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Oil and Gas Energy Efficiency The Business Case (2005)

October, 2005

Outline

- Background
- Primary Energy Economics - Capital Focus
- Size of the Oil and Gas Prize
- Realizing the Prize has a Cost
- Efficiency with Minimum Producer Capital
- Recommendations - The Road Forward
- Business Case Summary

Why an Energy Efficiency Business Case?

- PTAC Facilitates to Improve Industry Performance
- Unique challenge in that more than half of the energy used is “Off-the-Books”
  - No immediate bottom-line loss in revenue, or reduction in costs that impact shareholder decisions
- Previous Business Case Focused on the Prize
  - Estimated $1 billion/yr savings are still there and are even larger as energy use and prices rise
- PTAC Questionnaire in early 2004 indicated interest in Energy Efficiency but many barriers to implementing
    - Lack of Data; People; Capital Funds
- Other groups need to understand limits of the possible

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Energy Efficient Oil and Gas Recovery

- Future energy resources will be more energy intensive to recover.
- Learning how to be more efficient now develops tools needed for the future
  - Conventional Oil - More Enhanced Oil Recovery (EOR)
  - Heavy Oil - What follows primary heavy oil production?
  - Bitumen - More production with less energy --> Lower quality sands over time
  - Natural Gas - Lower pressure sources (Coal Bed Methane and unconventional gas) require more compression of gas from smaller sources

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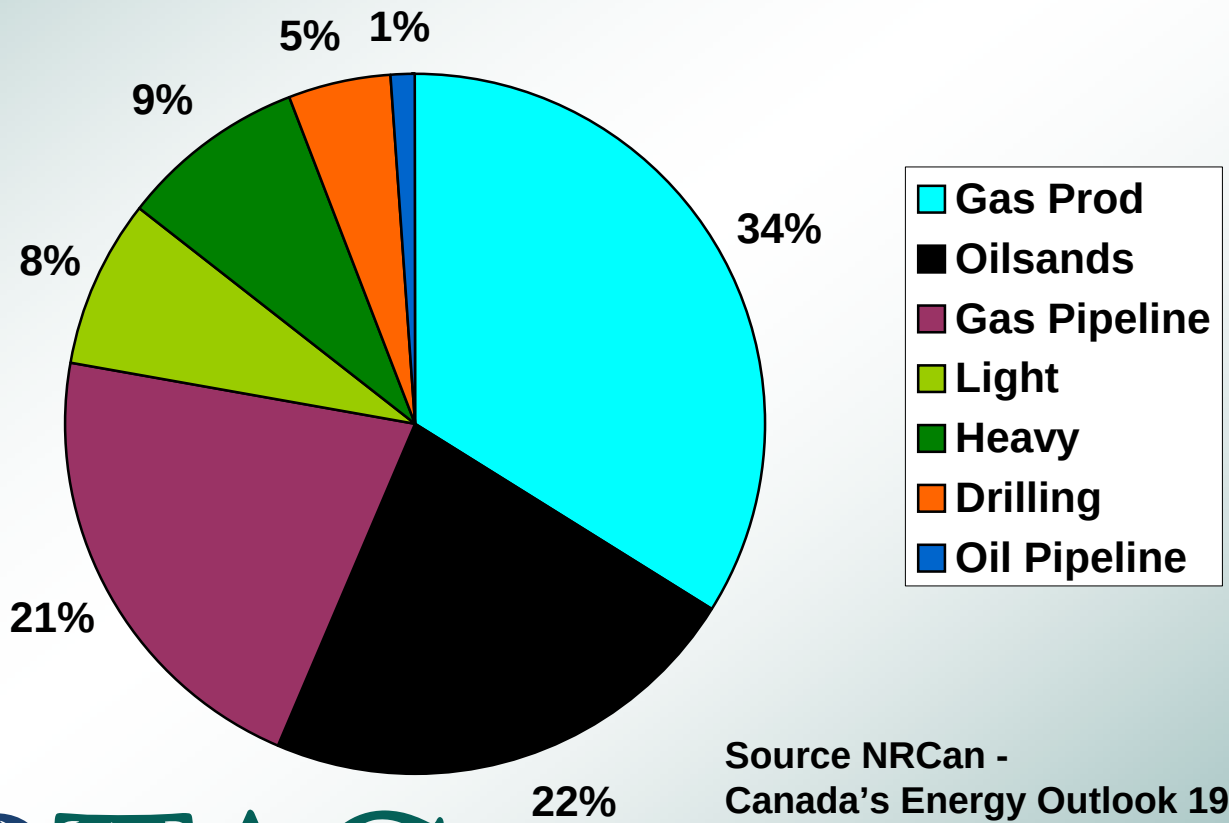
Upstream Oil and Gas Energy Use - Projected 2005 = Over 1,300 PJ/yr



