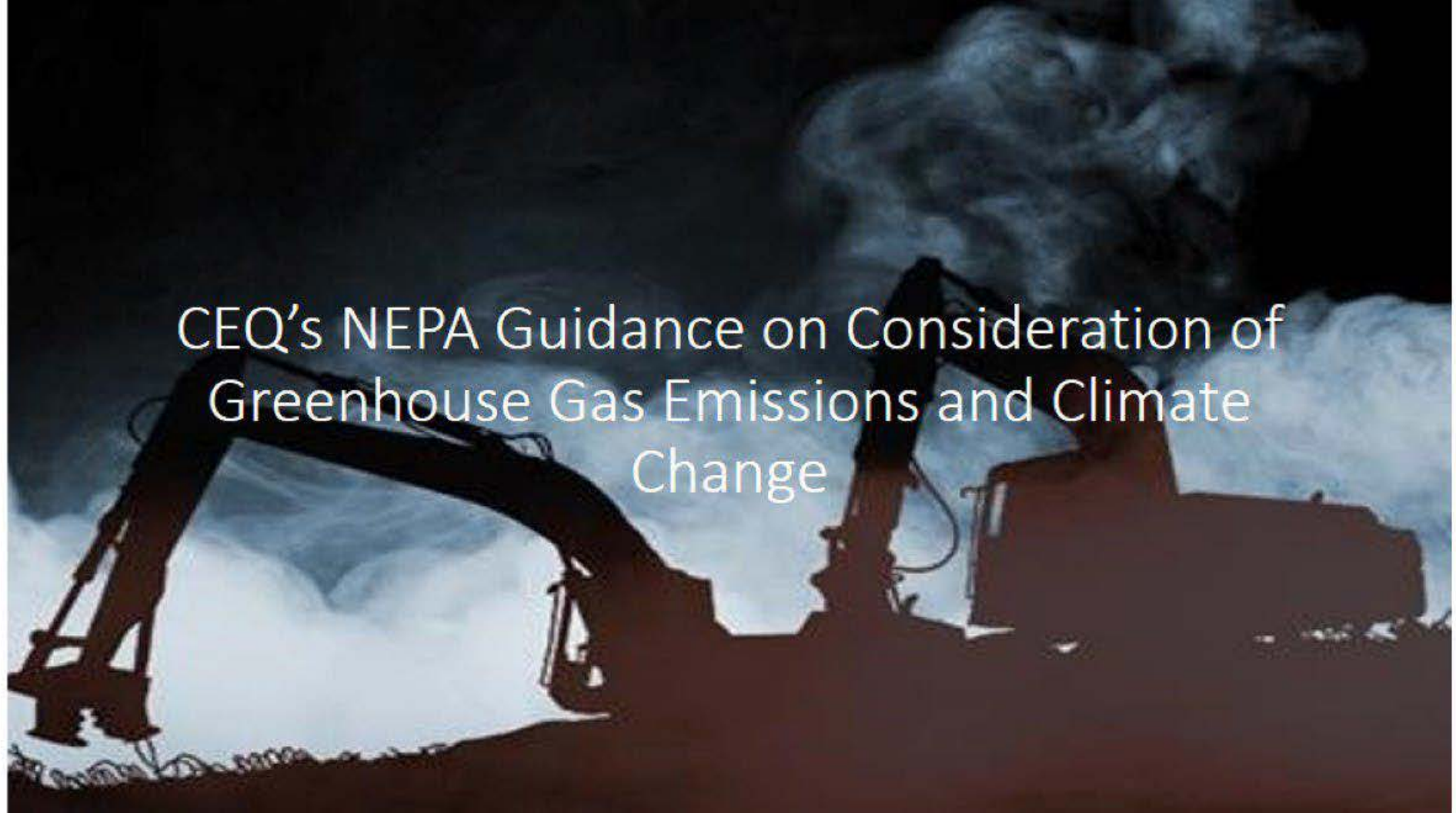

CEQ's NEPA Guidance on Consideration of Greenhouse Gas Emissions and Climate Change

The Plan…

- Introducing The Air Quality and Greenhouse Gas Planning Sub-CoP!
- Overview of NEPA Interim Guidance on Consideration of Greenhouse Gas Emissions and Climate Change
- Requirements vs Recommendations by Guidance
- GHG Analysis Basics
- Effects Analysis Considerations
- Case study

Introducing – The Air Quality and Greenhouse Gas Planning Sub-CoP!

