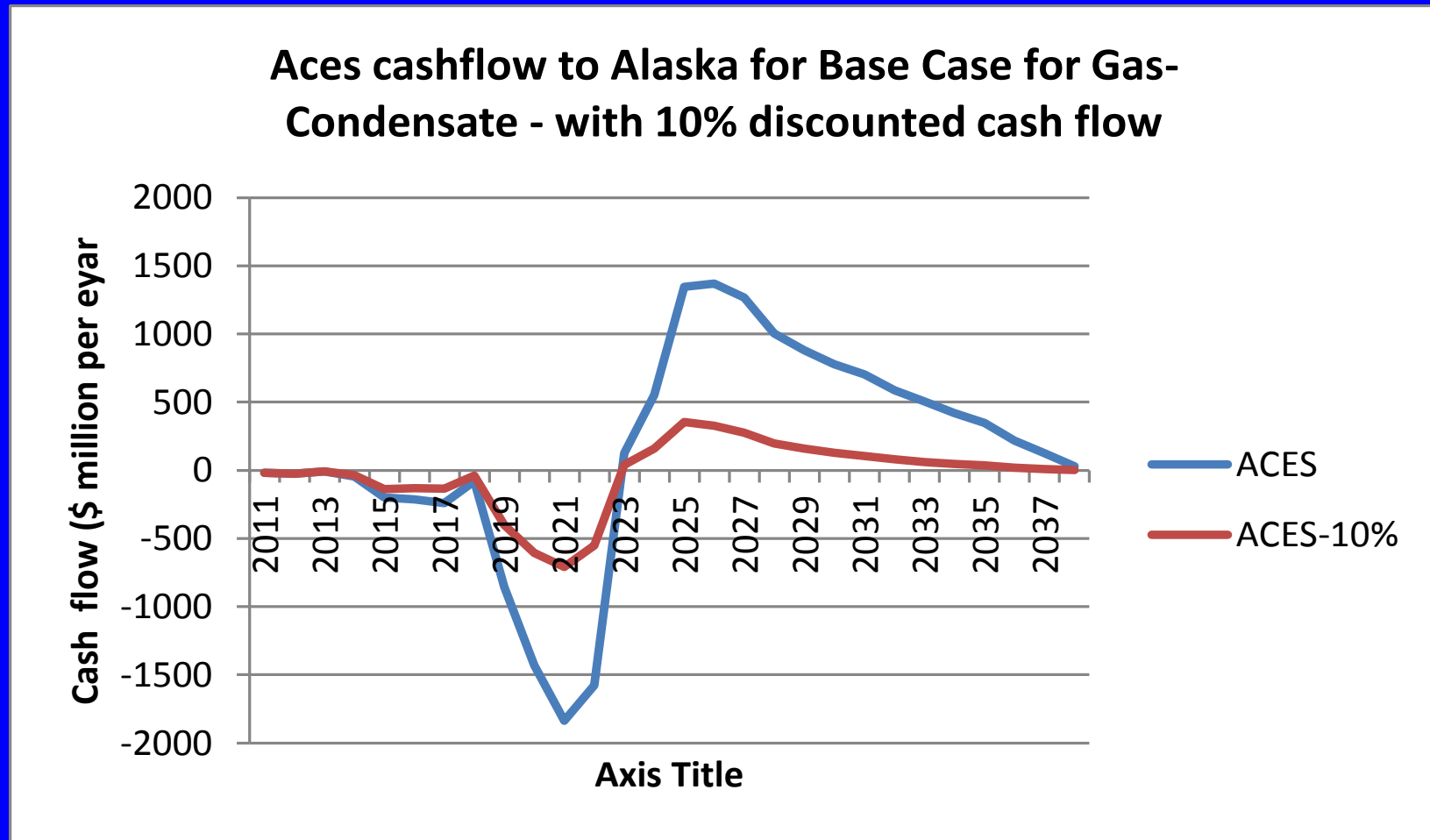
Chart 4.1.2.1-1 ACES cash flow to Alaska for Base Case
for Gas-Condensate
(stand alone)



By definition, for a marginal project the total negative ACES cash flow to government as a result of tax credits and tax deductions becomes (almost) identical to the positive cash flow. In other words the net government receipts are low.