Source NRCan -
Canada's Energy Outlook 1996-2020
And Update

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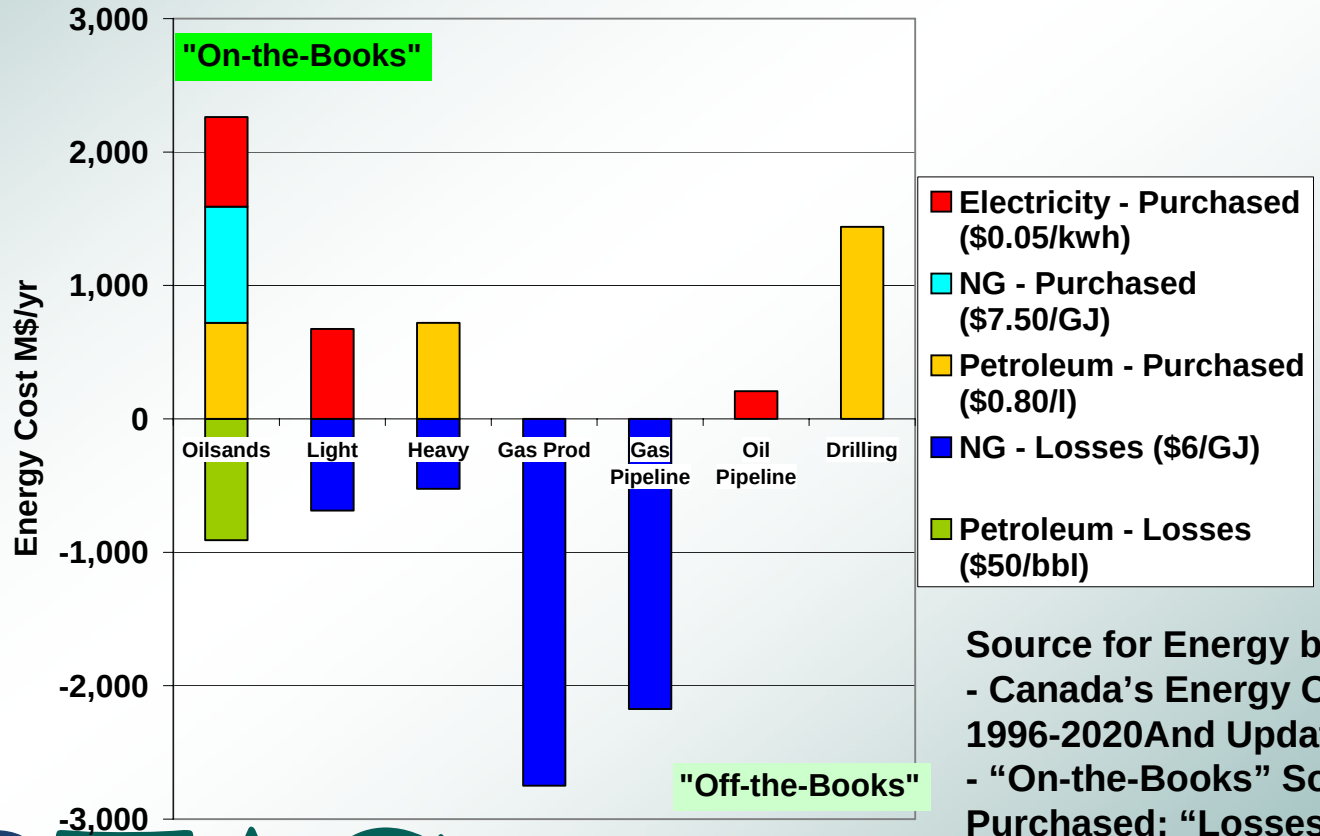
Estimated Value of 2005 Energy Use by Canadian Fossil Fuel Production Industry - Over $12 Billion/yr



Source for Energy by Type - Canada's Energy Outlook 1996-2020And Update
- "On-the-Books" Sources Purchased; "Losses" are production used as fuel.
- Prices used arbitrary.