Mission

Deliver technical solutions, tools, and information for performing air quality & greenhouse gas emissions analyses and planning for civil works, regulatory, and ops projects.

Vision

Strengthen the enterprise for air quality and greenhouse gas topics in an ever-changing project planning climate.

Leads:

Jason Emmons (SPN)

Kevin Wong (SPL)

Communication Plan

Sharepoint Site

https://cops.usace.army.mil/default.aspx

Repository for documents and user tools, notices for upcoming webinars, directions for connecting with other users via Microsoft Teams.

Webinars

Periodic webinars for timely information dispersal, for the Enterprise or by region, for policy changes and new user tools.

Microsoft Teams

Channels for user questions, webinar events, technical questions, and policy questions as well as a repository for tools and documents.

Annotate This Slide!

Your Air Quality/GHG Analysis Experience	Your NEPA Air Quality/GHG Analysis Review Experience	AQ/GHG Analysis Usually Performed BY:
3 or more	3 or more	Your District
1-2	1-2	Project Sponsor
No Experience	No Experience	Hired Firm

Overview - BLUF

This Guidance gives no numerical threshold to determine significance, instead a **qualitative analysis** should be used to determine significance while still quantifying GHG emissions.

Timing: implement immediately for current reviews, unless a Final EIS/NOI or Final EA/FONSI are complete; **do not** apply retroactively for completed reviews.

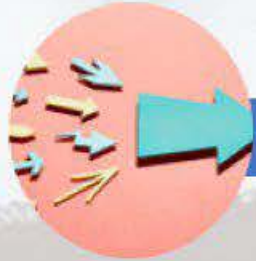
Social Cost of Greenhouse Gas (**SC-GHG**): state clearly SC-GHG is **only** for contextualizing emissions for alternatives comparison, not used for Benefit-Cost Analysis (BCRs). Currently set at $51/MT, awaiting update and reliable source for future calculations.

Requirements vs Recommendations

The use of non-mandatory language such as "guidance," "recommend," "may," "should," and "can," describes CEQ policies and recommendations. The use of mandatory terminology such as "must" and "required" describes controlling requirements under the terms of NEPA and the CEQ regulations, but this document does not affect legally binding requirements.

