Promoting Global Consistency in Estimating Greenhouse Gas Emissions from Oil & Gas Industry Operations

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Overview

- Importance of Emissions Inventories
- IPIECA/API/OGP Petroleum Industry Guidelines
 for Reporting Greenhouse Gas Emissions
- 2004 API Compendium of Greenhouse Gas Emissions Estimation for the Oil and Gas Industry
- SANGEA[™] Energy and Emissions Estimating System

An Approach to Consistent Emissions Estimating



*Emission calculations made following Guidelines accounting and reporting procedures and Compendium emission estimation methods.

Development of the Guidelines

- Voluntary guidelines for the accounting and reporting of GHG emissions from petroleum operations
 - Accounting recognition and consolidation of GHG emissions
 - Reporting presentation of GHG data in formats tailored to the needs of various reporting uses
- Based on WRI/WBCSD GHG Protocol
- Workshop and review with industry peers
- Customized for petroleum industry
 - Discusses cost effectiveness and materiality in relation to completeness and accuracy.

Guidelines Overview

Accounting and Reporting Principles

- Completeness
- Accuracy
- Consistency
- Relevance
- Transparency
- Setting the Boundaries
- Designing an Inventory to Monitor Performance
- Identification of Industry Emissions
- Evaluation of Oil & Gas Industry Emissions
- GHG Emissions Reporting
- Inventory Assurance Processes

Operational Boundaries

- Direct Emissions from sources owned or operated by reporting company
 - Combustion
 - Process emissions
 - Transportation
 - Fugitive losses
- Indirect Emissions (optional) consequence of reporting company but from sources owned by other parties
 - Consumption of purchased energy
- Other Indirect Emissions (optional)
 - Contractors
 - Drilling
 - Well maintenance
 - 3rd party shipping



Accuracy and Methodologies

- Link between Guidelines and Compendium
- Guidelines Tiers
 - Tier A: 10-30%
 - Tier B: 20-40%
 - Tier C: 30-60%

Improved accuracy Increasing level of effort and cost

Estimation Options for Combustion

			Estimation Tiers					
Source		Tier C	Tier B	Tier A				
Category	GHG		Estimation Approach					
	30	(increasing accuracy)						
Combustion Sources	CO2	Fuel consumption based on ratings, hours of operation and assumed loads for engines/turbines (energy balance for boilers/heaters); [Demonstrated in Compendium Exhibit 3-3]	Fuel consumption based on ratings, hours of operation and loads for engines/turbines (energy balance for boilers/heaters); [Demonstrated in Compendium Exhibit 3-3]	Fuel consumption based on single point metering and integrating mass flow for fuel gas, purchase records or tank measurements for commodity fuels (e.g., natural gas, diesel); [Compendium Section 4.2.				
		[Compendium Section 4.2 Demonstrated in Exhibits 4.3 and 4.5]	(mass/mass or mass/heating value) based on default factors. [Compendium Section 4.2. Demonstrated in Exhibits 4.3 and 4.5	(mass/mass or mass/heating value) based on default factors. [Compendium Section 4.2. Demonstrated in Exhibits 4.3 and 4.5]				
				Or factors based on actual measurements of fuel composition if available [Compendium Section 4.1. Demonstrated in Exhibit 4.1]				
	CH4	Not considered [CH4 emission factors are prov demonstrated in Exhibit 4.7. S demonstrated in Compendium	vided in Compendium Section 4.3 mall contribution of CH4 from cor Section 7	. Calculations are mbustion sources is				

API Compendium of GHG Emissions Estimation Methodologies

Objectives –

- Promote consistency in estimating petroleum company's GHG emissions
- Provide technical expertise on existing methodologies and ways to improve and streamline GHG emission estimates

Terms of Reference

- Review and evaluate existing methods and calculation approaches
- Provide recommendations on preferred and alternate methodology

Compendium Project Background

- Emissions Methodology Workgroup established in 1999 to work with the Climate Steering Committee
 - Initial Pilot Test Version April 2001
 - **Revised Compendium February 2004**
 - Structure
 - Multi-sector petroleum industry participation to ensure coordinated industry effort

Mandate

- Focus on industry sources
- Concentrate on CO₂ and CH₄

Compendium At A Glance

By source category

- Combustion emissions
- Vented emissions
- Fugitive emissions

• By industry segment

- Exploration and Production
- Transportation and Distribution
- Refining

Preferred vs. alternative methods

- Decision trees to guide method selection
- Sample calculations to demonstrate computational approaches
- Case Studies to demonstrate aggregation

Typical Methods Hierarchy



*Applies broadly to most types of air emissions, but may not be directly applicable nor highly reliable for GHG emissions.

