Challenges of Greenhouse Gas Inventories

Bruce Beynon
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Chevron

Questions to be answered today

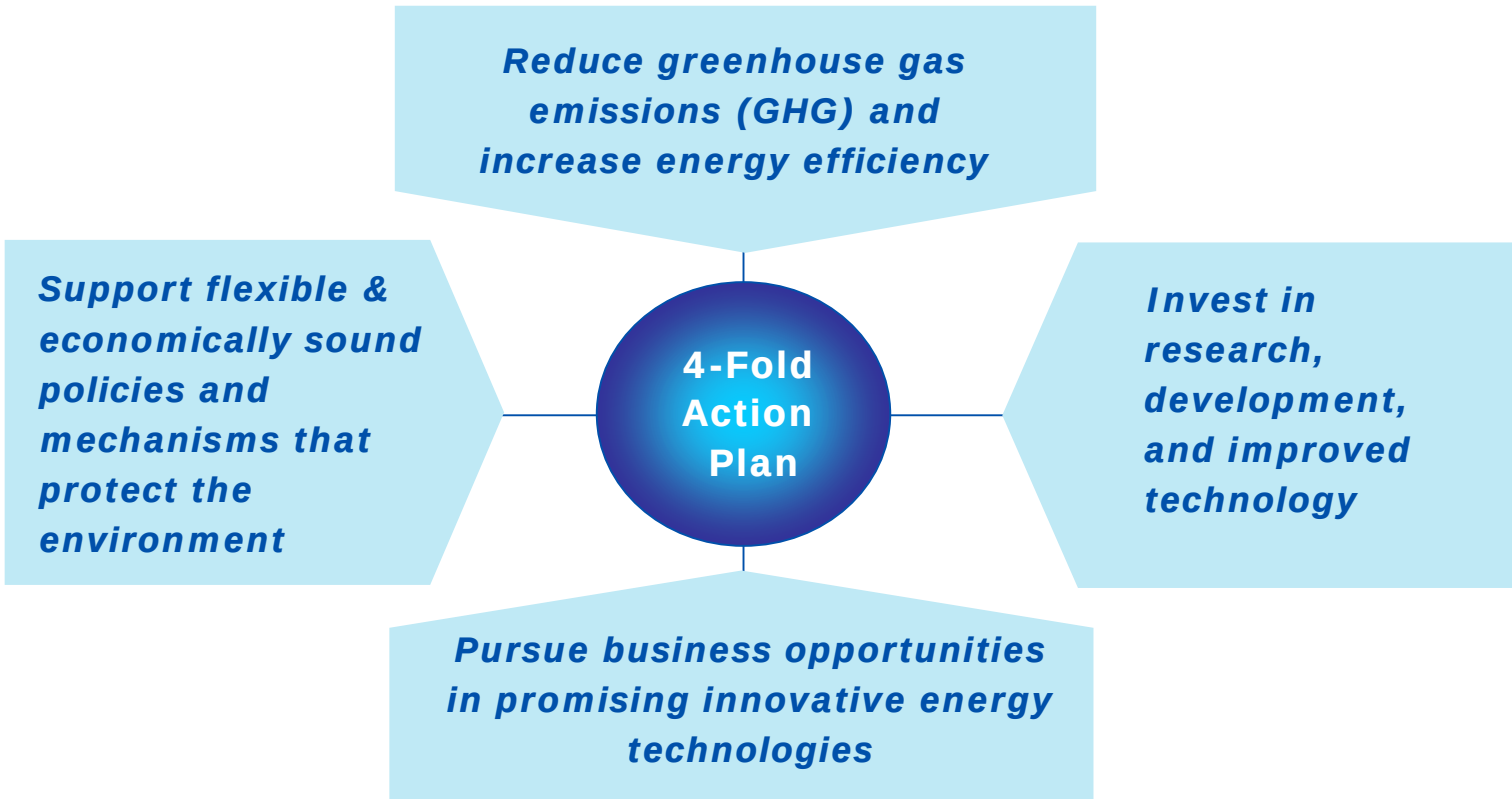
1. What is the business case for a U.S. oil and gas company to do a greenhouse gas inventory?
2. What are Chevron's methods for conducting their inventory?
3. What were some major lessons learned?

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.



Chevron's Four-Fold Plan of Action:
Sample of business-driven activities

Strategy element	Key actions
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!"