Analysis negative incremental Government take

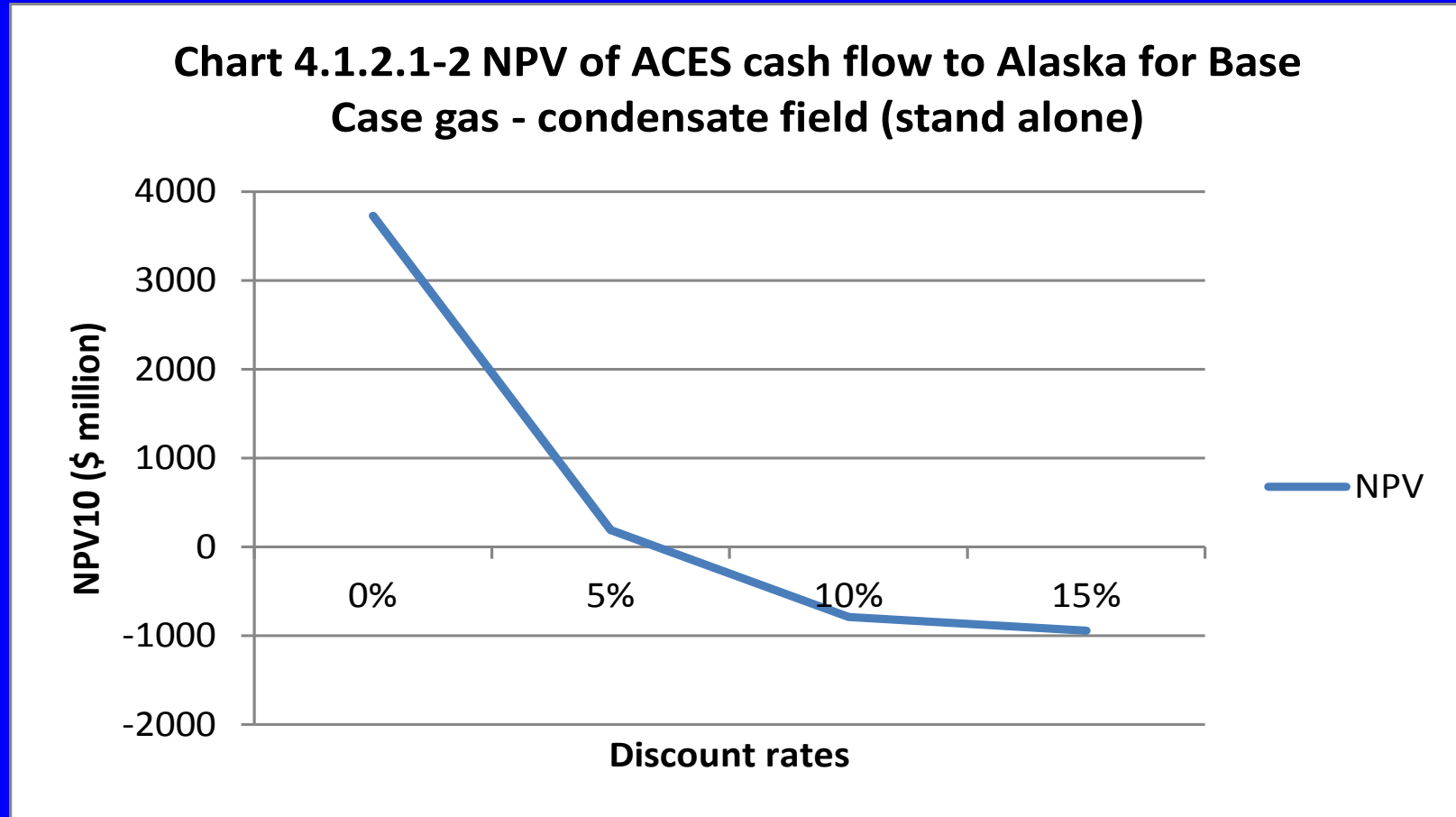
Analysis: concept



If the time value of money is taken into account, the negative outlays for government on ACES become higher than the positive income in total. This means that the discounted incremental government take is negative. The government actually loses value on the production tax.

Analysis negative incremental Government take

Analysis: concept



For the Base Case for a new gas condensate field, this makes the discounted government revenues negative over about a discount rate of 6%.

Alternatives to negative government take

The problem is caused by:

- The tax credit, and
- Providing write offs at a higher tax rate than is actually levied for new production (as proposed with the allowances for new production).

If Alaska adopts the elimination of the 40% tax credit for exploration, the issue related to the negative incremental government take would be reduced. The same is true for a flat unlimited allowance.

The alternatives are:

- To restructure the production tax by including a component that is not cost sensitive, similar to typical windfall profit taxes.
- To deny the 20% tax credit for certain asset classes, such as certain expensive facilities.