2004 Compendium Revisions – Emission Factor Details

- Reviewed/revised factors based on latest guidance
- Added N₂O factors
- Enhanced international application
 - SI and US units
 - Country/regional specific emission factors
- Uncertainty values
- Fuel-based CO₂ emission factors in HHV and LHV
- Composite country/regional electric grid emission factors
- Additional power output to energy input factors (engines)

2004 Compendium Revisions – Emission Sources

- Additional petroleum-sector activities
 - Minerals and mining operations
 - Petrochemical manufacturing
- More detailed, source-specific vented and fugitive emission factors
- Additional industry sources
 - CH₄ tank blanketing
 - Produced water
 - Exploratory drilling and well testing
 - Pipeline pigging

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– Natural gas distribution systems

SANGEA[™] Energy and GHG Inventory System

- Enables data collection, computation, compilation, and reporting
- Excel-based, compatible with standard Personal Computer (PC)
- Single system for all facilities
- User can choose input and output units (metric, English, mass, volume)
- Flexible level of detail/aggregation
- Based on API 2004 methodologies

SANGEA™ Software

- Gases Included
 - Carbon Dioxide
 - Methane
 - Nitrous Oxide
 - Emission Sources Included:
 - Onsite fuel consumption
 - Process emissions
 - Flaring
 - Venting
 - Fugitive Emissions
 - Indirect Emissions
- 16 Onsite Waste Treatment

- Organizational Boundaries
 - Operated Only
 - Equity Basis
- Operational Boundaries
 - Direct Emissions
 - Indirect Emissions
 - Energy export

Designed to be compatible with the Guidelines and the Compendium



Example SANGEA[™] Software Main Menu

Example Refinery - Energy & Emissions Estimating System -	Main Menu			
Spreadsheet Configuration Help Topics User Maintenance File Mainter	nance			
Step 1. Setup of Reporting Entity, Primary Production Measure and	Primary Users.	Complete.	Modify	
Step 2. Specification of Locations, Location Groups.		Add	Modify	Remove
Maintenance of Secondary Production Measures.		Add	Modify	Remove
Step 3. Installation of Modules required for Evaluation of Emissions.		Add		Remove
Step 4. Configuration of Emission Sources for Installed Modules.		Configure	Sources	
Step 5.				
Enter or Review Input Data and Audit Trail Information.	Select Locat	ion		-
Review Emission Data. Update or View Internal Report.	Select Location Gro	oup		•
Step 6. Check All Input Data and Audit Trail Information Entered.		Check Da	ta Ready	
Step 7. Quarterly Sign Off and Generation of Corporate Report.		Sign Off	3. Report	
🗖 Disable Main Menu				Exit Menu

Example SANGEA[™] Software Main Menu – Location Configuration

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tep 1. Not Appl	icable (can not move L				
Owned and Ope		ocations between Groups).	Specify the	Location's Place in t Hierarchy	he Reporting Entity
A CALE AND A CALE AND A CALE AND A	rated (Name o	f Input Data Sheet/Tab)		Company Name	-
tep 2. Select a	Location		<u>10</u>		
			f	Upstream Compan	y 💌
Location 1	100.0%	Company is Operator			
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tep 3. Accept L	ocation, and modify.	Company Has Equity Only		1	0.075
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		Other		upstream Pront Cen	ter 🔄
tep 4. Specify d	default Country and Re	gion for sources at this location	n		19
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tep 5 (optional). /	Allocate a secondary produ	iction measure.	30	Location 1	1997
Texas Producti	ion 🔻 A	td Measure		Location 1	
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Help			Modify & Next	Modily & Exit	Cancel
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of operator or equity ownership