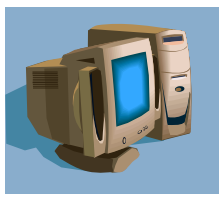
Conventional Systems

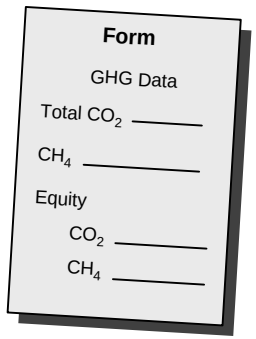
Protocol Document
- **Boundaries**
- **Methodologies**
- **Factors**

Numerous User-Developed Systems to Implement Inventory Protocol

Simple Data Form

Corporate Database





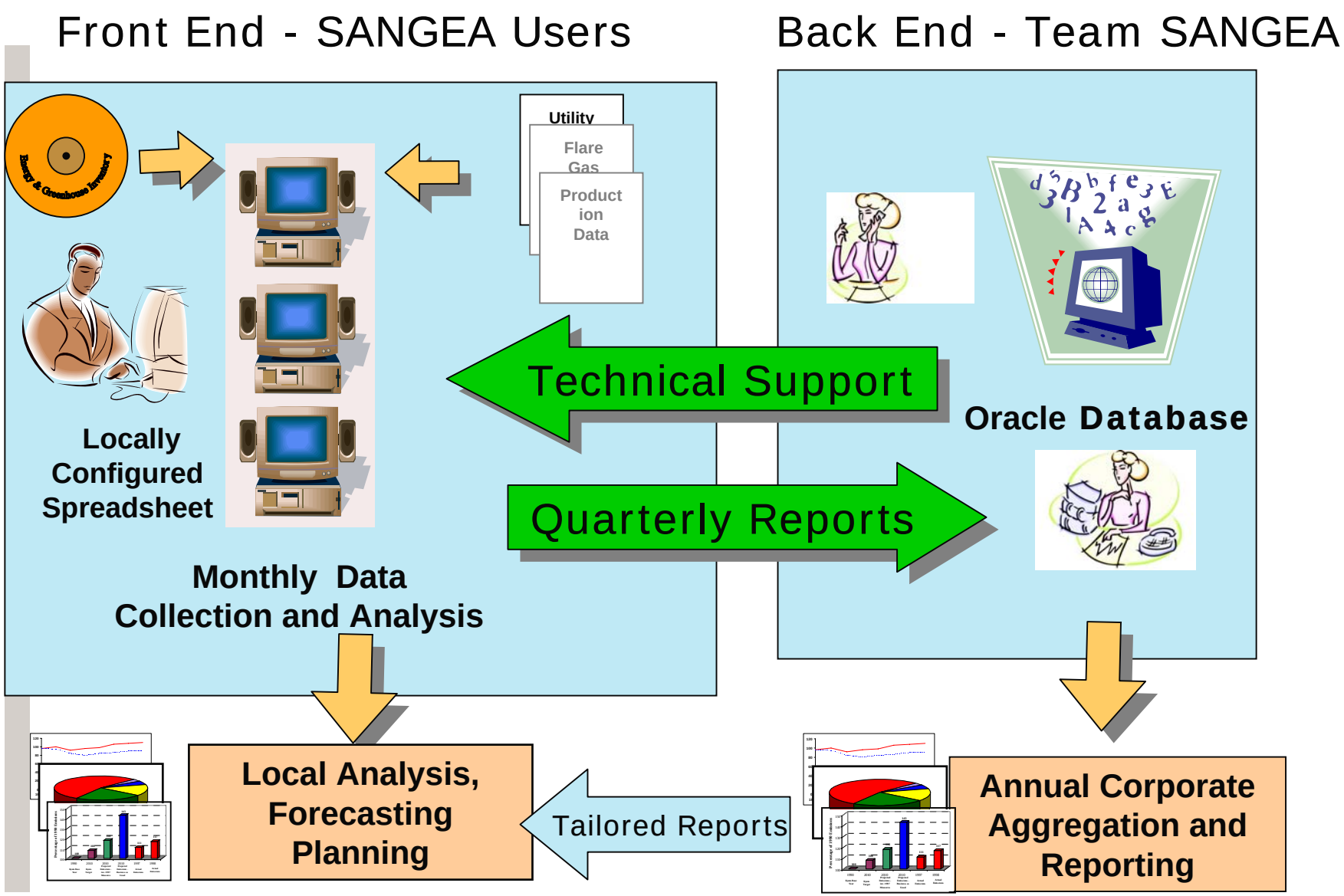
SANGEA

Hard Copy Manuals Difficult to Control Revisions

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

Total and Equity CO_2, CH_4, $CO_2(e)$ for Each Reporting Entity

SANGEA GHG Inventory System



What is SANGEA cont.

