

California Energy Commission Review of the Petroleum Industry Guidance Documents for Estimating and Reporting Greenhouse Gas Emissions

The American Petroleum Institute (API) welcomes the opportunity to offer input to the California Energy Commission (CEC) regarding the review the CEC has commissioned to evaluate the adequacy of global petroleum industry guidance documents for estimating and reporting greenhouse gas (GHG) emissions from Oil & Gas industry facilities and operations. API represents more than 400 companies involved in all aspects of the oil and natural gas industry that are interested in the successful implementation of consistent and harmonized approaches to promote voluntary programs for reporting greenhouse gas emissions.

In preparing these comments API is relying on its extensive experience that led to the development of the “*Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions*” (December 2003); and the API “*Compendium of Greenhouse Gas Emissions Estimation Methodologies for the Oil & Gas Industry*” (Revised edition, February 2004). API experts are also engaged in many other global protocol developments including the WRI/WBCSD GHG Protocol, the development of ISO 14064 (Draft International Standard, January 2005) and the 2006 IPCC National GHG Inventory Guidelines. Also, as you may be aware, many API member companies have voluntarily developed, verified and reported inventories of their greenhouse gas emissions.

The comments below focus on the following:

1. Review by Tiarrx (April 15, 2005) titled, “*Review of the IPIECA Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions*”
2. Review by ICF Consulting (April 13, 2005) titled, “*Review of the API Compendium for Oil and Gas Operations in California*”
3. Next steps

In reviewing each of these documents we will present some general observations followed by specific comments on the reviewers' assertions.

1. Review of the IPIECA Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions

General Observations

- The report correctly states that the IPIECA Petroleum Industry GHG Reporting Guidelines (Industry Guidelines) does not represent a detailed protocol for specific programs, but rather provides a global framework that can be adapted based on local circumstances. It is also designed to work in conjunction with the API Compendium of GHG Emissions Estimation Methodologies for the Oil & Gas Industry (API Compendium) for the proper selection of specific estimation methods that are applicable to the various industry sectors and operations.

- Although the review recognizes that the Petroleum Industry Guidelines and the API Compendium complement each other, it cites the 2001 “road test” version of the API Compendium and not the revised February 2004 publication.
- The review does not address the fact that the Industry Guidelines presents a tiered approach, as shown in Tables 6-1 and 6-2 of the IPIECA document. The Guidelines contain a recommended range of estimation methods that, depending on the intended use of the data, are compatible with the accuracy needed by the user. It thus provides a direct link between specific estimation methods for sources that are characteristic to oil & gas industry operations and the needs of the user.

Specific Comments

- In Table 1 the review summarizes required elements for GHG reporting. This is a bit of a misnomer since the Petroleum Industry Guidelines are intended to provide guidance and recommendations without specifying the program elements. The Guidelines encapsulate industry consensus on what are important elements for such reporting within the context of oil & gas industry operations and the aim for consistency among reporting frameworks.
- In Table 4 the review narrowly defines reporting of emissions from mobile sources, as pertaining only to those sources owned by the company. The Petroleum Industry Guidelines actually specify, *“The definition of direct emissions applies to sources owned or controlled by the reporting company. For sources that are leased, companies that report on the basis of operational control should account for emissions in the same way as if the sources were owned.”*
- Section 2.0 of the report describes the California Oil & Gas industry, which might be outside of the scope of reviewing the IPIECA Petroleum Industry Guidelines. Although the California Climate Action Registry (CCAR) is primarily a California Registry its founding legislation permits it to register nationwide U.S. GHG emissions and to also include GHG emissions from sources outside of the U.S. This mandate requires that the CCAR protocols be applicable to a broad range of industry activities and operations beyond mere California considerations.
- At the bottom of Section 3.2.3 the review digresses from a review of the Petroleum Industry Guidelines to providing recommendations on what should be included in a CEC/CCAR Petroleum Industry Protocol. This seems to be outside the scope of the protocol review and should be included separately with recommendations for future actions.
- In Section 3.4 the review addresses the discussion on verification in the Petroleum Industry Guidelines, but fails to also recognize the recommended practices for assuring the quality of the data management system and the integrity of the generated inventory.