Example SANGEA[™] Software Main Menu – Source Module Configuration

Module Configuration



Help

Module Name	Description
🗖 Acid Gas Removal	Emissions from the Treatment of Gas to Remove Acid Gases (carbon dioxide and hydrogen sulfide)
Coke Combustion	Emissions from Coke Combustion during the Regeneration of Catalytic Cracker and Other Catalysts an
Combustion	Emissions from Combustion of Fuels and Wastes (other than flaring)
Crude Oil	Emissions from the Transport and Storage of Crude Oil
Flare	Emissions from Flares while both Lit and Unlit
Flashing	Emissions from Tank Flashing of Crude Oils
Fugitive	Emissions from leaks of Gases from such equipment as Valves, Flanges, Connectors, Open Ended Line:
Glycol Dehydrator	Emissions from Methane Resulting from the Treatment of Gas to Remove Moisture
🗖 Hydrogen Plant	Emissions from Conversion of Hydrogen Plant Feedstock to Hydrogen
Indirect Emission	Emissions or Emission Credits from the Import and Export of Steam and Electricity
Miscellaneous	Emissions from Coal Mining and Wastewater Treatment and Emissions or Credits from Miscellaneous Sov
🗖 Venting 🔨	Emissions from processes other than Combustion or Chemical Reactions, including specific devices and $\overline{ar{s}}$

Cancel

Install

Example SANGEA[™] Software Combustion – Source Configuration

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1	Combustion Module Configuratio	on and a second s	1000					<u> </u>				4	
2	3		Add a New	Source to t	he Combusties	Madula				1			
3			Autrainew	Source to t	ne compustion	mounte				3			
4			Select	the Location	Europele						Sulfu	Content	
5	Local Fuel Specifications	1	Jeleo	t the Location	Example					Fuel Units	Content	Units	8 8
6	Refinery Fuel Gas	Hav	-		Care ta				r.			Mass Fraction	
7	Purchased Natural Gas	Hav	Spec	tify Fuel Type	Natural Gas							Mass Fraction	
8	Waste Gas	Hav				-				16		Mass Fraction	
10	masterias		Select the U	Inits for Input	Volume 👻	scf		+		10		14iass Fraction	
11				ang an		-							
12			Enter Sourc	e Description									
13					2						Sulfu	Content	
14	Selected Standard Fuels	1								Fuel Units	Content	Units	- S
15	Natural Gas		En	iter Source Id						6 scf	2000	grain/10^6 scf	
16			10		IV								
1/			Select	t Device Type									
19	Fuel Gas		Genera	ıl					-	6 sef	0	r	0
			denera	1									·
20	Field Gas (associated or produced gas)		Genera						•	6 scf	0	L. C.	0
21	Flash Gas		Boller o	r Furnace od Poilor >104	O Dhulbru Llocophy	allad (Dea NIS				6 scf	0		0
22	Gasoline		Wall-Fir	ed Doller >10 ad Boiler >10/	8 Btu/br: Uncontri	olled (Pictus olled (Doct-N	JEDS)				285	ppm by Weight	
23	Diesel / Distillate (No. 2)		Wall-Fir	ed Boiler >10^	8 Btu/br: Controll	edLow NO:	x burners				2500	ppm by Weight	
25	Crude Oil		Wall-Fir	ed Boiler >10^	8 Btu/hr: Controll	edFlue gas	recirculation	n			0.01	Mass Fraction	0
26	Solid Waste		Small Bo	oiler <10^8 Btu	u/hr: Uncontrolled	170					õ		0
27	Jet Fuel		Small Bo	oiler <10^8 Btu	u/hr: ControlledL	ow NOx bur	ners	62 2.88			0		0
28		-	Small Bo	biler <10^8 Btu	u/hr: ControlledL	ow NOx buri	ners/Flue ga	as recirculation					
29			Tangen	tial-Fired Boiler	's (all sizes): Uncor	ntrolled allad Elua a	na vasiva dat						
30			Residen	tial-Fireu boller	s (all sizes): Contr <3v10^5 Bhu/br	ulieuriue <u>u</u>	jas recirculai	uon					
31	Emission Sources Specified		Engine	(4-stroke lean l	burn)								
54	Linission Sources Specified	2	Engine	(4-stroke lean l	burn, 90-105% Lo	ad)			1	5 S	Sulfur	월	
33	Location	Source Descr	iptio Engine	(4-stroke lean l	burn, <90% Load))				Fuel Units	Content	Units	
34	Example	IC Engines	Engine	(4-stroke rich b	ourn)					10^6 Btu (HHV)	0	Mass Fraction	Internal C
35	Example	External combus	tion b Engine	(4-stroke rich b	ourn, 90-105% Loa	ed)				10^6 Btu (HHV)	0	Mass Fraction	Power (s
36	Example	Gas Turbines	Engine	(4-stroke rich b	burn, <90% Load) huwa					10^6 Btu (HHV)	0	Mass Fraction	Gas Turl
37	Example	Incinerators	Engine	(2-stroke lean l (2-stroke lean l	burn) hurn 90-105% Lo	(be			-	10"6 Btu (HHV)	0	Mass Fraction	Incinerat
38				(2 sciole lean)	Darny 20-103 78 EU	uu/			00000				
40													
41	Local Fuel Composition for:	Natural Gas f	or Turbines	1	Annual Compositi	on being us	ed.						
K ·	Indirect Emission Mo	dule / Hvdr	rogen Plant M	Adule \ Co	mbustion Mod	lule / Col	ke Comb	4					

