

ChevronTexaco

ChevronTexaco Corporate Energy and GHG Inventory System: SANGEA

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Susann Nordrum

The SANGEA System

- What is it?
- Why did we develop it?
- Why are we offering it free to industry?
- What does it mean for you?

SANGEA™ Energy and Greenhouse Gas Inventory Software

- **Enables data collection, computation, compilation and reporting**
- **Excel-based, compatible with standard Personal Computer (PC)**
- **Single system and methodology for all facilities**
 - **User customizes for location**
- **User can choose input and output units (metric, English, mass, volume)**
- **Flexible level of detail/aggregation**
 - **Total fuel gas utilization OR by source**
- **Incorporates API 2001 methodologies**

Conventional Systems

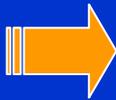
Protocol Document

- Boundaries
- Methodologies
- Factors

Numerous User-Developed Systems to Implement Inventory Protocol

Simple Data Form

Corporate Database



Lotus Notes

Excel



Form
GHG Data
Total CO₂ _____
CH₄ _____
Equity
CO₂ _____
CH₄ _____

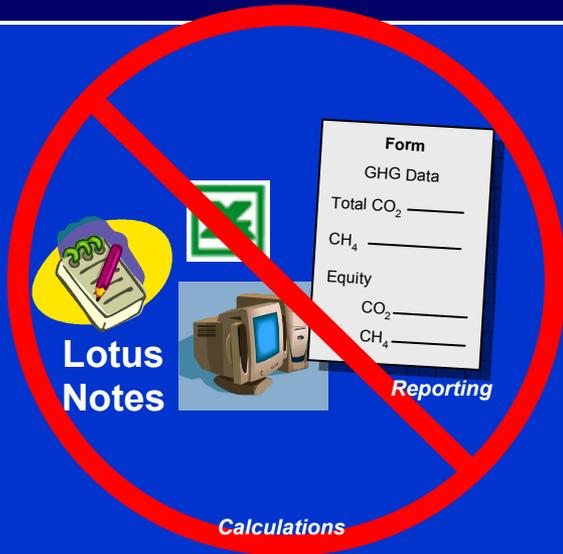


*Hard Copy
Manuals Difficult to
Control Revisions*

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

*Total and Equity
CO₂, CH₄, CO₂(e)
for Each Reporting
Entity*

The SANGEA System



SANGEA Energy And Greenhouse Gas Inventory System



Database



- *Excel-Based*
- *Control Revisions Electronically (Can't Submit Report if Not Using Latest Version)*
- *Transfer Set-up From Year-to-Year and Version-to-Version*
- *Efficient, Consistent, Central Support is Cost-Effective*
- *Promotes, Facilitates, Standardizes Audit Trail Information*

Total Operated or Equity CO₂, CH₄, N₂O and CO₂(e) Plus Energy Utilization and Criteria Pollutants and Details:

- *Combustion*
- *Flaring*
- *Venting*
- *Fugitives*
- *Indirect*
- *Crude Oil Storage/Loading*
- *Miscellaneous*

Scope

- **Gases Included**
 - Carbon Dioxide
 - Methane
 - Nitrous Oxide
- **Gases Screened**
 - HFCs
 - PFCs
 - SF6

Scope *(Continued)*

- **Emission Sources Included:**
 - Onsite fuel consumption
 - Process emissions
 - Flaring
 - Venting
 - Reinjection (emission credit)
 - Electricity Import/Export
 - Fugitive Emissions
 - Onsite Waste Treatment

Why Did We Develop the SANGEA™ System?

- **Electronic Implementation of API Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil and Gas Industry**
- **Industry-wide Standardization/Consistency**
 - DOE 1605(b) revisions
 - WRI/WBCSD Protocol
 - EPA Climate Leaders
 - ISO Standard
- **Internal Standardization/Consistency**
- **Consistent with IPIECA-led effort to develop standardized protocol for the petroleum industry**

Why are we Offering the SANGEA™ Software Free of Charge?

- **Demonstrate our Commitment to Action**
 - Climate change is an important issue
 - If you can't measure it, you can't manage it
- **Promote Consistency in Emissions Estimating**
 - Advantageous for companies in partnerships to have common tools that yield consistent results
 - Improve comparability of data across industry
- **Provide a tool as a starting point to initiate action**
 - Enable additional participation in voluntary industry GHG inventory efforts

What does It Mean for You?

- **Consistent, Auditable, Efficient, Up-to-date system for estimating energy, greenhouse gas and criteria pollutant emissions**
- **Integrated with API Compendium and IPIECA Guidelines efforts**
- **Modular approach useful in a variety of industries**
- **Easy to update as facilities change**
- **Can be applied to carbon sequestration projects (currently being used to document carbon dioxide reinjection at the ChevronTexaco Rangely facility)**

Lessons Learned

Successes

- **Comprehensive system has many advantages**
 - **Common methodologies**
 - **Data management**
 - **Version control**
- **Able to focus on Quality Assurance/Quality Control at the reporting entity level**
- **Acceptance of system was facilitated by involving users in its development**
- **Software includes both energy and greenhouse gas, as well as criteria pollutants**
- **Software designed so that upgrades can be easily implemented**

Lessons Learned

Bruce Beynon, senior environmental engineer in the Mid-Continent Business Unit in ChevronTexaco North America Upstream, was one of the dozens of people who helped test and recommend changes to the beta version of the software.

“A major improvement with SANGEA™ software,” says Beynon, “is it’s more flexible and easier to update as facilities change. It also allows me to account for varying emissions from different fuel compositions and different sources of electricity, which not only helps us in Mid-Continent, where we’ve got production facilities in different states, but is invaluable in operating companies that have facilities in different countries.”

Lessons Learned

Areas for Improvement

- Users need to systematically self-check input and output data
- Need to assess materiality
- Users guide is too technical – Needs examples
- Need standard protocol for petroleum industry
- Make flaring and combustion modules more similar to improve user-friendliness

Summary

- **Systematic, 1+-year effort to develop inventory**
 - Project Manager
 - Stakeholder Group
 - 70+ Users
 - Ongoing Help Desk and Upgrades
- **Off-the-shelf technology not available**
- **Unique Attributes**
 - Enterprise-wide deployment
 - Verifiable system
 - Based on API methodology
 - Flexible and customizable for the energy industry

SANGEA™ is a trademark of ChevronTexaco Corporation for greenhouse gas emissions calculation software. Patent Pending.