



Case Study – Environment Impact Assessment from E&P Operations

Developing a GHG Protocol Template for E&P Industry



Our Team has customized a GHG protocol template for the Oil & Gas industry which is still not available yet as a sector specific tool

Next Step – This customized template is getting migrated into an app using a no-code platform



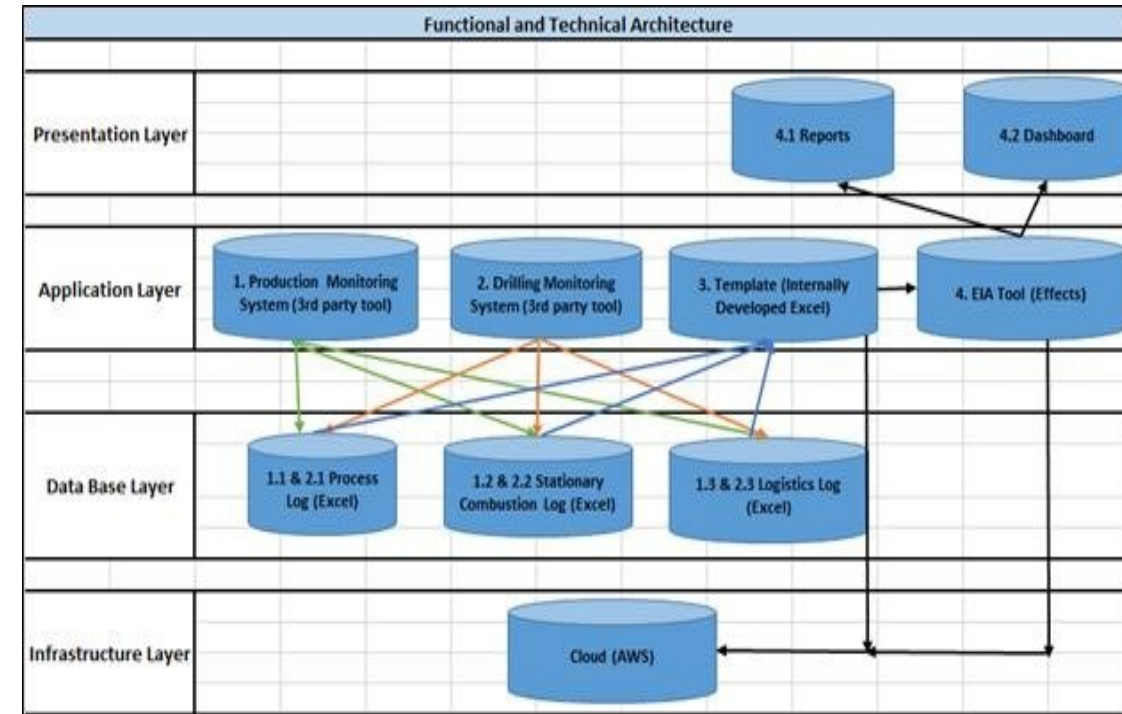
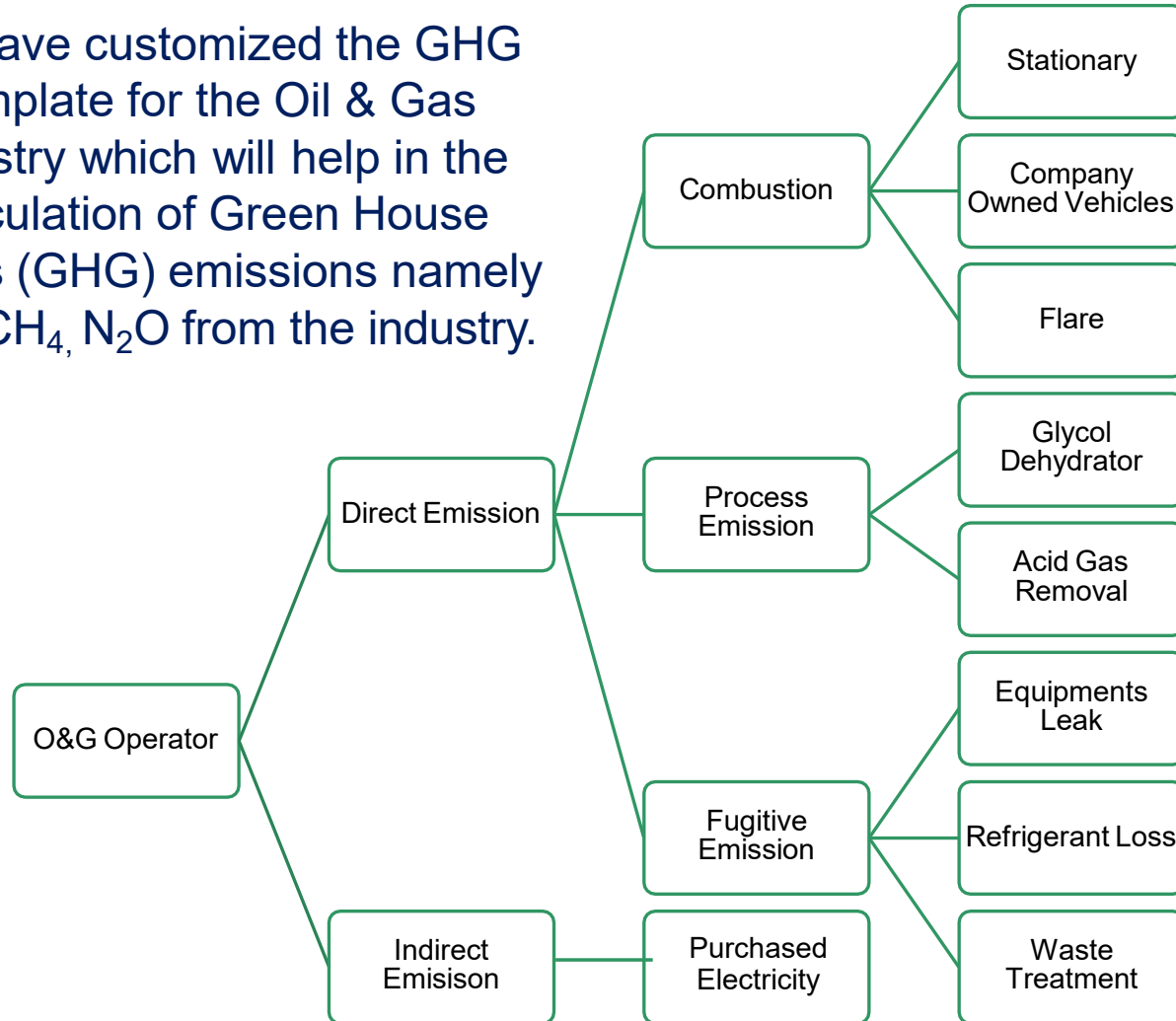
Typical Emission Sources from E&P operations