Alternatives to negative government take

As an example, the production tax could be restructures by simply maintaining a fixed tax of 25% and not linking the price sensitive component to the production tax value.

For instance, the price sensitive component could be linked directly to the price, as a typical windfall profit tax or could be based on a particular formula which includes price.

Such a approach would eliminate the negative government take problem.

The main advantages of this method are:

- It would make it easy to adjust the production tax for different classes of resources, such as heavy oil, shale oil, natural gas, GTL to be discussed later without being limited by the negative government take issue.
- There is no need for an allowance for new production, since this could be formulated simply as a special class of resources.
- There is no need to allocate the production tax value to oil and to gas.

Alternatives to negative government take

In other words there are two approaches to the basic architecture of the production tax:

1. A high price sensitive tax rate, less a set of allowances to deal with new production, heavy oil, shale oil and natural gas, or
2. A lower fixed production tax, say 25%, plus a number of payments based on a windfall profit concepts or other formulas to differentiate between existing and new production and heavy oil, shale oil and natural gas.

This second approach merits further research.

It is also possible to develop a “hybrid” with option 1 used for light oil and option 2 for heavy oil, shale oil and natural gas.

Other issues

There are other issues:

1. The production tax is far too complex - The current complexity of the production tax is a strong disincentive for investment. **It can be strongly recommended to review the tax to see what changes can be made to reduce complexity.**
2. The production tax reflects a “short term” approach - Long term investments are discriminated against because the base price of \$ 30 is not adjusted for inflation or in other ways. This automatically makes long term investments relatively unattractive. Yet in order to achieve a higher level of production long term investments are required. **It can be recommended to adjust the \$ 30 per boe base price.**

Session 3

Making heavy fuel oil and shale oil economic

It is highly unlikely that oil production levels can be increased without significant investments in heavy oil and possibly shale oil.

This session will deal with:

- **Some general comments on heavy oil and shale oil**
- **Shale oil pilot projects**
- **Making heavy oil economic**
- **Making shale oil economic**
- **“Out of the box” concepts to make both heavy oil and shale oil economic.**

Session 3

Heavy Oil and Shale Oil

General

The production of heavy oil and shale oil are likely going to be expensive. Therefore, they will be discussed jointly in this session.

However, heavy oil and shale oil also are rather different:

- **Heavy oil is subject to traditional oil field development while shale oil will require pilot projects with subsequent development in small individual steps.**
- **Heavy oil is heavy (typically 22 degrees API or less), while shale oil is likely going to be comparable to current Alaskan crudes or lighter.**

Heavy Oil

General

Major heavy oil development may face significant challenges, since a mixture in the TAPS line of too much heavy oil may cause operational problems.

Major heavy oil development may have to be stimulated in conjunction expansion of light oil projects, with possible condensate and liquid stripping projects from gas fields (such as Point Thomson) and/or a construction of GTL plant(s) (with subsequent cracking of waxy components).

Alternatively, one could build upgraders fueled by cheap natural gas on the North Slope in order to upgrade heavy crudes to lighter crudes. It is not know at this time whether construction of upgraders would be a viable possibility.

Shale Oil

General

At this time it is not known whether shale oil production will be possible in Alaska. Pilot projects will be required to identify whether reservoir characteristics are of a nature that would permit fracking and would result in a sufficient flow of oil to make shale oil economic.

If shale oil would be economic, the resources may be quite considerable, for instance, in excess of several billion barrels. It is therefore very important for Alaska to identify whether shale oil is economic or not, under current economic and technical circumstances.

New shale oil developments will likely require major new infrastructure. The Federal permitting of this infrastructure and related environmental concerns could be a major stumbling block.

Heavy Oil

Options for Heavy Oil terms

The economics and cost of heavy oil will be very dependent on the gravity of the oil. Economics and costs rapidly deteriorate as heavy oil is heavier. This is therefore the basis for possible options to make heavy oil economic. These options are:

- Make royalties sensitive to gravity based on degrees API.**
- Create a special production tax allowance which is sensitive to the degrees API.**
- Provide both royalty and production tax relief.**

Heavy Oil

Gravity sensitive features

In general it may be possible to separate:

- **Heavy Oil - 15 – 22 degrees API – West Sak, Schrader Bluff, Orion, Polaris, Nikaitchuq.**
- **Ultra Heavy Oil – 10 – 15 degrees API - Ugnu**

Over 22 degrees API no special fiscal encouragement is required, other than “new” terms for new investment.