2. Review of the API Compendium for Oil and Gas Operations in California

General Observations

- The review report evaluates each of the API Compendium methodologies on its merits for potential inclusion in an oil and gas sector protocol for the California Climate Action Registry. However, in doing so, the review fails to convey a key message from the API Compendium and IPIECA Petroleum Industry Guidelines: that different methods have different accuracies and applications.
- Chapter 1 of the document is titled 'California Industry Characteristics'. However, rather than focusing on the oil and gas industry in California, the first four paragraphs discuss emissions estimating issues. The chapter should be rewritten to be more like Chapter 2 of the review of the Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions. Alternatively, Chapter 2 of the Guidelines Document review could be substituted for Chapter one of this document. Emissions estimating issues should be discussed in a separate chapter.
- The review report is critical of the early work conducted by GRI/EPA. It is recognized that the report and measurement information is 10+ years old, however it still remains the most comprehensive measurement program of CH₄ emission sources in the US, and is the source of CH₄ emissions factors used by the EPA and the IPCC for natural gas industry operations. With this in mind, the tone of some comments in the CEC report is overly harsh and should be revised significantly to prevent discrediting the final version of the report.
- The review report is also critical of the age of the emission factors from the GRI/EPA study. The API Compendium recognizes that industry operations are dynamic, and that emission factors can change over time (API Compendium Section 3.4). The API Compendium attempts to thoroughly document each emission factor source, so that the user can determine the relevance of a particular emission factor for their operations. Even so, it is not uncommon for regulatory agencies to rely on emissions data of similar vintage (i.e., AP-42 and EPA Protocol for Equipment Leak Emission Estimates are both cited by many regulatory agencies and use measurement data from the late 1980's to early 1990's).
- The review report and the API Compendium are in agreement that site-specific information is more accurate – for a given site. It could be used, where available, but it may lack the general applicability and representativeness that is essential for sector-specific emission factors. The report notes that the GRI/EPA study, which underlies many of the API Compendium emission factors, is growing out of date with changing technologies, improved operating practices, government regulations, and voluntary reduction programs (e.g. Gas STAR). Unfortunately, this new information is not generally presented or available in a manner that enables “average” or “typical” emission factors to be developed. Such generalized emission factors are necessary where it is not cost-effective to develop site-specific factors.

- In order to provide better context, the review should address available information about the major sources of greenhouse gas emissions from oil and gas industry operations, as provided in examples in the API Compendium and other publicly available data from petroleum companies' voluntary reports on sustainability, health, environment and safety issues. In doing so it will become immediately clear that most of the greenhouse gas emissions from the oil and gas industry are due to combustion, although emissions from venting, fugitive and specialized processes should also be considered.

Specific Comments

Chapter 1

- Page 4 (1st paragraph) – the phrase 'based on some reports' is vague. It is not clear what reports this statement is referencing. In addition, the last sentence of this paragraph could be improved by indicating that default emission factors can be used if they are reasonably representative of local conditions. Default factors are typically acceptable if they are within 5% of actual data.
- Page 4 (2nd paragraph) – the last sentence indicates that the only alternative to direct measurement is default emission factors. In fact, the API Compendium gives a range of alternatives for estimating emissions, including not only measurement and default factors, but also site-specific and equipment specific information. Also, the API Compendium does not recommend direct measurements; instead, it suggests that the emissions estimating approach be tailored to the information needs and types of information available.
- Page 4 (4th and 5th paragraphs) – The review report implies that all of the data collection for the GRI/EPA Methane Study was conducted in 1992 or earlier. Although the inventory year for the GRI/EPA study was 1992, measurements and data continued to be collected through 1995. As noted above, regulatory reporting programs commonly use emission factors of this vintage.
- Page 6: California Exploration and Production – the second sentence in the first paragraph does not make sense. The average methane content is indicated to be "...78.8% mole by weight..." and "...2% more by weight..." The percentages should either be by volume or mass. The term 'mole by weight' is unclear.
- Page 6: California Exploration and Production (and again on page 13 of Chapter 3) – The review report states that the largest methane emission source in the U.S. national inventory is gas powered pneumatic devices. No reference is provided for this statement. From the GRI/EPA study, fugitive emissions from reciprocating compressors were the largest source of CH₄ emissions (from all sectors combined), followed by pneumatic devices.
- Page 7: California Gas Transmissions And Distribution – The review report comments that one of the main fugitive and vented emission sources in gas transmission and distribution are pipeline leaks. No reference is provided for this statement. Based on the GRI/EPA study, pipeline leaks were a significant source of emissions in the distribution sector, but a very small source for transmission.