Oil & Gas	Process	Well drilling	CO ₂ ,CH ₄ ,N ₂ O
		Flares	CO ₂ ,CH ₄ ,N ₂ O
		Incinerators	CO ₂ ,CH ₄ ,N ₂ O
		Dehydration processes	CH ₄
		Gas sweetening processes	CO ₂ ,CH ₄
		Process Heat	CO ₂ ,CH ₄ ,N ₂ O
		Exploratory Drilling	CO ₂ ,CH ₄
		Gas sampling and analysis	CO ₂ ,CH ₄
		Mud degassing	CO ₂ ,CH ₄
		Low pressure gas well casing	CO ₂ ,CH ₄
		Well completions	CO ₂ ,CH ₄
		Wastewater treatment	CO ₂ ,CH ₄
		Air Conditioning/Refrigeration	CO ₂ , CH ₄
		Site preparation, construction, and excavation	CO ₂ ,CH ₄ ,N ₂ O
		Stationary	Boilers
	Dehydrator reboilers		CO ₂ ,CH ₄ ,N ₂ O
	Heaters		CO ₂ ,CH ₄ ,N ₂ O
	Internal Combustion(IC) engine generators		CO ₂ ,CH ₄ ,N ₂ O
	Reciprocating Compressor Drives		CO ₂ ,CH ₄ ,N ₂ O
	Fire Pumps		CO ₂ ,CH ₄ ,N ₂ O
	Turbine Electric Generators		CO ₂ ,CH ₄ ,N ₂ O
	Turbine/centrifugal compressor drivers		CO ₂ ,CH ₄ ,N ₂ O
	Electricity imports		CO ₂
	Cogeneration		CO ₂
	Dehydrator Kimray pumps		CH ₄
	Storage tanks and drain vessels		CO ₂ , CH ₄
	Chemical injection pumps		CO ₂ , CH ₄
	Equipment component leaks		CO ₂ , CH ₄
	Mobile		Mobile drilling equipment
		Company vehicles(Petrol, Diesel)	CO ₂ ,CH ₄ ,N ₂ O
		Planes/helicopters(In Case Of Offshore)	CO ₂ ,CH ₄ ,N ₂ O
		Supply boats, barges	CO ₂ ,CH ₄ ,N ₂ O