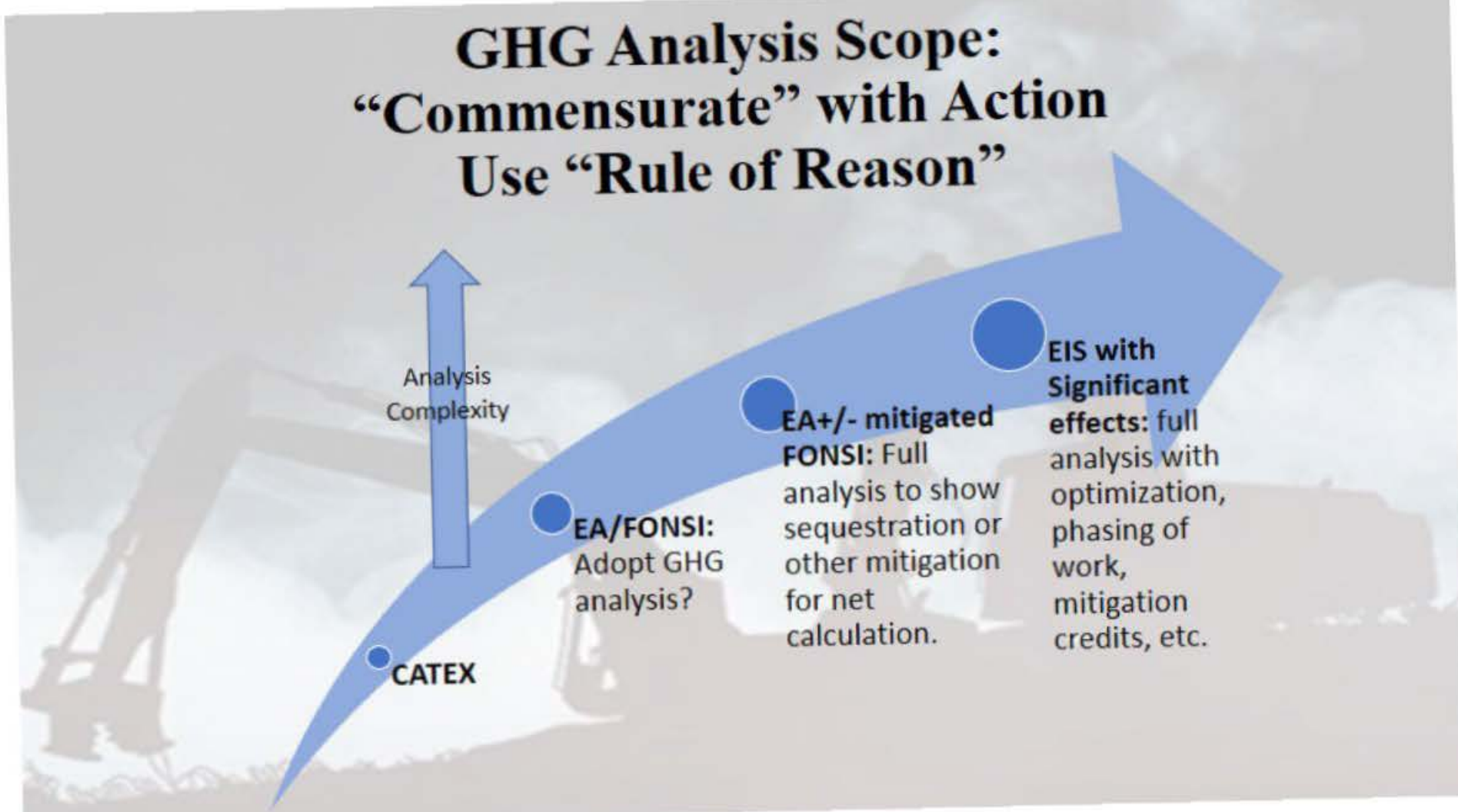
Must:

1) Consider & Disclose - reasonably foreseeable effects and GHG emissions, and
2) a range of reasonable alternatives & mitigation measures,
3) Identify climate trends for affected environment (ie no-action alternatives),
4) Establish a baseline to contextualize direct and indirect emissions,
5) Consider EJ per EO12898 and EO14008.



Recommended: Everything else, but....

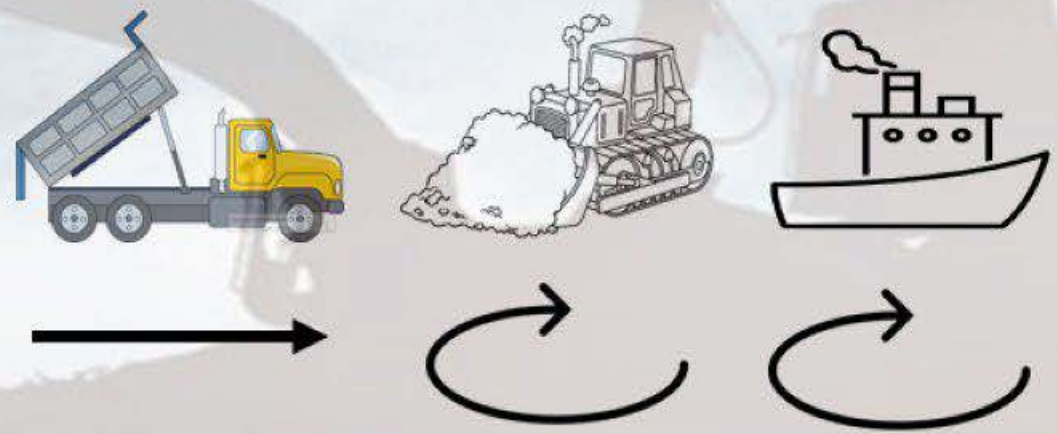
GHG Analysis Scope: "Commensurate" with Action Use "Rule of Reason"