Fiscal incentives for Ultra Heavy Oil will have to be stronger than for Heavy Oil.

Heavy Oil

Gravity sensitive features

Essentially, there are three options possible:

- **Provide royalty relief, for instance:**
 - 60% of the royalties for heavy oil
 - 25% of the royalties for ultra heavy oil
- **Provide in addition to the allowance for “new” production a further allowance for “heavy” and a higher allowance for “ultra heavy” production.**
- **Apply both the royalty relief and production tax incentives.**

Heavy Oil

Gravity sensitive features

There are some disadvantages to lowering royalties:

- **Lowering royalties may open an “Pandora’s Box” of new issues related to royalties**
- **Lowering of royalties would have to be done in a manner that the contribution to the Permanent Fund of 25% of the royalty value remains unaltered.**

The main disadvantage of concentrating on production tax allowances is that this would significantly exacerbate the negative incremental government take issues. In turn this may be resolved through Option 2 (under the negative government take discussion).

Shale Oil

Options for Shale Oil terms

The main problem with fiscal terms for shale oil are:

- **It is unknown what the results of the pilot projects will be.**
- **Shale oil moves from the low cost “hot spots” to higher cost areas and therefore a fiscal systems has to be rather flexible in order to sustain shale oil investment and encourage such investment in the first place.**

Shale Oil

Options for Shale Oil terms

In order to promote shale oil development it is likely necessary to adopt the 45% - 55% government take range indicated in Day 1 and introduce a flexible system based on R-factors.

The R-factor could be for instance based on annual revenues over annual costs for the prior year. As an example, sliding scales with respect to royalty, production tax or both, could be designed in such a manner that the following overall levels of government take would be achieved:

R-factor = 0 - overall level of government take is 45%

R-factor = >2 - overall level of government take is 55%.

Between these two levels the R-factor for each month would be determined by linear interpolation.

Note: the levels of the R-factors and the variation of the royalties, production tax or both would need detailed research. Also the definition of the R-factor requires more work.

Shale Oil

Options for Shale Oil terms

The R-factor would apply after the pilot project phase, but the R-factor would be determined on the basis of the data of the prior year.

This may result in a situation where the R-factor may start low, gradually improve to the maximum level as the hot spots are being produced and over time again decline to lower levels as more expensive oil shale deposits are being produced.

The R-factor could still be combined with a price sensitive scale for the production tax, so under higher prices both the R-factor and the price sensitive scale would be higher.

In general it is recommended to evaluate an R-factor fiscal regime in order to promote shale oil development.

Heavy Oil and Shale Oil Summary

In order to achieve a relatively broad based and substantive approach to increasing Alaska oil production the levels of government take at current price levels could be approximately:

- **70%-75% for existing production**
- **60%-65% for new light oil production**
- **55%-60% for heavy oil production**
- **45%-55% for ultra-heavy oil production**
- **45%-55% for shale oil based on an R-factor.**

The precise levels of government take would require more research.

Heavy Oil and Shale Oil

“Out of the Box” option

It is possible to make Heavy Oil and Shale Oil economic with entirely new concepts.

The main obstacle to enhanced economics are the royalties. Jurisdictions such as Norway, Denmark and Newfoundland & Labrador are successful with simply gaining government take through direct state participation.

Considerable improvements in IRR or NPV10/BOE (working interest) could be obtained if the royalty would simply be replaced by a direct participation share, for instance a 12.5% royalty could be replaced by a 25% participation share owned by an Alaska State investment company. The Alaska State investment company would then be responsible for contributing the equivalent of 25% of the royalties to the Permanent Fund.

Session 4

Making natural gas economic

Under Session 2 an Option 3 was recommended for natural gas with respect to the BOE issue. It was recommended to evaluate a separate scale for gas, which starts at a lower BOE benchmark but increases steeper.

At the same time on Day 1 it was concluded that it will be difficult for Alaska gas to enter the North American market or Asian LNG market. To compete in the Pacific market the government take on gas has to be in the 45% - 55% range.

Session 4

Making natural gas and GTL economic

This session will deal with:

- **Lower base production tax rates**
- **Low royalty with improved production tax scale**
- **“Out of the box” concepts to make both heavy oil and shale oil economic.**
- **GTL projects**

Natural gas

Lower base production tax rates

In principle the production tax rate could be set a 0% starting point for gas rather than a 25% starting point in order to enhance the ability to aggressively enter the market and sustain low prices.