Emission Calculation for O&G Clients

We have customized the GHG template for the Oil & Gas industry which will help in the calculation of Green House Gases (GHG) emissions namely CO₂, CH₄, N₂O from the industry.



Emission Sources Calculation for O&G Clients

User Input		Emission Factor and Heating Values if not known refer to Sheet Emission Factors for the Tables					
Calculated Values							
GHG gases from Combustion Sources(Stationary & Mobile)		Emission Factors & Heating Values from Tables 1,2,3,4,15					
CO2	From Stationary Devices	Fuel Type	Unit(kg/t)	Quantity	Emission Factor/Heat Value	Carbon content factor	CO2 emitted
		Boilers/steam Generators	Coal	tonnes	40	0.1036	0.73
Dehydrator reboilers	Coal	tonnes	50	0.1036	0.73	13.86513	
Heaters/Treaters	Diesel	tonnes	2	0.0742	0.87	0.47340	
Internal Combustion(IC) engine generators	Diesel	tonnes	1.5	0.0742	0.87	0.35505	
Fire Pumps	0	0	0	0	0	0.00000	
Reciprocating Compressor Drives	0	0	0	0	0	0.00000	
Turbine Electric Generators	Coal	tonnes	30	0.1036	0.73	2.77303	
Turbine/centrifugal compressor drivers	0	0	0	0	0	0.00000	
Well drilling	Diesel	tonnes	10	0.0742	0.73	1.98609	
Flares	0	0	0	0	0	0.00000	
Incinerators	0	0	0	0	0	0.00000	
TOTAL						30.5448	
CO2	From Mobile Sources	Fuel Type	Unit(kg/t)	Quantity	Emission Factor	Carbon Content factor	CO2 emitted
		Mobile drilling equipment	Diesel	tonnes	30	0.0742	0.87
Company vehicles(Petrol)	Petrol	tonnes	1	0.0709	0.84	0.2184	
Company vehicles(Diesel)	Diesel	tonnes	1.5	0.0742	0.87	0.3550	
Planes/helicopters(In Case Of Offshore)	0	0	0	0	0	0.0000	
Supply boats, barges	0	0	0	0	0	0.0000	
Site preparation, construction, and excavation	Diesel	tonnes	2	0.0742	0.87	0.4734	
Total						3.4318	
CH4	From Stationary Devices	Fuel Type	Unit(kg/t)	Quantity	Emission Factor	CH4 emitted	
		Boilers/steam Generators	Coal	tonnes	40	0.000001	0.000040
Dehydrator reboilers	Coal	tonnes	50	0.000001	0.000050		
Heaters/Treaters	Diesel	tonnes	2	0.000003	0.000006		
Internal Combustion(IC) engine generators	Diesel	tonnes	1.5	0.000003	0.000005		
Fire Pumps	0	0	0	0	0.000000		
Reciprocating Compressor Drives	0	0	0	0	0.000000		
Turbine Electric Generators	Coal	tonnes	30	0.000001	0.000010		
Turbine/centrifugal compressor drivers	0	0	0	0	0.000000		
Well drilling	Diesel	tonnes	10	0.000001	0.000001		
Flares	0	0	0	0	0.000000		
Incinerators	0	0	0	0	0.000000		
Total						0.0001	
CH4	From Mobile Sources	Fuel Type	Unit(kg/t)	Quantity	Emission Factor	CH4 emitted	
		Mobile drilling equipment	Diesel	tonnes	30	0.000003	0.0000
Company vehicles(Petrol)	Petrol	tonnes	1	0.000003	0.0000		
Company vehicles(Diesel)	Diesel	tonnes	1.5	0.000003	0.0000		
Planes/helicopters(In Case Of Offshore)	0	0	0	0	0.0000		
Supply boats, barges	0	0	0	0	0.0000		
Site preparation, construction, and excavation	Diesel	tonnes	2	0.000003	0.0000		
Total						0.000044	
N2O	From Stationary Devices	Fuel Type	Unit(kg/t)	Quantity	Emission Factor	N2O emitted	
		Boilers/steam Generators	Coal	tonnes	40	0.000015	0.000600
Dehydrator reboilers	Coal	tonnes	50	0.000015	0.000750		
Heaters/Treaters	Diesel	tonnes	2	0.00000600	0.000012		
Internal Combustion(IC) engine generators	Diesel	tonnes	1.5	0.00000600	0.000009		
Fire Pumps	0	0	0	0	0.000000		
Reciprocating Compressor Drives	0	0	0	0	0.000000		
Turbine Electric Generators	Coal	tonnes	30	0.000015	0.000150		
Turbine/centrifugal compressor drivers	0	0	0	0	0.000000		
Well drilling	Diesel	tonnes	10	0.00000600	0.000006		
Flares	0	0	0	0	0.000000		
Incinerators	0	0	0	0	0.000000		
Total						0.00150810	
N2O	From Mobile Sources	Fuel Type	Unit(kg/t)	Quantity	Emission Factor	N2O emitted	
		Mobile drilling equipment	Diesel	tonnes	30	0.00000600	0.00000600
Company vehicles(Petrol)	Petrol	tonnes	1	0.00000601	0.00000600		
Company vehicles(Diesel)	Diesel	tonnes	1.5	0.00000600	0.00000900		
Planes/helicopters(In Case Of Offshore)	0	0	0	0	0.0000		
Supply boats, barges	0	0	0	0	0.0000		
Site preparation, construction, and excavation	Diesel	tonnes	2	0.00000600	0.0000120		
Total						0.0000870	
		Stationary Devices	Mobile Sources	Total			
CO2		30.5448	3.4318	33.9766			
CH4		0.0001	0.0000	0.0002			
N2O		0.0015	0.0001	0.0015			