Emissions = input parameters x emission factor

Input Parameters

	On Road	Off Road	Marine
License Plate?	Yes	No	N/A
Measurement of use	Miles	Hours	Hours



Emissions = input parameters x emission factor

Input Parameters (Equipment List)

Attachment 1: Equipment List by Management Measure

	Off Road			On Road		
	Equipment	Quantity	Hrs./Day	Equipment	Trips/Day	Mile/Trip
Aggregrate Base & Asphalt	Loader	1	8	Haul: 15-cy trucks	6	30
	Grader	1	8	crew	6	14.7
	Roller	1	8			
Backfill & Compacted Fill	Loader	2	8	Haul:	1	8
	Dozer	1	8	Crew:	6	14.7
	Roller	1	8			
Chainlink Fence	Backhoe	1	8	Haul: flatbed trucks	1	6
				crew	3	14.7
Clearing & Grubbing	Rubber-tired dozer	1	8	Haul: 15-cy trucks	6	30
				crew	3	14.7
Cofferdam Installation	Crane	1	8	Haul: flatbed trucks	1	15
	Excavator	1	1	crew	4	14.7
Concrete Planters	Forklift	1	8	Haul: flatbed trucks	4	30
Demolition concrete/riprap	Excavator	1	8	Haul: 15-cy trucks	4	30
	Rubber-tired loaders	2	8	crew	5	14.7
Demolition stormdrain	excavator	1	8	Haul: flatbed trucks	1	20