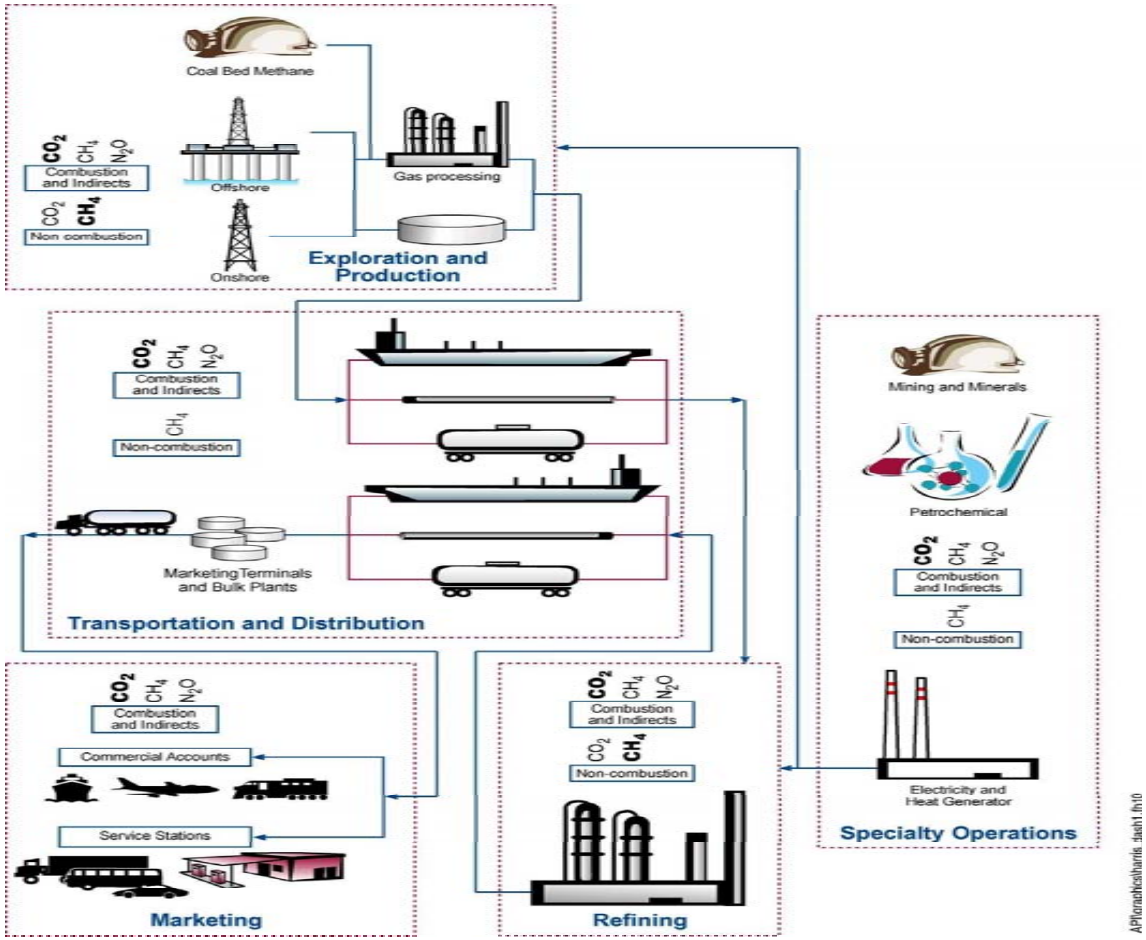
Specifically designed for the petroleum industry