User Input Value		Emission Factor and Heating Values if not known Sheet Emission Factors for the Tables			
Calculated Values					
GHG from Indirect Sources					
CO2	Units Consumed	CO2 Emission Factor	CO2 emission		
Electricity imports(in kWh)	10,000.00	0.4000	4.0000	tonnes CO2/year	
Process heat/steam imports(fuel)	0.0000	0.0000	0.0000	Emission Factor from Table 5	
Cogeneration	50,000.0000	0.5800	29000.0000		
Total			29004.0000		
CH4	Units Consumed	CH4 Emission Factor	CH4 emission		
Electricity imports(in kWh)	10000.00	0.0000680	0.0006800	tonnes CH4/year	
Process heat/steam imports(fuel)	0.0000	0.0000000	0.0000000		
Cogeneration	50000.0000	0.0002760	1.3800000		
Total			1.3801		
N2O	Units Consumed	N2O Emission Factor	N2O emission		
Electricity imports(in kWh)	10,000.00	0.0002860	0.0028600	tonnes N2O/year	
Process heat/steam imports(fuel)	0.0000	0.0000000	0.0000000		
Cogeneration	50,000.0000	0.0010900	5.4500000		
Total			5.450286		
		CO2	CH4	N2O	
Indirect Source		29004.0000	1.3801	5.450286	