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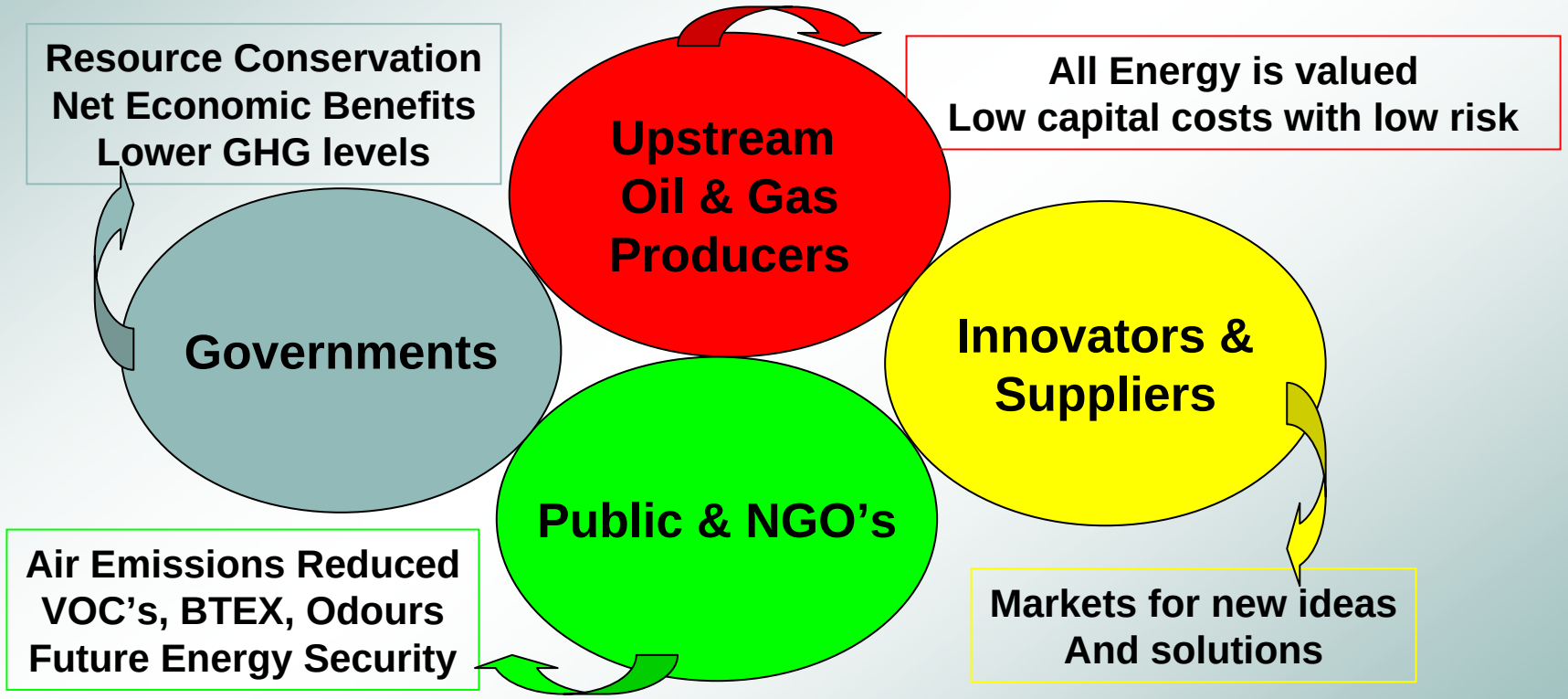
Current Aspirations of Oil and Gas Industry Stakeholders



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Primary Energy Economics - Capital Focus

- Just because Energy Efficiency (EE) is economic doesn't mean it will be implemented by primary producers.
- Producers and owners of the resource must balance investment in energy efficiency vs. development
  - Consumer push is to increase supplies, keep prices down for consumers = development
  - Sustainability push to reduce GHG emissions and conserve resources for the future = energy efficiency
- Result is a short payout window for primary oil and gas producers to implement conservation, unless it is regulated or influenced by other factors.

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Possible Energy Efficiency Tiers

1. **Technically Achievable - Regulation Driven**
   - **Should already be there for existing regulations**
   - **Some response time to implement new regulations**
2. **Low Hanging Fruit - <1 yr payout (Why not?)**
   - **Mainly operational, low or no capital**
3. **Practically Achievable - 1-2 yr payout (Expected)**
   - **Increase recovery, decrease fuel, new products**
4. **Economically Achievable - +ve PV (Conservation)**
   - **Generally the desire of resource owners (Provinces)**
5. **Technically Achievable - -ve PV (Offset benefits)**
   - **Critical or +ve on Environment, Health, Safety**