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

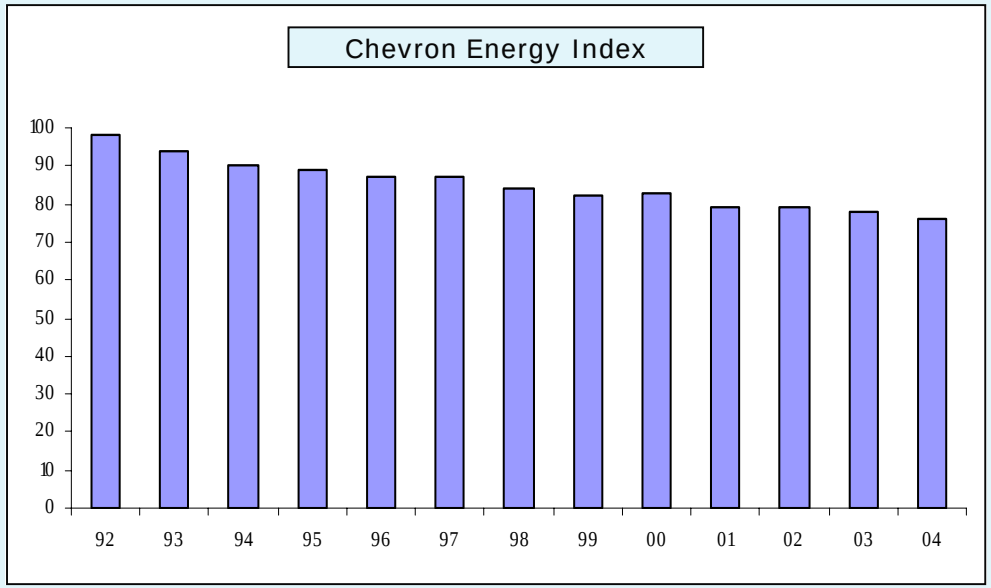
What's Great about SANGEA™

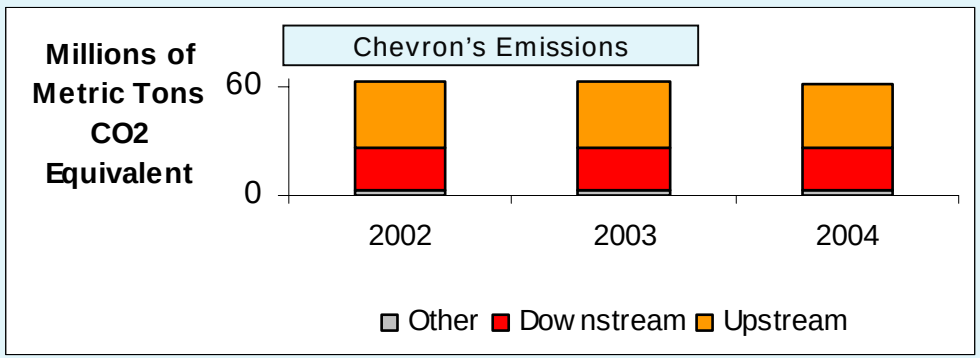
- Available free of charge
- Based on API Compendium methodology
- API committed to keeping system up to date
- In use at a major international petroleum company for more than four years
- Verified by a third-party audit.
- Flexible and customizable for the energy industry

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





Note: 2002, 2003, and 2004 Equity share emissions do not include Chevron Phillips Chemical and Dynegy. Other includes shipping, power & gasification, coal & corp. services

- 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 OpCos set emission goals for 2005 and forecast 2005-07
- 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)

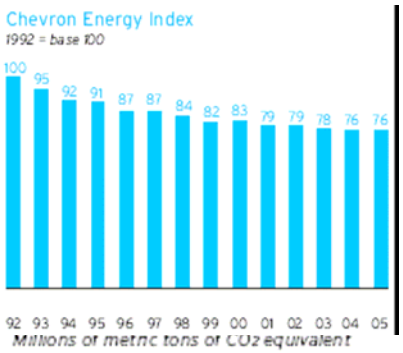
Reporting of SANGEA Data:
Corporate Responsibility Report–GHG Emissions