Emission Sources Calculation for O&G Clients

User Input Value		Emission Factor and Heating Values if not known refer to Sheet Emission Factors for the Tables			
Calculated Values					
GHG from Vented Sources					
Process Vents					
	Volume of Gas/year	Sour Gas Concentration in %	Sweet Gas Concentration in %	Emission of CO2 in tonnes/year	
CO2	Gas sweetening processes	121	45	30	0.000955029
Total				0.000955029	
CH4					
	Volume of Gas treated/year	Emission Factor	Facility CH4 molar content	Emission of CH4 in tonnes/year	
CH4	Dehydration processes(MMSCF)	121	0.0052859	78.8	0.580645153
	Dehydrator Kimray pumps	121	0.0052859	78.8	0.580645153
	Gas sweetening processes	121	0.0185	78.8	2.2385
Total				3.399790307	
Other Venting					
CO2	Value	Emission factor	tonnes CO2/year	First Complete for CH4	
	NA	NA	NA		
	Storage tanks and drain vessels Exploratory drilling & Well testing and completions(Vol. in MMSCF)	NA	NA	0	
	Pneumatic devices(no. of devices)	3	70	4.655701142	
	Chemical injection pumps(no. of pumps)			0	
Total				4.655701142	
CH4	Value	CH4 content in volume%/mole% default 70%	Emission factor	tonnes CH4/year	
	1500	70	0.000886	1.380983756	
	Exploratory drilling & Well testing and completions(vol. in MMSCF)	30	70	0.000886	0.000509151
	Pneumatic devices(no. of devices)	3	70	4.341	13.16769559
	Chemical injection pumps(no. of pumps)	0		0	
Total				14.3487325	
Maintenance/Turnarounds					
CO2	Value	CH4 content in volume%/mole% default 70%	Emission factor	tonnes CO2/year	
	4	70	0.2605	0.307567084	EF from Table 10
	Mud degassing(No. of days)				
	4	70	0.00206 tonne CH4/well-day	0.944645939	
	Low pressure gas well casing(No. of wells)	5	70	0.07329	0.302308376
	Compressor blowdowns(No. of devices)	5		843	11785.91371
	Compressor starts(No. of devices)	5		0	
	Gathering pipeline blowdowns(Miles)	4		0	
	Vessel blowdown(No. of vessels)	4	70	0.0015	0.001675127
	Well workovers(No. well workovers/yr)			0	
Total				11787.2699	
CH4	Value	CH4 content in volume%/mole% default 70%	Emission factor	tonnes CH4/year	
	5	70	0.2605	1.087358378	EF from Table 10
	Mud degassing				
	4	70	0.00206 tonne CH4/well-day	2.671258888	
	Low pressure gas well casing(No. of wells)	5	70	0.07329	0.32526685
	Compressor blowdowns(No. of devices)	5		843	37500.63452
	Compressor starts(No. of devices)	5		0	
	Gathering pipeline blowdowns(Miles)	4		0	
	Vessel blowdown(No. of vessels)	4	70	0.0015	0
	Well workovers(No. well workovers/yr)	0		0	
Total				37504.71913	
Non Routine Activities					
CO2	Value	CH4 content in volume%/mole% default 70%	Emission factor	tonnes CO2/year	
	4	70	0.00065	0.000725888	
	Emergency shutdown (ESD)/ emergency safety blowdown (ESB)(No. of platforms)			0	
	Pressure relief valves (PRVs)(No. of Valve)	4	70	0.00065	0.000725888
	Fire Suppression	None	None	None	
Total				0.000725888	
CH4	Value	CH4 content in volume%/mole% default 70%	Emission factor	tonnes CH4/year	
	0	0	0	0	
	Emergency shutdown (ESD)/ emergency safety blowdown (ESB)(No. of platforms)			0	
	Pressure relief valves (PRVs)	4	70	0.00065	0.002309645
	Fire Suppression	None	None	None	
Total				0.002309645	
Summary					
	CO2			0.000955029	
	CH4			3.399790307	
	Other Venting			4.655701142	
	Maintenance/Turnarounds			11787.2699	
	Non Routine Activities			0.002309645	
	Total			11791.92728	

User Input Value		Emission Factor and Heating Values if not known refer to Sheet Emission Factors for the Tables				
Calculated Values						
GHG from Fugitive Sources						
	Value	CH4 content in volume%/mole%	Emission Factor	tonnes CO2 /yr	BOD(Biochemical Oxidation)mg /L	
CO2	Equipment component leaks(in m3/day)	1000	78.8	0.005903	348.5374265	NA
	Wastewater treatment(flow rate (10e6 gallons/yr))	15000	78.8	0.2	0.000167302	15
	Air Conditioning/Refrigeration	-	-	-	-	NA
Total				348.5375938		
CH4	Value	CH4 content in volume%/mole%	Emission Factor	tonnes CH4/yr		
	1000	78.8	0.005903	2154.595	EF from Table 12	
	Equipment component leaks(in m3/day)					
	Wastewater treatment(Vol. in m3/yr)	15000	78.8	0.2	0.9	EF from Table 13 & 14
	Air Conditioning/Refrigeration	-	-	-	-	
Total				2155.495		
				CO2	CH4	
Fugitive Sources				348.5375938	2155.495	





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