However, this option would not overcome the fact that the royalty on gas would remain a significant component off the netback inhibiting the ability to offer aggressive prices. For instance, with a netback value for gas of \$ 4 per MMBtu and a 12.5% royalty, a royalty of \$ 0.50 per MMBtu will have to be paid. This means gas prices have to be \$ 0.50 higher than those for certain competitors, such as Russia, in order to get the same net margin.

This will make it difficult to compete.

This option is therefore not recommended.

Natural gas

Lower royalties

The most significant support that Alaska can give a gas project is to release producers of the obligation to pay 75% of the royalty and require only payments for the 25% of the royalty to go to the Permanent Fund.

The production tax sliding scale could then be adjusted to reflect this new lower royalty.

Such a structure would permit Alaskan producers to compete effectively in both the North American and Asian markets.

This option is recommended.

Natural Gas

“Out of the Box” option

It is possible to make also for gas to convert the royalty in a high level of Alaska State participation.

As discussed for heavy oil and shale oil, considerable improvements in IRR or NPV10/BOE (working interest) could be obtained if the royalty would simply be replaced by a direct participation share, for instance a 12.5% royalty could be replaced by a 25% participation share by an Alaska State investment company. The Alaska State investment company would then be responsible for contributing the equivalent of 25% of the royalties to the Permanent Fund.

This would be a highly effective option to enter the market and compete both in the Pacific and for the North American market.

Cost Recoverable Subsidy for a 1 Bcf LNG export project by pipeline

In order to encourage an a 1 Bcf export Alaska gas line one could apply a cost recoverable subsidy.

Alaska would fund a subsidy for the gas line in order to cap transport costs at \$ 1 per MMBtu. This may involve billions of dollars of subsidies compared to a commercial gas line.

Alaska could recover these costs through a share of a windfall profit margin. The revenues from the windfall profit margin would be dedicated to a recovery of the subsidy.

Cost Recoverable Subsidy for a 1 Bcf LNG export project by pipeline

**The windfall profit margin would work as follows, as an example
in terms of values per MMBtu:**

Japan gas import price	- \$ 16.00
LNG transport and liquefaction	- \$ 4.00
Windfall profit margin	- \$ 8.00

Value of natural gas fob Kenai	- \$ 4.00
Pipeline transport	- \$ 1.00
Conditioning	- \$ 1.00

Netback to producers	- \$ 2.00

**For instance, the State of Alaska may recover 75% of the
windfall profit margin. In this case \$ 6.00 per MMBtu**

GTL

GTL projects would typically be subject to the natural gas terms with respect to the upstream.

A GTL project would otherwise be a midstream project and would therefore be subject to similar fiscal terms as a refinery.

It would be difficult to stimulate investment in GTL projects unless there is a procedure for approving the feed gas price. In order for GTL projects to be attractive feed gas prices would have to be low.

Preferably, legislation should fix the feed gas price criteria that the Alaska Government may agree to.

Session 5

Implementation of new terms

This session will deal with:

- **Administrative implementation of new terms**
- **Contractual relationships**

Session 5

Implementation of new terms.

With respect to light oil for existing and new production it seems that no particular implementation measures need to be taken. It is likely that investors will respond positively to the new terms and make the necessary investments.

With respect to heavy oil, shale oil, natural gas and GTL it is unlikely that investors will commit to large multi-billion dollar programs unless there is a degree of fiscal stability in a contractual framework.

Session 5

Contractual relationship

With respect to the past gas projects the process that was followed was that:

- **Companies indicated interest in a project**
- **The Government and companies negotiated a contract with specific fiscal terms and commitments**
- **The contract was submitted for approval by the Alaska Legislature.**

If Alaska want a broad based effort to have large scale investment in heavy oil, shale oil, natural gas and GTL, it can be recommended to invert the process.

Session 5

Contractual relationship

The new process would be:

- **The Alaska Legislature approves fiscal terms for heavy oil, shale oil, and natural gas and GTL feed gas prices.**
- **The Alaska Legislature approves that Alaska may enter into specific contracts for the development of heavy oil, shale oil, natural gas or GTL projects which provide for:**
 - **Certain minimum work obligations**
 - **Fiscal stability on fiscal terms for a certain period.**
 - **A limited contractual term.**

Contractual relationship.

Based on these prior approvals the Government of Alaska would be authorized to sign contracts, without further legislative approval.

It is understood that the matter of fiscal stability would be an issue to be brought for the Alaska Supreme Court.

Summary

With the appropriate fiscal and contractual framework Alaska can achieve:

- **1 million barrel per day throughput through the TAPS line, and**
- **Significant LNG exports to the Pacific market.**