Questions to be answered today

1. What is the business case for a U.S. oil and gas company to do a greenhouse gas inventory?
2. What are Chevron’s methods for conducting their inventory?
3. What were some major lessons learned?
Political Realities

- Kyoto Protocol has entered into force
- EU has established an Emissions Trading Scheme:
  - Chevron has compliance obligations at five installations
- And in the United States...
  - Several federal bills have proposed GHG registry, monitoring, and/or cap-and-trade systems
  - Several State have initiatives under development:
    - California Executive Order & California Global Warming Solutions Act of 2006
    - Northeast States’ Regional Greenhouse Gas Initiative
    - Western Coast Regional Partnership
Chevron’s Climate Change Position and Action Plan

At Chevron, we share the concerns of governments and the public about climate change. We developed a formal, business-driven climate change strategy in 2001, comprising a four-fold action plan.

- **Reduce greenhouse gas emissions (GHG) and increase energy efficiency**
- **Support flexible & economically sound policies and mechanisms that protect the environment**
- **Invest in research, development, and improved technology**
- **Pursue business opportunities in promising innovative energy technologies**
## Chevron’s Four-Fold Plan of Action: Sample of business-driven activities

<table>
<thead>
<tr>
<th>Strategy element</th>
<th>Key actions</th>
</tr>
</thead>
</table>
| 1. Reducing emissions of (GHGs) and increase energy efficiency | Set GHG emissions goal (*generally one year out*)  
Implement energy efficiency programs  
Overcoming gas-to-market barriers: established standards -- and taking action -- to reduce venting & flaring of natural gas  
Analyze cost of carbon scenarios in capital project planning |
| 2. Investing in research, development and improved technology | Ongoing research and technology development, e.g. carbon dioxide capture & storage in geologic formations |
| 3. Pursuing business opportunities in promising, innovative energy technologies | Offer services to help organizations implement energy efficiency, renewable and alternative energy projects, e.g., CES  
Selective investments in alternative and renewable technologies, e.g., geothermal development, CTV’s hydrogen business unit |
| 4. Supporting flexible and economically sound policies and mechanisms that protect the environment. | Engagement under the Kyoto Protocol: comply with European Union Emissions Trading Scheme and develop projects under the Clean Development Mechanism  
Ongoing public policy activities |

Source: adapted from 2004 CVX CR Report
The Development of SANGEA™

- The software tool used to collect Chevron’s worldwide
  - greenhouse gas emissions
  - Energy use information
  - criteria pollutant emissions
- Linchpin of Chevron’s Global GHG Strategy

“You can’t manage what you don’t measure!”
Conventional Systems

**Protocol Document**
- Boundaries
- Methodologies
- Factors

**Numerous User-Developed Systems to Implement Inventory Protocol**

**Simple Data Form**

**Corporate Database**

- Inefficient
- Inconsistent to Support
- Does Not Encourage/Facilitate/Standardize Audit Trail Information

**Hard Copy Manuals Difficult to Control Revisions**

**SANGEA**

Total and Equity CO₂, CH₄, CO₂(e) for Each Reporting Entity
SANGEA GHG Inventory System

Front End - SANGEA Users

- Monthly Data Collection and Analysis
- Local Analysis, Forecasting Planning
- Locally Configured Spreadsheet

Back End - Team SANGEA

- Technical Support
- Oracle Database
- Quarterly Reports
- Annual Corporate Aggregation and Reporting

Tailored Reports
What is SANGEA cont.

Specifically designed for the petroleum industry

By Segment
- Exploration & Production
- Transportation
- Distribution
- Refining
- Retail marketing

By Processes
- Flashing
- Coke Combustion
- Hydrogen plants
- Glycol dehydrator
- Sulfur Recovery Units
SANGEA™ Software

Gases Included:
- Carbon Dioxide
- Methane
- Nitrous Oxide

Emission Sources:
- Fuel combustion
- Process emissions (crude loading and storage)
- Flaring & Venting
- Fugitive Emissions
- Indirect Emissions (electricity and steam)
- Miscellaneous

Organizational Boundaries
- Operated Only
- Equity Basis

Operational Boundaries
- Direct Emissions
- Indirect Emissions
- Energy export

Designed to be compatible with the IPIECA Guidelines and the API Compendium
Implementation of the SANGEA™ System

- 2001 – Roll-out throughout ChevronTexaco
- 2002 – First full year of GHG inventory data collection
- 2003 – Preparation for third-party verification
  - Request for Proposals
  - Selection of verifiers
  - Phase 1 initiated
- 2004 – Verification work completed
- 2005 and beyond
  - Continue quarterly reporting and annual inventory
  - Maintain high-quality inventory through internal Management System and possible 3rd-party reviews
What’s Great about SANGEA™

- Available free of charge
- Based on API Compendium methodology
- API committed to keeping system up to date
- In use at a major international petroleum company for more than four years
- Verified by a third-party audit.
- Flexible and customizable for the energy industry
Emissions Inventory Summary

- If you don’t measure it, you can’t manage it—a credible inventory is fundamental to the CVX corporate greenhouse gas strategy
- SANGEA standardizes methods for calculating, reporting, and tracking emissions across CVX operations
- Program undergoing continuous improvement
Actions and Results

- Greenhouse gas emissions accounting has become standardized -- CVX SANGEA™ software has the key role.
- CVX energy efficiency improved 24% from 1992. US refinery plans an additional 10% by 2012 via API commitment to the US.
- CVX to reduce upstream flaring/venting in Nigeria and Angola. F/V is 24% of CVX GHG.
- Gorgon Project – state-of-art CO2 reinjection program planned in Australia (2-3 million metric tons per yr).

Note: 2002, 2003, and 2004 Equity share emissions do not include Chevron Phillips Chemical and Dynegy. Other includes shipping, power & gasification, coal & corp. services.
2005 GHG emissions reported as 59.7 million tonnes CO2e (excluding Unocal)

Met 2005 goal - no net increase in GHG emissions compared with 2004.

Estimate for 1Q 2006 GHG emissions is 15.9 million tonnes CO2e.

On target to meet preliminary goal for 2006 of 68.5 million tonnes CO2e.
Lessons Learned

Like in Financial Accounting, GHG emission can be estimated and reporting using different methodologies. API Compendium has a variety of approaches to GHG estimation.

• Units matter!
• Equity share matters!
• Using site specific gas values makes the inventory MUCH more accurate!
• Focus on continuous improvement!