Chapter 2

- Page 8: Emissions Categories – The review report suggests that the API definition for vented emissions “can be made more clear by implying that these emissions are intentional or designed in the process or technology to occur during normal operations.” Clarification for the API Compendium definition will be considered for the next revision cycle. Nonetheless, it should be noted that the API Compendium also includes process upsets and emergency vents within this category.
- Page 9: Industry Sector Definitions – In Exhibit 2 we suggest that the 'Recommended industry sectors' instead be suggested as optional sub-sectors. In some cases, it is difficult to distinguish emissions from various activities. For example, a single meter may measure fuel utilization for gas gathering/boosting and processing. While the total emissions from these operations could be estimated based on the meter reading, the accuracy of the estimate would be decreased if an attempt is made to allocate the emissions to each sub-sector.

Chapter 3

- Pages 11-12: API Compendium Evaluation Methodology – The API Compendium evaluation methodology is not stated clearly. The phrase 'based on the understanding of the California industry' is unclear. Also, the second paragraph under API Compendium Evaluation Methodology indicates that the 1996 GRI/EPA study underlies most of the default factors. This is not true. While the 1996 study was used for many of the default methane emission factors (since it is the most current and comprehensive reference for the sources) many other default emission factors are taken from other sources, such as AP-42. A similar comment can be made about the fourth bullet on page 12, under General Findings.
- Page 13: Source-Specific Findings (1st paragraph) – This should reiterate that the API Compendium provides preferred and alternative methodologies, and that use of default emission factors is typically not the preferred alternative in the API Compendium. Ultimately, the choice of emissions estimating methodology depends on the need for accuracy, relative contribution of the specific source, and what information is available.
- Page 13: Source-Specific Findings (2nd paragraph) – it is stated that the GRI study 'presented flawed analyses...' Such a statement would be more constructive if the authors could substantiate it with a published reference so that the reader can better understand what the alleged flaws are and the magnitude in terms of potential impact to an inventory.
- Page 14: Source-Specific Findings – The review report concludes that “while 90-plus percent of the GHG emissions quantified by the API Compendium methods are well estimated, most of this being carbon dioxide from fuel combustion, the methane emissions that are more likely to be cost-effectively controllable are not estimated most accurately, or by methods that would directly track emission reductions”. It should be noted that the purpose of the API Compendium is to support inventory development and not necessarily track emission reductions, although many of the methods can be used for this purpose. Furthermore, the assertion about cost-effectiveness of methane emission reductions is not substantiated. Additional, detailed case-by-case studies would be needed to determine the most cost-effective option for each facility.
- Page 14: Source-Specific Findings (last paragraph) – The summary is poorly written. In particular, the statement that '... methane emissions... are not estimated most accurately...' does not make sense. The API Compendium provides several methods for estimating methane emissions, including highly detailed approaches in Appendix B, though it does not

in of itself estimate emissions. Also, it does not specify how a user should develop the estimate, since this will depend on the purpose of the inventory, need for accuracy, etc.