	LUG	a rue composition for natura	in Gas for Furbilles	Annual Composition per	ny useu.
• •	MK	Indirect Emission Module /	Hydrogen Plant Module	Combustion Module /	Coke Comb 🖪

Example SANGEA[™] Software Combustion – Default Emission Factors

	А	К	L	М	N	0	Р	Q	R	S	
1]	evice Rating						Units	
2	Selected Standard Fuels	Device Type	Lower Limit	Upper Limit	Units	CO2 Factor	CH4 Factor	N2O Factor	Emission	Fuel	
3	Natural Gas	General				117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
4		Boiler or Furnace				117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
5		Wall Fired Boiler >10^8 Btu/hr: Uncontrolled (100		10^6 Btu/Hr	117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
6		Wall-Fired Boiler >10^8 Btu/hr: Uncontrolled	100		10^6 Btu/Hr	117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
7		Wall-Fired Boiler >10^8 Btu/hr: ControlledLo	100		10^6 Btu/Hr	117.65	0.002250	0.000627	lb	10^6 Btu	(HHV)
8		Wall-Fired Boiler >10^8 Btu/hr: ControlledFI	100		10^6 Btu/Hr	117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
9		Small Boiler <10^8 Btu/hr: Uncontrolled		100	10^6 Btu/Hr	117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
10		Small Boiler <10^8 Btu/hr: ControlledLow N	Ox burners	100	10^6 Btu/Hr	117.65	0.002250	0.000627	lb	10^6 Btu	(HHV)
11		Small Boiler <10^8 Btu/hr: ControlledLow N	Ox burners/FI	100	10^6 Btu/Hr	117.65	0.002250	0.000627	lb	10^6 Btu	(HHV)
12		Tangential-Fired Boilers (all sizes): Uncontro	lled			117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
13		Tangential-Fired Boilers (all sizes): Controlle	dFlue gas re	ecirculation		117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
14		Residential Furnaces <3x10^5 Btu/hr		0.3	10^6 Btu/Hr	117.65	0.002250	0.002157	. lb	10^6 Btu	(HHV)
15		Engine (4-stroke lean burn)				117.65	1.25	0.002157	lb	10^6 Btu	(HHV)
16		Engine (4-stroke lean burn, 90-105% Load)				117.65	1.25	0.002157	lb	10^6 Btu	(HHV)
17		Engine (4-stroke lean burn, <90% Load)				117.65	1.25	0.002157	lb	10^6 Btu	(HHV)
18		Engine (4-stroke rich burn)				117.65	0.23	0.002157	lb	10^6 Btu	(HHV)
19		Engine (4-stroke rich burn, 90-105% Load)				117.65	0.23	0.002157	lb	10^6 Btu	(HHV)
20		Engine (4-stroke rich burn, <90% Load)				117.65	0.23	0.002157	lb	10^6 Btu	(HHV)
21		Engine (2-stroke lean burn)				117.65	1.45	0.002157	lb	10^6 Btu	(HHV)
22		Engine (2-stroke lean burn, 90-105% Load)				117.65	1.45	0.002157	lb	10^6 Btu	(HHV)
23		Engine (2-stroke lean burn, <90% Load)				117.65	1.45	0.002157	lb	10^6 Btu	(HHV)
24		Turbine				117.65	0.00860	0.0030	lb	10^6 Btu	(HHV)
25		Gas Turbine: Uncontrolled				117.65	0.00860	0.0030	lb	10^6 Btu	(HHV)
26		Gas Turbine: ControlledWater-Steam Inject	ion			117.65	0.00860	0.0030	lb	10^6 Btu	(HHV)
27		Gas Turbine: ControlledLean-Premix				117.65	0.00860	0.0030	lb	10^6 Btu	(HHV)
28	Fuel Gas	General				117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
29		Boiler or Furnace				117.65	0.002250	0.002157	lb	10^6 Btu	(HHV)
30		Engine				117.65	0.005600	0.003672	lb	10^6 Btu	(HHV)
31		Turbine				117.65	0.0086	0.003000	lb	10^6 Btu	(HHV)
32	Field Gas (associated or	General				123.6	0.00251	0.0024	lb	10^6 Btu	(HHV)
33		Boiler or Furnace				123.6	0.00251	0.0024	lb	10^6 Btu	(HHV)
34		Engine				123.6	0.0024	0.0024	lb	10^6 Btu	(HHV)
35		Turbine				123.6	0.009573	0.00334	lb	10^6 Btu	(HHV)
36	Flash Gas	General				130.3	0.00251	0.0024	lb	10^6 Btu	(HHV)
37	Butane	General				146.8	0.0021	0.0092	lb	10^6 Btu	(HHV)
i∎Î ∎	N N Sheet1 / Sheet	2 / Sheet2 /				440.0	0.0004	0.0000	0.	4.040 DH	anas

