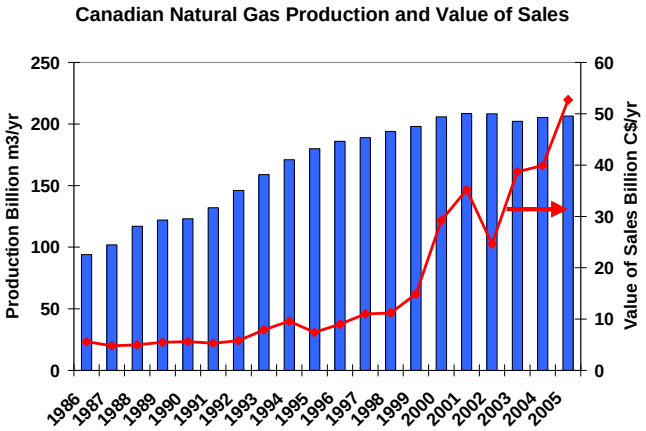
PTAC Knowledge Centre
Upstream Oil and Gas Energy Efficiency

Sweet Gas Plant = Minimize Fuel Inputs and Methane Leakage

1. Quick Facts[1]:



- Total Sweet Gas Prod. = 140 billion m^3/yr
- Percentage of Gas that is Sweet = 70%
- Product Energy Intensity (PEI) = 1.4 GJ/m^3OE for sweet gas production
- Energy Cost - Production = $1.1 B$/yr
- Gas Plant Operating Costs = $1.6 billion $/yr (excluding fuel)
- Assumed Fugitive Methane Emissions from Sweet Gas Plants = 1% of Production
- Value of Fugitives = $133 M$/yr
- GHG From Fugitives = 12.4 $MtCO_2eq$/yr
- Energy Values:
  a. Electrical Power @ $20/GJ
  b. On-site Gas Used as Fuel or Lost as Fugitives @ $6/GJ

2. Key General Documents on Sweet Gas Production and Energy Issues

a. ***Improving Gas Plant Efficiency Workshop*** – These workshops hosted by CETAC-West offer suggestions for improvements based on a number of integrated energy audits completed by CETAC-West and a number of experts in various gas plant systems http://www.ptac.org/eea/dl/eeaw0301fr.pdf .

b. **CETAC-West/PTAC Energy Efficiency Workshop January, 2007** – See the latest presentations on energy efficiency in sour gas and other operations: http://www.ptac.org/eet/eetw0701p.html . Key Presentations to review include:
   i. **Amine Sweetening, Unit Operations Optimization Tools, Sulphur Recovery/Incineration** – http://www.ptac.org/eet/dl/eetw0701p01.pdf
   ii. **Acid Gas Removal** Duke Energy http://www.ptac.org/eet/dl/eetw0701p28.pdf

c. ***"Vent Options for Gas Plant and Compression Facilities"*** New Paradigm 2001. This document discusses ways of detecting and mitigating fugitive leaks. Available on the PTAC website: http://www.ptac.org/links/EnergyEfficiencyKC/eekc0506.pdf

[1] Sources for most statistical data are *CAPP Statistical Handbook, CAPP Stewardship Report 2004*, or other CAPP documents.

3. **Information on New Energy Options for Sweet Gas Plant Operations**
    a. **Reduction of Fugitive Leaks to Flare and Atmosphere** – Methane is a colourless, odourless and lighter-than-air gas which quickly dissipates from leaks which are difficult to find but usually easy to mitigate with maintenance. Past maintenance practices, implemented in times of low gas value, should be reviewed to include more effort on reduction of fugitives from leaks. Building LEL gas detectors, while useful for detecting bulk concentrations of methane, do not indicate leaks escaping through open doors, roof vents and other openings. Many midstream and downstream users of natural gas have developed improved leak detection and mitigation methods which could be used in upstream operations.
    b. **Integrated Energy Audits of Sweet Gas Plants –** Integrated audits conducted by CETAC-West have shown significant potential energy savings, fuel gas and electrical, in energy intensive sweet gas facilities.
    c. **Co-Generation Potential in Sweet Gas Fractionation Plants –** May 1991 CAPP report "CO2 Reduction through Energy Conservation" estimated that there would be over 80 MW of cogeneration potential in Alberta's fractionation plants. At the time this was uneconomic due to regulation and low power prices barriers that should no longer hinder this opportunity
    d. **Slipstream Technology PTAC RFP** – Technology draws fugitive emissions into compressor engine intakes to reduce methane emissions and improve energy efficiency. http://www.ptac.org/eet/dl/eetw0701p16.pdf

4. **Financial Support for Change**
    a. Federal
        i. Financial Assistance for Industry http://oee.nrcan.gc.ca/industrial/financial-assistance.cfm?attr=24

5. **Key Reports on Volumes, Trends and Environmental Impacts**
    a. ***"A National Inventory of Greenhouse Gas (GHG), Criteria Air Contaminant (CAC) and Hydrogen Sulphide (H2S) Emissions by the Upstream Oil and Gas Industry Volume 1, Overview of the GHG Emissions Inventory"*** CAPP Publication prepared by Clearstone Engineering http://www.capp.ca/raw.asp?x=1&dt=NTV&e=PDF&dn=86220.
    b. ***"Business Case for Energy Efficiency in the Upstream oil and gas Industry"*** – PTAC March 2006 –This report highlights the total cost of energy use in the upstream oil and gas industry, both on-the-books and off-the-books. An estimated $4.5 billion was the Canada wide cost of compression in field, gas plant and transmission compression. http://www.ptac.org/links/dl-eie/bcee0601.pdf
    c. ***"Canada's Energy Outlook: The Reference Case 2006"*** NRCan – Contains information on energy use by sector, fuel type, and resulting emissions. http://www.nrcan.gc.ca/inter/pdf/outlook2006_e.pdf