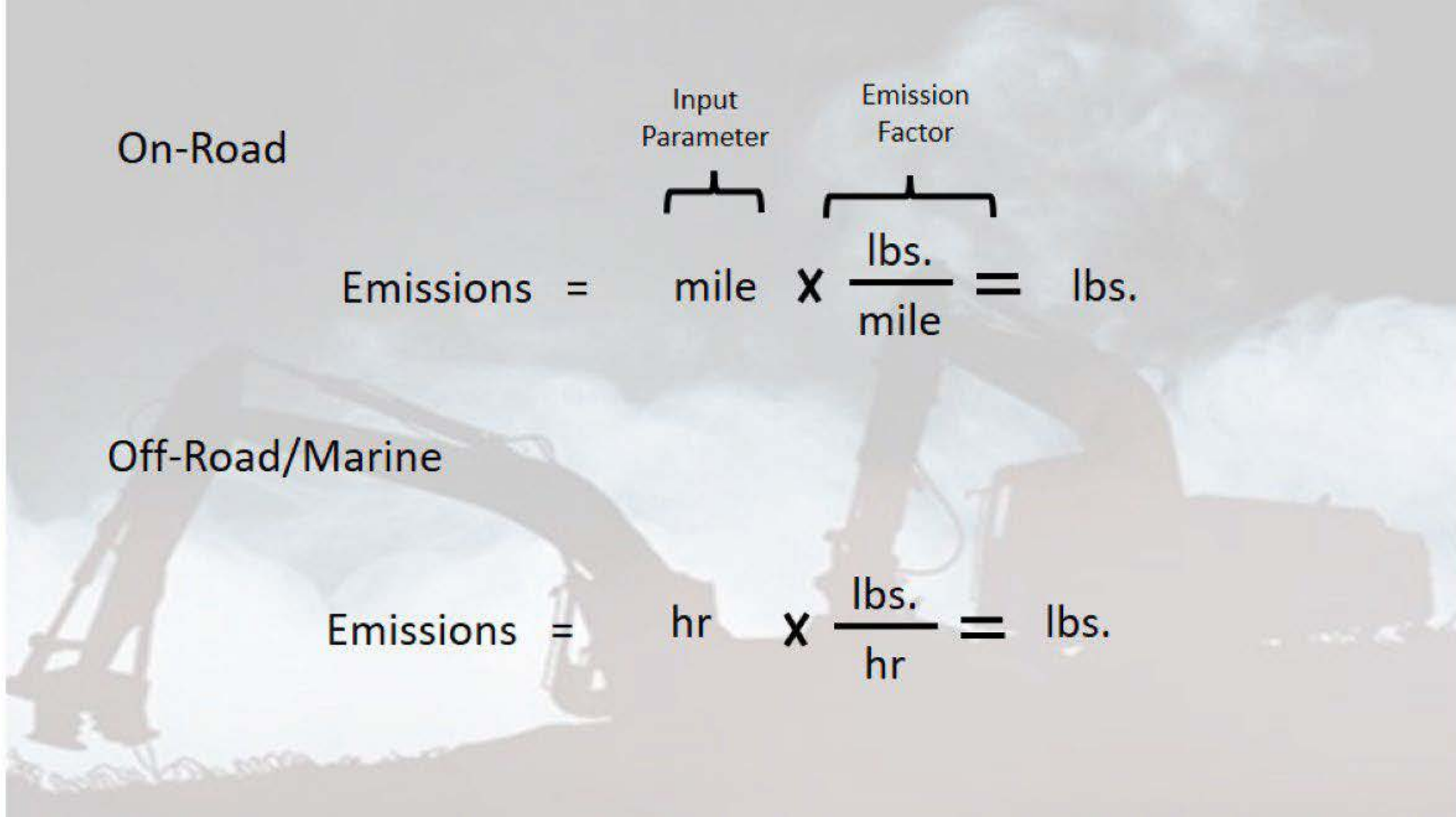
Emissions = input parameters x emission factor

		(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)	(lb/hr)
Excavator	MaxHP	ROG	CO	NOX	SOX	PM	CO2	CH4
	50	0.0297	0.2365	0.1616	0.0003	0.0035	25.0	0.0027
	120	0.0448	0.4942	0.2638	0.0009	0.0092	73.6	0.0040
	175	0.0518	0.6636	0.1982	0.0013	0.0091	112	0.0047
	250	0.0647	0.3210	0.2222	0.0018	0.0074	159	0.0058

https://ww2.arb.ca.gov/our-work/programs/mobile-source-emissions-inventory/msei-modeling-tools-emfac-software-and

Emissions = input parameters x emission factor

	2011	2012	2013
	1967-2011	1968-2012	1969-2012
Compound	lb/mile	lb/mile	lb/mile
CO	**0.01021519**	**0.00931790**	**0.00846435**
NOx	**0.03092379**	**0.02742935**	**0.02418049**
ROG	**0.00252764**	**0.00226308**	**0.00201594**
SOx	**0.00004042**	**0.00004086**	**0.00004092**
PM10	**0.00149566**	**0.00133697**	**0.00118458**
PM2.5	**0.00129354**	**0.00114629**	**0.00100582**
CO2	**4.21590774**	**4.21518556**	**4.21279345**
CH4	**0.00011651**	**0.00010441**	**0.00009261**


On-Road
Input Parameter
Emission Factor
Emissions = mile x lbs./mile = lbs.
Off-Road/Marine
Emissions = hr x lbs./hr = lbs.