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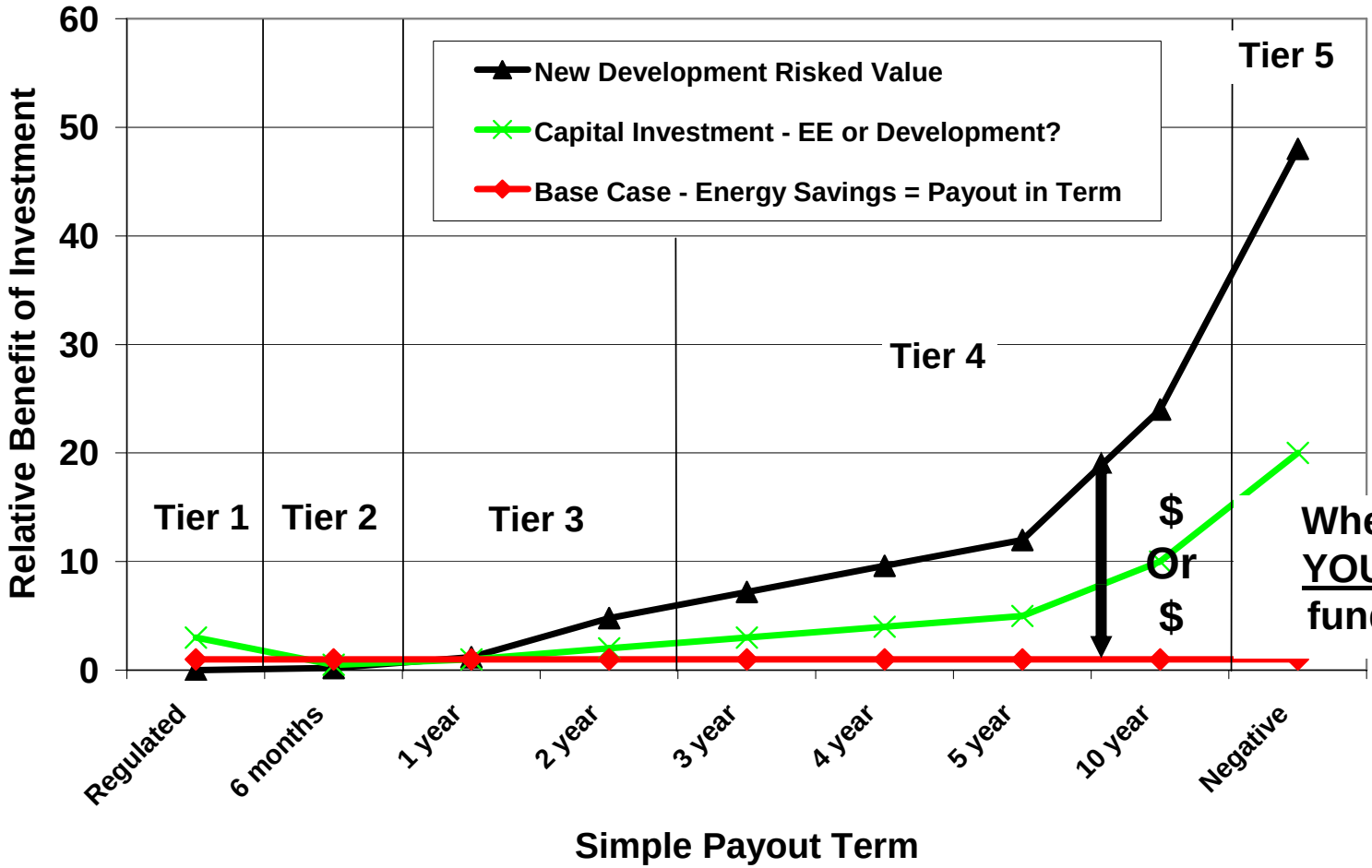
Economics Full Range



Where would YOUR Pension fund invest $?

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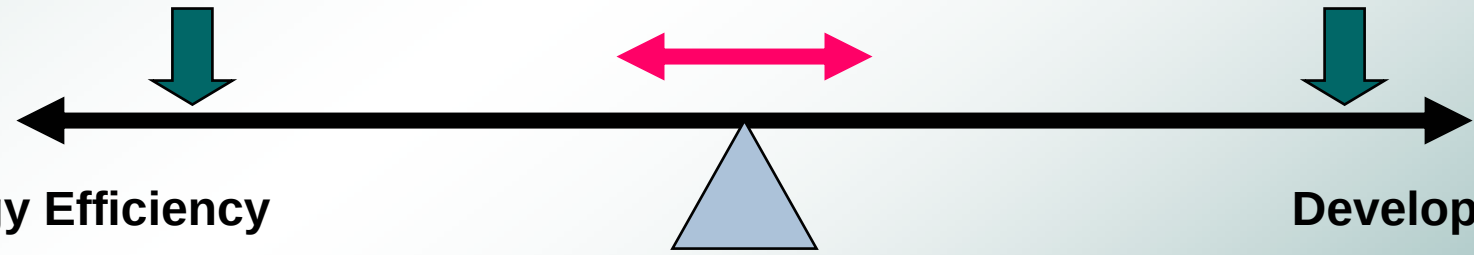
Economic Balance of Energy Efficiency vs. Development

Lower Return on Capital
Present Value Driven
More People Required
Long-term View
Sustainable Growth

Higher Return on Capital
Payout Driven
Fewer People Required
Short-term View
Rapid Growth

Who Determines the Desired Balance?