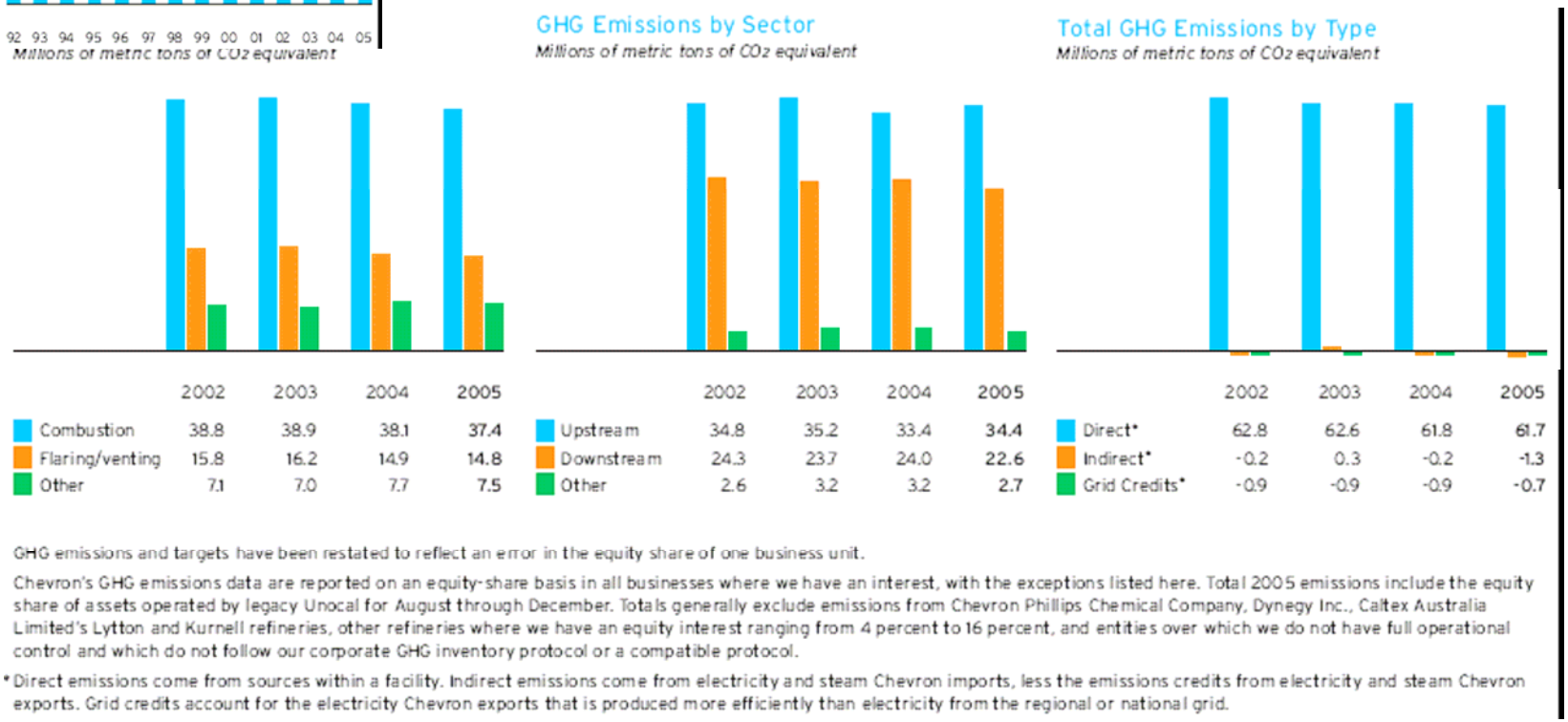
2005 GHG emissions reported as 59.7 million tonnes CO2e (excluding Unocal)

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.





	2002	2003	2004	2005
Combustion	38.8	38.9	38.1	37.4
Flaring/venting	15.8	16.2	14.9	14.8
Other	7.1	7.0	7.7	7.5

	2002	2003	2004	2005
Upstream	34.8	35.2	33.4	34.4
Downstream	24.3	23.7	24.0	22.6
Other	2.6	3.2	3.2	2.7

	2002	2003	2004	2005
Direct*	62.8	62.6	61.8	61.7
Indirect*	-0.2	0.3	-0.2	-1.3
Grid Credits*	-0.9	-0.9	-0.9	-0.7

GHG emissions and targets have been restated to reflect an error in the equity share of one business unit.

Chevron's GHG emissions data are reported on an equity-share basis in all businesses where we have an interest, with the exceptions listed here. Total 2005 emissions include the equity share of assets operated by legacy Unocal for August through December. Totals generally exclude emissions from Chevron Phillips Chemical Company, Dynegy Inc., Caltex Australia Limited's Lytton and Kurnell refineries, other refineries where we have an equity interest ranging from 4 percent to 16 percent, and entities over which we do not have full operational control and which do not follow our corporate GHG inventory protocol or a compatible protocol.

*Direct emissions come from sources within a facility. Indirect emissions come from electricity and steam Chevron imports, less the emissions credits from electricity and steam Chevron exports. Grid credits account for the electricity Chevron exports that is produced more efficiently than electricity from the regional or national grid.

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!