Example GHG Analysis – Direct Effects

Lower Colma Creek Direct (Construction) Greenhouse Gas Emissions Inventory and Analysis - Preferred Alternative

5x40x0.00397866 = 0.796

GHG Emissions Inventory

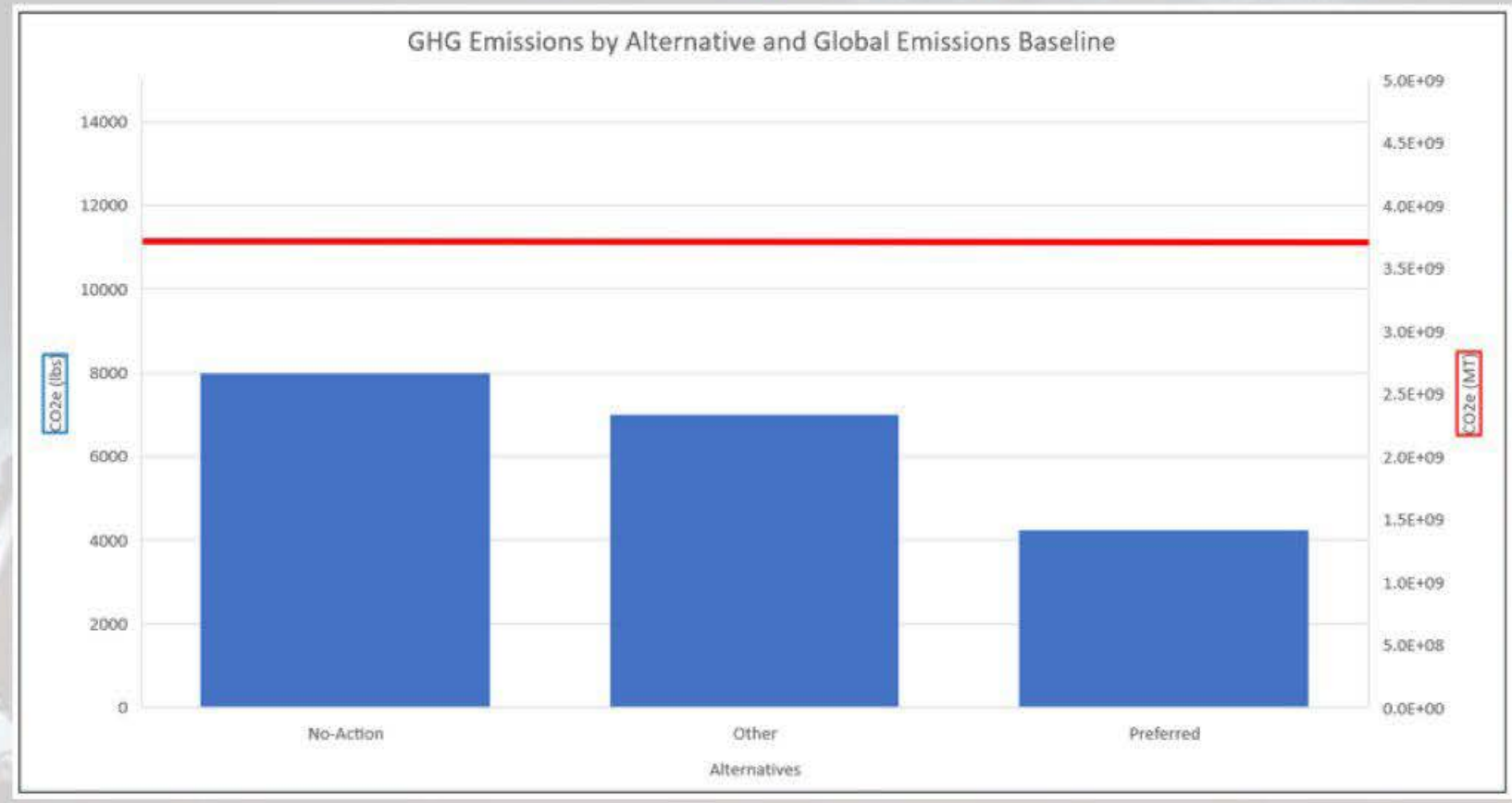
Emission Source Data						Emission Factors for Construction Equipment (lbs/Hp-hr) or (lbs/mile)[1,2,3]				Daily GHG Emissions from Construction Activities (lbs/day)				
Construction Activity/Equipment Type	Power Rating (Hp)	Load Factor	# Active	Hourly Hp-Hrs	Hrs per Day Or Miles Per Day [3]	CO	CO_2	CH_4	N_2O	CO	CO_2	CH_4	N_2O	CO_{2e}
Worker vehicles	N/A	NA	5	NA	40	0.00397866	1.11019931	0.00004121	0.00035150	0.796	222.040	0.008	0.070	243.991
Water Truck	N/A	NA	1	NA	2.8	0.00457902	4.21483461	0.00004176	0.01031407	0.013	11.802	0.000	0.029	20.423
Dump Trucks (10 CY)	400	0.38	10	1520	8	0.03139379	7.62439642	0.00082991	0.05812359	0.954	231.782	0.025	1.767	759.920
Excavator	120	0.37	2	88.8	8	0.49421220	73.62306780	0.00404531	0.26376217	2.926	435.849	0.024	1.561	904.692
Concrete/Industrial Saws	30	0.38	1	11.4	8	0.37057343	58.46365276	0.00303830	0.24708163	1.127	177.730	0.009	0.751	402.923
Rubber Tired Loaders	120	0.45	1	54	8	0.39159132	58.91350855	0.00358381	0.24763471	1.410	212.089	0.013	0.891	479.483
Dump Truck	400	0.38	1	152	40	0.00457902	4.21483461	0.00004176	0.01031407	0.183	168.593	0.002	0.413	291.762
Water Truck	400	0.38	1	152	40	0.00457902	4.21483461	0.00004176	0.01031407	0.183	168.593	0.002	0.413	291.762
Roller	120	0.38	2	91.2	8	0.38010541	58.98875264	0.00353881	0.26471585	2.311	358.652	0.022	1.609	841.123

