

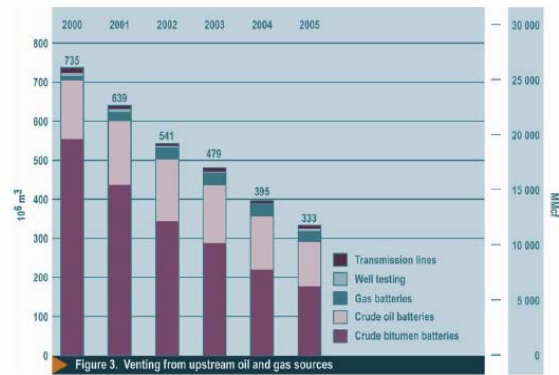
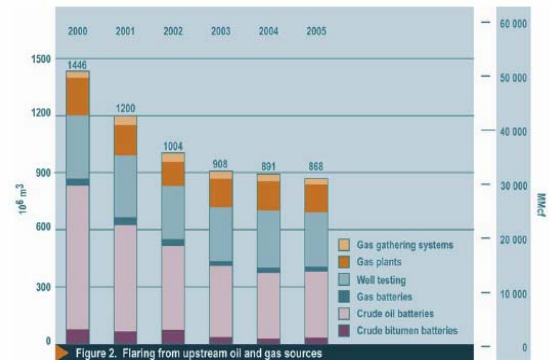


**PTAC Knowledge Centre  
Upstream Oil and Gas Energy Efficiency**

**Oil Batteries = Conserve Gas, Minimize Investment in Heating Water**

**1. Quick Facts:**

- In 2005 Alberta solution gas conservation = 96.3% (See plots below from Flaring and Venting report EUB ST60B-2006)
- Assumed solution gas value = \$6/GJ
- Volume Flared or Vented in Alberta = 14 m3 gas/m3 oil = 0.5 GJ/m3 of oil = \$3/m3 of oil.
- Value of Gas Flared in Alberta = \$189 million/yr
- Value of Gas Vented in Alberta = \$84 million/yr
- Each m3 of water takes twice as much energy to heat than a m3 of oil.
- At an average WOR of 17 m3 water/m3 oil it will take about 2 GJ of gas/m3 of oil of to heat the production stream by 50 degrees C, at 50% efficiency = \$12/m3 of oil.
- Value of energy to heat water in Alberta = 1 b\$/yr
- Vents, flares and water heating could consume as much as 7.5% of the energy in each m3 of oil produced at a total cost of about \$1.25 billion/yr. Another 7.5% will be used to pump fluids (mainly water) to surface and re-inject the water.



**2. Key General Documents on Oil Battery Energy Efficiency Issues**

- a. API Publications on Artificial Lift Exploration and Production Series 11: production equipment. <http://www.api.org/Publications/>
- b. Artificial Lift Equipment – Enform Course on Artificial Lift. [http://www.pits.ca/technology\\_programs/field\\_production\\_programs/artificial\\_lift\\_systems.htm](http://www.pits.ca/technology_programs/field_production_programs/artificial_lift_systems.htm)
- c. Water Management – **“Produced Water and Associated Issues”** Rodney R. Reynolds, PTTC 2003, [http://www.pttc.org/pwm/produced\\_water.pdf](http://www.pttc.org/pwm/produced_water.pdf). This 65-page document is an excellent manual for water issues for the independent operator and covers a range of topics.
- d. Vent and Flare Gas Reductions - **“Vent Options for Oil and Gas Production Facilities”** – New Paradigm 2001. This report may be viewed on the PTAC website: <http://www.ptac.org/links/EnergyEfficiencyKC/eekc0505.pdf>.

### 3. Information on New Energy Options for Oil Battery Efficiency Issues

- a. **Artificial Lift R&D Council** – [www.alrdc.com](http://www.alrdc.com)
- b. **Fire-Tube Immersion Heater Efficiency Project** – PTAC/TEREE and ENEFEN Engineering Efficiency Engineering Presentation  
<http://www.ptac.org/eet/dl/eetf0401p09.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. Regulations and Oil Batteries Sources

- a. Alberta: AEUB Guide 60 <http://www.eub.ca/docs/documents/directives/Directive060.pdf>
- b. Saskatchewan: SIR – [www.ir.gov.sk.ca](http://www.ir.gov.sk.ca)
- c. B.C. Oil and Gas Commission <http://www.ogc.gov.bc.ca/>

### 6. Key Reports on Volumes, Trends and Environmental Impacts

- a. **“Upstream Petroleum Industry Flaring and Venting Report - Industry Performance for Year ending December 31, 2005”**, AEUB October 2006 shows vent volumes by company. Available on the EUB website:  
[http://www.eub.gov.ab.ca/bbs/products/STs/st60B\\_current.pdf](http://www.eub.gov.ab.ca/bbs/products/STs/st60B_current.pdf)