Chapter 4

- Page 15: Inventory Issues Absent from the API Compendium – Please note that the issues presented are addressed in the Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions. In developing the API Compendium and the Industry Guidelines there was a deliberate decision not to repeat information between the two documents, but rather use them in a complementary fashion.
- Page 16: exhibit 3 - lists the following sources as absent from the API Compendium; the table below provides detailed comments on the reviewers remarks in its Exhibit 3:

Exhibit 3: Sources Absent from the API Compendium

Missing source	Review Report Remarks	API Comments
Fuel for portable/backup/emergency engines, generators, fire pumps, etc.	These sources are not explicitly listed but can fall into existing combustion sources in the API Compendium.	The API Compendium approach for CO ₂ emissions from combustion is to use fuel composition or fuel-specific factors. CH ₄ and N ₂ O factors are provided in the API Compendium for engines, generators, and pumps.
Fuel for plant maintenance e.g. welding and cutting		CH ₄ and N ₂ O emission factors for welding are not currently included in the API Compendium.
Tugs		CH ₄ and N ₂ O emission factors for marine vessels are available in the API Compendium (Table 4-9)
Standby vessels		
Supply vessels		
Other ships		
Incineration of waste material/by-products	Ensure this source does not overlap with flaring	Incineration is addressed in API Compendium Section 4.6.
Accidental or training fires		Not currently addressed in the API Compendium
Fire fighting equipment		Not currently addressed in the API Compendium
Construction operations		The API Compendium approach for CO ₂ emissions from combustion is to use fuel composition or fuel-specific factors.
CO ₂ well stimulation		Not specifically addressed in the API Compendium
Oil well completion venting		
Gas well completion venting		
Mud degassing		
Gas dehydration from non-glycol processes	The API Compendium only provides guidance on glycol dehydration.	Not currently addressed in the API Compendium
Gas sweetening from non-	The API Compendium only	Not currently addressed in the API

Missing source	Review Report Remarks	API Comments
amine processes	provides guidance on amine gas sweetening.	Compendium
Oil pipeline pigging		Not currently addressed in the API Compendium
Gas pipeline pigging	This source is listed in the API Compendium as a composite factor with other activities. Pigging should be a separate source for the Gathering/Booster and Transmission sectors.	Included in the emission factor for Transmission pipeline venting/blowdowns (Table 5-24)
Drips		Not currently addressed in the API Compendium
Sampling		Included in the emission factor for Distribution M&R Station maintenance/upsets (Table 5-25)
Other	It is good practice to consider an “other” category in case a list of sources is not comprehensive to the facilities being inventoried.	Disagree. Impossible to define emission factors for “other” category. The API Compendium does provide a general approach for estimating emissions from “other” process vents.

Appendix A

- Page 31 – Remarks on refinery fuel gas system leaks neglect to address text in the API Compendium (p. 6-3) on a separate study conducted by API to quantify CH₄ emissions from refinery fuel gas systems. Testing at the first site (single train, < 99,000 BPD capacity) indicated that CH₄ emissions from the fuel gas system represent about 0.11% of the total refinery GHG inventory. Recent result from a second refinery (multi-train, 100,000-199,000 BPD capacity) indicated CH₄ emissions from the fuel gas system represent about 0.19% of the total refinery GHG inventory.

3. Next Steps

In the brief comments above, API has provided some initial feedback on the assertions made by the consultants that were commissioned by the CEC to undertake the review of the two referenced guidance documents. The comments include detailed feedback on topics where API does not agree with the reviewer’s comments, while acknowledging the reviewer’s comments that point to areas that need improvement or that have not been addressed yet in the current version of the guidance documents.

API views these guidance documents as “evergreen” and is committed to undertake periodic review and revision of the material presented and provide improved methodology as it becomes available. API is looking forward to continue to collaborate with the CEC and the California Climate Action Registry in using these documents for the development of appropriate protocols and tools for estimating and reporting GHG emissions from Oil and Natural Gas facilities and operations that would be appropriate for California and beyond.