$CO_{2e} = CO_2 + X*CO + Y*N_2O + Z*CH_4$
Where X = 100 Year Global Warming Potential for Carbon Monoxide = 1
Where Y = 100 Year Global Warming Potential for nitrous oxide = 298
Where Z = 100 Year Global Warming Potential for Methane = 25
CFR Title 40 Chapter I Subchapter C Part 98: Table A-1 Global Warming Potentials

GHG Analysis

Total CO2e (lbs/day)	4236.1
Total Project CO2e (Tons)	317.7
BAAQMD Construction GHG (CO2e) Threshold	None
Project Prevents Adherence to a GHG Reduction Goal?	No
Federal Construction GHG (CO2e) Threshold	None

GHG Analysis Figures



Mitigated Emissions (Not-Mandatory)

$$Sequestered\ CO_2 = SR\ x\ Vol_{dredged}\ x1/D\ x\ Time$$

Where:

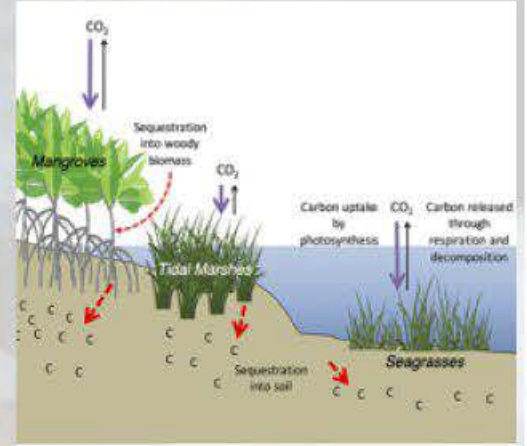
Sequestered CO_2 = the amount of CO2 in metric tons or pounds sequestered