Example SANGEA[™] Software Combustion - Fuel Emission Factor Definition

A REAL PROPERTY AND A REAL	Specify Fuel and Device Specific Emission Factors for a New Local Fuel	
	Step 1. Enter Local Fuel Name Site Specific Fuel Gas Step 2. Select Local Specification or Select from Standard Gases Local Specification	
Enter fuel- specific emission factors here	Enter or Select Device Type Specify Rating Limit at which these Factors Apply (optional) Step 3. Select the Type of Available Data Enter Fuel Density (optional) b per Scf	•
	Enter Fuel HHV Factor 960 Btu Per scf Enter Fuel HHV Factor 1060	
	Enter Fuel CO2 Factor 122.5 Ib ref Btu (HHV)	
22	Enter Fuel N2O Factor 0,001 Ib per Btu (HHV) Add & Next Device Add & Next Fuel Add & Exit Cancel	Help

Example SANGEA[™] Software Input Data Screen

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Enter	Monthly Usage for: \	Vaste Gas						
Location		Source Description	Source Id		Units	YTD	Jan	F
Example	h	Incinerators	3		10^6 Btu (HHV)	344,000	344,000	
Enter	Monthly Usage for:	Natural Gas for Turbines						
Location		Source Description	Source Id		Units	YTD	Jan	F
Example	Monthly Usage for: 1	Gas Furbines Refinery Fuel Gas	2		IO 6 B(U (HHV)	7,140,000	7,140,000	
Location	4	Source Description	Source Id		Units	YTD	Jan	F
Example	5	External combustion boilers/heaters	1		10^6 Btu (HHV)	45,762,500	45,762,500	
Enter	Monthly Usage For: 1	Purchased Natural Gas	C		U-it-	VTD	1	
Location		Source Description	Source la		Units	TID	Jan	<u> </u>
Example	Monthly Usage for: 1	Natural Gas	·			672,000	672,000	
Location		Source Description	Source Id		Units	YTD	Jan	F
Hydrogen Plant Sources Enter Monthly Hydrogen	Input Data	dstack Snecified-						
Location	(Source Description	Source Id	Feedstock	Units	YTD	Jan	F
Euomolo		Natural and food to H2 plant	1	Natural Gaz	1016 col	6 600	6 600	<u> </u>

A	В	С	D	E	F	G	Н	
Report by Equity 🗖								
Report On Operator Only	1	Run Report						
Skip Unused Locations 🛛	La:	st Report Created:	28-Jun-01					