Energy Efficiency

Development

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What Would Change the Balance?

Current Paradigm - Corporate Fiduciary Responsibility to Shareholders is to Maximize Development

Alternate Paradigm - Energy Efficiency

- **1) Regulations - Get all Energy Use "On-the-Books"**
  - **Easiest to Implement on a consistent basis**
- **2) Shareholders - Direction to Corporate Management**
- **3) Public Image - Public Influence on Corporate Activities**
- **4) Executive Leadership - CEO applauded (or fired!)**
- **5) Stewardship - Peer pressure, corporate image and competitive edge**

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Size of the Prize - Conventional

- Over $1 billion/yr in Conventional Oil and Gas Sectors
- Compression - Monitoring and Control - Over $400 M/yr
  - Improve efficiency of engines and reduce recycle (15%)
- Flaring and Venting - Over $200 M/yr
  - Solution Gas conserved to 98+% for all companies
- Heavy Oil Trucking - Over $150 M/yr
  - Extend sales pipelines to reduce haul distances.
- Improve Field Heaters - Over $100 M/yr
  - Upgrade heaters and shutdown unnecessary heaters
- Reduce Power Purchases - Over $100 M/yr
  - Convert to more Distributed Power Generation
- Other Sources - Over $50 M/yr

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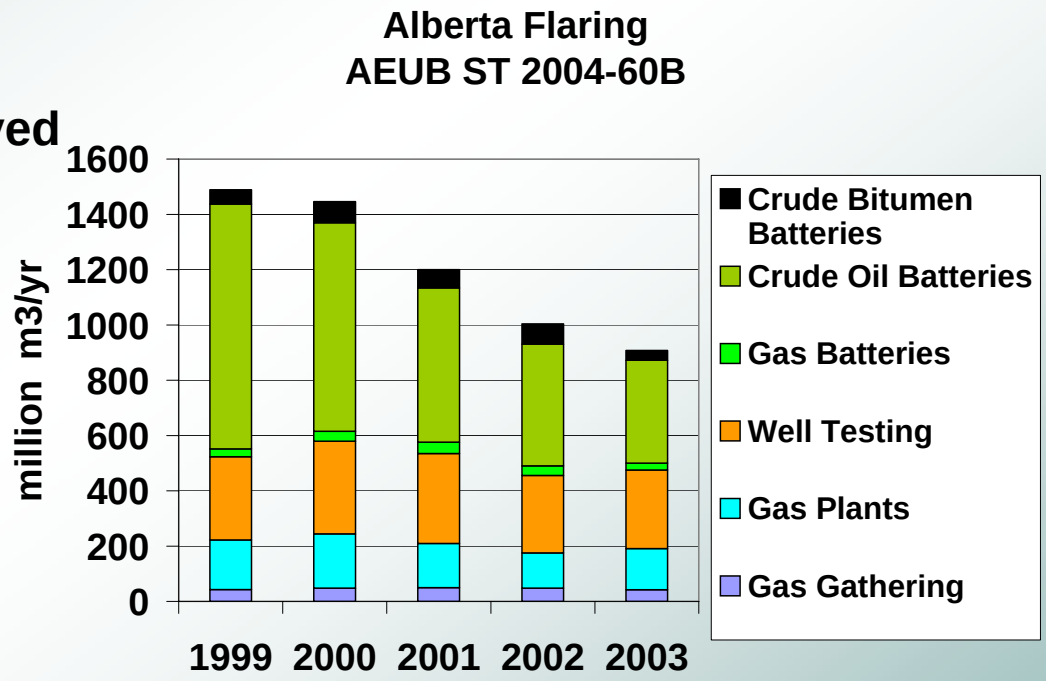
e.g. Flaring & Incineration

Quick Facts:

- **Alta Reduced 70% since 1996**
- **Over 95% solution gas conserved**

Results due to motivation:

Tougher Alta Regulation
Higher Gas Prices
End of Gas Supply Bubble



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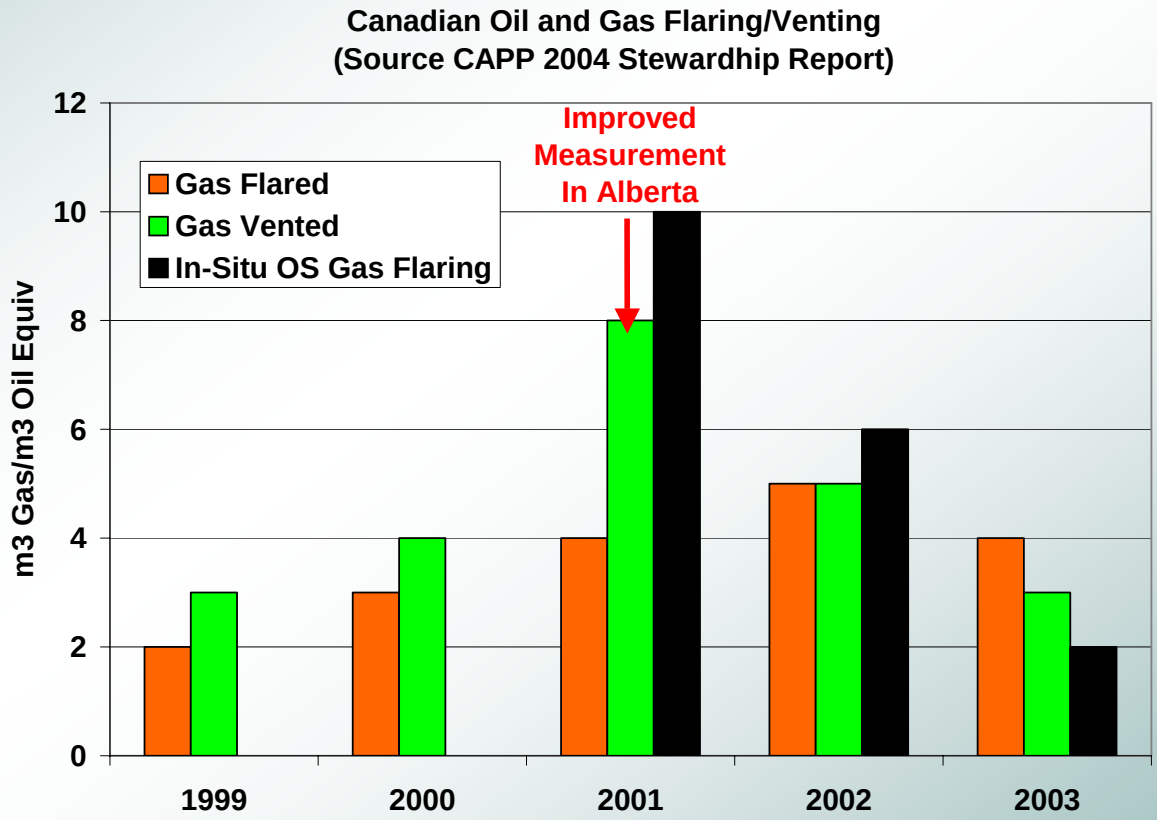
Canadian Motivation Not So Good!

CAPP 2003 data:
Solution gas flaring
- **Alta = 372 M m3/yr**
  = 37% of total
- **Total = 993 M m3/yr**

- **Conventional Oil**
- **Alta = 45%**
- **Sask = 30%**
- **Offshore = 20%**
- **Rest = 5%**



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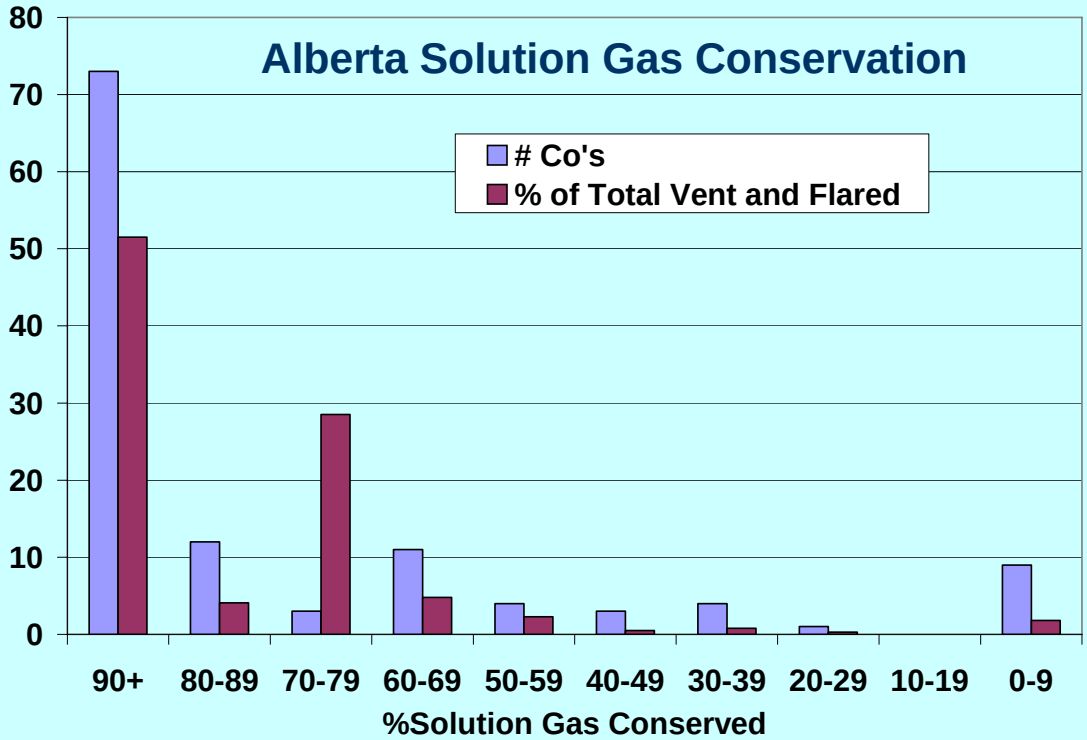
Some Companies not as Motivated as Others - Barrier is NOT Technology