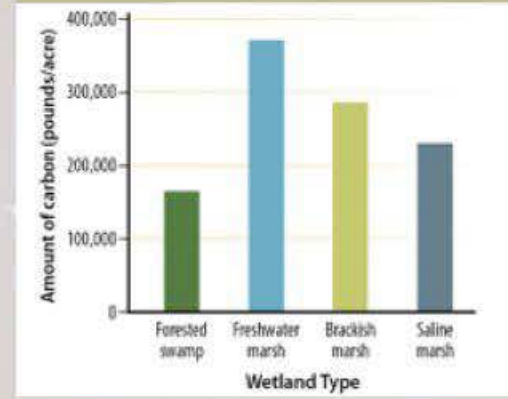
SR = sequestration rate in metric tons of pounds of CO_2 per unit area, per unit of time

$Vol_{dredged}$ = volume of dredged material

D = depth of wetland to be created (get depth from site manager) no compaction assumed during placement.

Time = the unit of time over which benefits are calculated (50 years, though could be less with sea level rise)





Social Cost of Greenhouse Gas (SC-GHG)

$$SC - GHG = CO_2e * SC$$

Where:

$SC - GHG$ = *the social cost of greenhouse gas emissions in dollars*

CO_2e = *total greenhouse gas emissions converted to carbon dioxide equivalence units in metric tons*

SC = *the currently accepted social cost in dollars per metric ton of carbon dioxide*

Current Interim SC-GHG: $51/metric ton CO_2

Using 3% discount rate

https://www.whitehouse.gov/wp-content/uploads/2021/02/TechnicalSupportDocument_SocialCostofCarbonMethaneNitrousOxide.pdf

BE READY to use EPA's New Proposed Values Once a Discount Rate is Decided:

https://www.epa.gov/environmental-economics/scghg

Emission Year	SC-CO_2 (2020 dollars per metric ton of CO_2) 2.5%	2.0%	1.5%
2020	117	193	337
2021	119	197	341
2022	122	200	346
2023	125	204	351
2024	128	208	356
2025	130	212	360
2026	133	215	365
2027	136	219	370
2028	139	223	375
2029	141	226	380
2030	144	230	384

Net Emissions

$$\text{Net } CO_2e = Gross\ CO_2e - Mitigated\ CO_2$$

Where:

Net CO_2e= the amount of CO2 in metric tons or pounds sequestered

Gross CO_2e = total CO_2e from direct and indirect emissions in pounds or metric tons

Mitigated CO2e = total CO_2e sequestered, recaptured (mitigation is not mandatory but recommended when possible)

GHG Analysis Considerations Key Points

Establish your Baseline (i.e. global GHG emissions rate/climate conditions expected)

No-Action Alternative Serves as the Baseline for the Analysis.

Ex. for an FRM project- no action emissions from flood fighting and rebuilding.

Identify alternative w/most GHGs;

Identify gross individual GHG emissions by chemical, annually and net lifetime

Identify combined GHG emissions in units of CO2e and SC-GHG.

GHG Effects Considerations

Don't set precedent by adopting Climate Action Plans and Greenhouse Gas Reduction Goals for determining significance!

Effects from Emissions:
Direct, Indirect, Local,
Long-term/Short-term,
Connected, and Cumulative

Action Affects on Climate Change?

Climate Change Affects on Action?

Resources

AQ/GHG Planning Sub-CoP Currently Developing:

- Webinars
- SOPs with Companion Excel Calculation Templates

Already Available:

- Deep Draft Navigation Planning Center of Expertise (PCX) (Marine Emissions)
- US EPA "MOVES" - mobile source emissions model (On/Off-road vehicles)
- CALEEMOD - mobile source emissions model (On/Off-road vehicles)
- EMFAC 2021 – emissions factors (On/Off-road vehicles)
- EPA Port Emissions Inventory Guidance (Marine Vessels)


Q&A/DISCUSSION