Location	CO2	CH₄	N₂O	CH₄ (CO₂e)	N ₂ O (CO ₂ e)	Total CO2e	Energy (10°6Btu (LHV))
Field 123 Well 55 Processing	2,266,147	4,128	440.2	86,687	136,461	2,489,295	668,585
Field 123 Well 56 Processing	523,001	43	0.0	895	0	523,895	0
Field 321 Well 77 Processing	414,988	18	0.8	380	238	415,607	728,363
Field 321 Well 66 Processing	80,505	43	0.0	895	0	81,400	0
Total (tonne):	3,284,641	4,231	441.0	88,857	136,699	3,510,197	1,396,948

Module	COz	CH₄	N₂O	CH₄ (CO₂e)	N ₂ O (CO ₂ e)	COze	Energy (10°6Btu (LHV))
Acid Gas Removal	241,516	128	nla	2,684	nła	244,200	nła
Coke Combustion	1,259,175	nla	nla	nla	nła	1,259,175	nla
Cold Vent	11	67	n/a	1,415	nła	1,425	nła
Combustion	175,637	21	3.3	435	1,009	177,081	2,956,991
Flare	1,031	6	0.0	127	0	1,158	nla
Flashing	1,515	6	0.0	121	0	1,636	nla
Fugitive	nla	2,621	nla	55,039	nła	55,039	nla
Glycol Dehydrator	nla	21	nla	447	nła	447	nla
Hydrogen Plant	177,848	nla	nla	nla	nła	177,848	nla
Indirect Emission	1,462,820	197	171.3	4,141	53,106	1,520,066	-1,560,043
Crude Dil	nla	129	n/a	2,702	nła	2,702	nla
Miscellaneous	-34,911	1,036	266.4	21,748	82,584	69,420	nla
Total (tonne):	3,284,641	4,231	441.0	88,857	136,699	3,510,197	1,396,948

CO2 (by Location & Module)	loid Gas Removal Sok	e Combustion	Cold Vent	Combustion	Flare	Flashing	Fugitive Tyco
Field 123 Well 55 Processing	80,505	408,340	11	132,988	1,031	1,515	nła
Field 123 Well 56 Processing	80,505	442,495	0	0	0	0	nła
Field 321 Well 77 Processing	0	408,340	0	42,648	0	0	nła
Field 321 Well 66 Processing	80,505	0	0	0	0	0	nla
Total (tonne):	241,516	1,259,175	1 1	175,637	1,031	1,515	0

CH 4	(by Location & Module)	oid Gas Removal Sol	ke Combustion	Cold Vent	Combustion	Flare	Flashing	Fugitive Syca
	Field 123 Well 55 Processing	43	nla	67	3	6	6	2,621
	Field 123 Well 56 Processing	43	nla	0	0	0	0	0
	Field 321 Well 77 Processing	0	nla	0	18	0	0	0
	Field 321 Well 66 Processing	43	nła	0	0	0	0	0
	Total (tonne):	128	0	67	21	6	6	2,621
	🛛 🖌 Setup 🖌 Input - Group	o 1 🖊 Input - Grou	ıp 2 ∖Summary	By Location	∕ By Mc 🖣			•

Example SANGEA [™] Software Summary Chart -Emissions by Module



Summary

- Robust methods for calculating, reporting, and tracking emissions are essential for cost-effectively managing GHG emissions
- Consistent methodologies lend credibility to the estimates and enable aggregation and comparison
- Petroleum Industry has taken significant steps toward consistency
 - Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions
 - API Compendium of Greenhouse Gas Emissions Estimation for the Oil and Gas Industry
 - SANGEA[™] Energy and Emissions Estimating System

Path Forward

- SANGEA[™] software will be available through API
- Workshops and conference participation to publicize Compendium, Guidelines, and SANGEA[™] software
- Periodic updates to Compendium, Guidelines, and SANGEA[™] software
- Continued outreach to ensure consistency
 - DOE 1605(b)
 - ISO 14064
 - IPCC
- Examine applications to emission reduction
 projects



Access to GHG Tools

Guidelines Document

- http://api-ec.api.org

or

– http://www.ipieca.org/reporting/ghg.html

or

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- http://www.ogp.org.uk
- Compendium
 - http://api-ec.api.org
- SANGEA[™] software
 - http://api-ec.api.org

Acknowledgments

- API
- PIECA, OGP
- ChevronTexaco
- Member companies
 - Working groups, drafting task forces, and steering committees
 - Companies who shared internal information