Quick Alta Facts:

- **Already reduced by 40% between 2000 and 2003 saving = $115 M/yr**
- **More Still Possible:**
- **Current Average 95%**
- **If all conserved 98+% = 533,000 E3m3/yr (64%) = $110 M/yr @ $6/GJ**

- **One company responsible for 30% of Flaring and Venting**



Source AEUB ST2004-60B

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Size of the Prize - Oilsands

- Likely over $500+ Million/yr in Oilsands - And Growing!
- Cogeneration for Power and Heat
  - Already over 1,000 MW of Cogen (70-80% eff) in Oilsands replacing Coal Power (30% eff)
  - Oilsands excellent locations for Cogen as they need large amounts of power and heat
- Shift to lower cost “Off-the-books” energy
  - Energy self-sufficiency is the goal. On-site upgrader provides fuel for steam and power for Mining and SAG-D
  - Reduces energy needed to supply gas, power, etc.
- Process Efficiency Improvements
  - Continually needed as production moves into lower quality sands, which will increase energy intensity.

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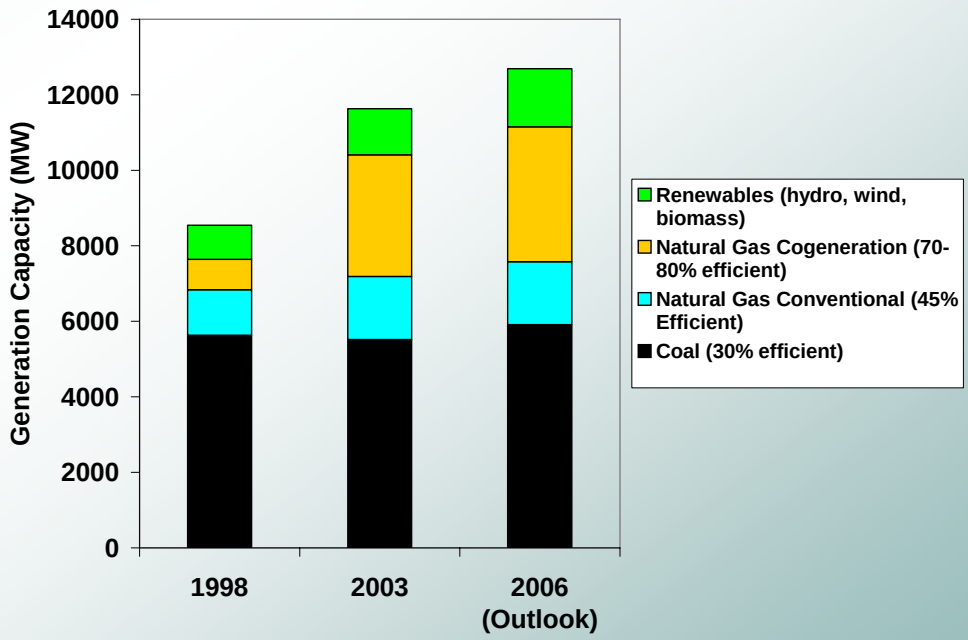
Co-Generation

Quick Facts:

- Stand alone power generation Efficiency - 30-50%
- Buy power - $20/GJ
- Cogen Efficiency - up to 80%
- On-site cogen - $3.75/GJ

The Growth of Cogeneration in Alberta after Deregulation



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Realizing the Prize has a Cost

- Every prize has a cost - Regulation, Payout or PV
- Conventional Oil and Gas Prize and Cost by Tier?????
  - Tier 1 - $175 M/yr - Cost --> $350 M (Avg payout 24 mos.)
    - New regulations for Flaring and Venting in Alta/Sask
  - Tier 2 - $185 M/yr - Cost --> $93 M (Avg payout 6 mos)
    - Reduce recycle; equipment S/D; Reduce Power Use
  - Tier 3 - $300 M/yr - Cost --> $450 M (Avg payout 18 mos)
    - Compression; More vent gas; Improve heaters
  - Tier 4 - $400 M/yr - Cost --> $1,200 M (Avg payout 36 mos)
    - Extend HO Pipelines; Compression; Cogen or DG
  - Tier 5 - $20 M/yr - Cost --> $100 M (Avg payout 60 mos)
    - Methane vent mitigation; reduce well test emissions
  - Total $2.2 B vs. Conventional Capital = $26.8 B/yr (2004)

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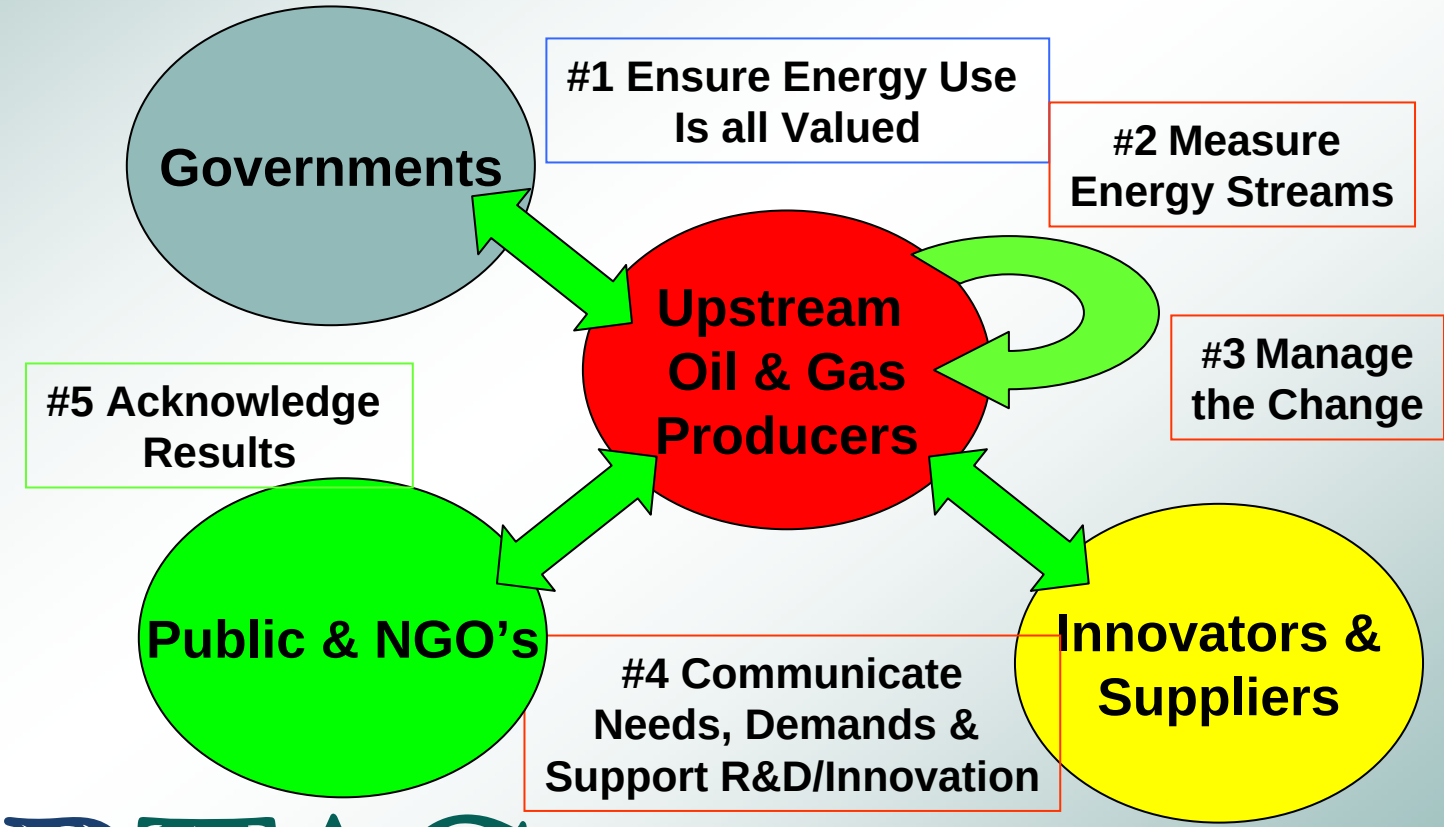
Getting to the Win-Win



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Summary

- Energy Efficiency Improvement is hindered by the Increasing demand for production growth which competes for capital
- Much can be accomplished with little capital by focusing on increased measurement and energy management.
  - “You can’t manage what you don’t measure”
- The potential prize is large:
  - Tier 1-3 - Can and should be implemented
  - Tier 3-4 - Long-term opportunities require new motivation
- Improve efficiency of all parts of the energy supply system, while reducing energy demands by end-users

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Contact Info

- Petroleum Technology Alliance Canada (PTAC) www.ptac.org
- New Paradigm Engineering Ltd www.newparadigm.ab.ca