Incorporating Greenhouse Gas Emissions Analyses into National Environmental Policy Act Reviews

Troy Mayhew, P.G.
U.S. Army Corps of Engineers,
Jacksonville District

38th Annual National Conference on Beach Preservation Technology
February 6, 2025

USACE
Air Quality & Greenhouse Gas Emissions Analysis
SUB-COMMUNITY OF PRACTICE

ARMY CORPS GUIDANCE

- Engineering and Construction Bulletin 2024-9
- Guidance for Incorporating Greenhouse Gas Emissions Analysis in National Environmental Policy Act Reviews
- Issued August 2024
- Expires August 2026
- Applies to all projects that must comply with NEPA, including supplemental NEPA documents.
- This ECB summarizes best practices and provides the latest guidance and policy.

PRIMARY GREENHOUSE GASES

- Carbon Dioxide (CO_2), Methane (CH_4), and Nitrous Oxide (N_2O)
- We are primarily concerned with the GHGs above that are generated by internal combustion engines.
- GHGs can be sequestered (and produced) through the creation or restoration of wetlands.
- Sequestration - The process that captures or removes GHGs from the atmosphere.

OTHER GREENHOUSE GASES

- Refrigerants: (hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF6) are typically generated during industrial processes
- Not typically a concern on USACE projects

GREENHOUSE GAS EMISSIONS ANALYSIS

- Definition – Qualitative and quantitative accounting for GHG emissions anticipated for USACE actions, including direct and indirect emissions within the project lifetime.
- Used to compare Action Alternatives
- Qualitative Analysis – Accounting for GHG emissions using a unit other than the mass of emissions anticipated.
- Quantitative Analysis – Accounting for GHG emissions and sequestration using actual mass of emissions.

QUALITATIVE ANALYSIS

- A qualitative GHG analysis must be done in the early stages of planning to determine the appropriate NEPA document (EA, EIS, etc…) and to identify or eliminate project alternatives.
- GHG emissions are just one consideration during the alternatives analysis and are not likely to result in a determination of significant effects.

QUALITATIVE EXAMPLE: NAVIGATION PROJECT

- Construction emissions: Direct and short-term. Directly related to the size of the project (cubic yards).
- O&M emissions: Direct and long-term. Maintenance dredging over the project life (50 years)
- Wetlands: Sequester CO_2, generate CH_4 and N_2O. Calculated over the project life.
- Look for opportunities to beneficially reuse sediment to create natural and nature-based features.
- Compensatory mitigation is NOT required.

QUALITATIVE EXAMPLE: NAVIGATION PROJECT

- The No Action Alternative emissions are rarely zero. Need to account for actions by others in the absence of the federal project.
- For example: consider the changes to shipping traffic and associated truck traffic.

QUANITATIVE ANALYSIS

- CO_2 emissions are highly correlated to fuel use.
- 99 percent of carbon in diesel fuel is emitted in the form of CO_2.
- Fuel quantities can be calculated from engineering cost estimates.
- Emissions factors for CO_2, CH_4 and N_2O, based on equipment and fuel type, can be found on EPA's EMISSION FACTORS HUB.

QUANITATIVE ANALYSIS

Calculate total emissions based on fuel quantities:

Emissions = Volume x Emission Factor

Where:
Emissions = Mass of GHG (g, kg, MT)
Volume = Gallons
Emissions Factor = Mass of emissions per equipment type

Example: Ships and Boats burning diesel fuel

$$\frac{6.51 \text{ g } CH_4}{\text{Gal}} \times \frac{5000 \text{ Gal}}{} = \frac{32{,}550 \text{ g } CH_4}{}$$

QUANITATIVE ANALYSIS

Calculate total emissions based on vehicle miles or hours:

Emissions = Activity x Emission Factor

Where:
Emissions = mass of GHG (g, kg, MT)
Activity = hours, miles, etc.
Emissions Factor = mass of emissions per activity

Example: Medium and Heavy-Duty Diesel Vehicles

$$\frac{0.0095 \text{ g } CH_4}{\text{Mile}} \times \frac{5000 \text{ miles}}{} = \frac{47.5 \text{ g } CH_4}{}$$

QUANITATIVE ANALYSIS

- There are other, more detailed emissions models that can be used, such as EPA's MOtor Vehicle Emissions Simulator (MOVES).
- California-specific emission models will under-estimate emissions outside of CA because they have stricter equipment emissions standards.

QUANITATIVE ANALYSIS

- To calculate net emissions and social costs, USACE developed the Net Emissions Analysis Tool (NEAT).
- NEAT calculates construction emissions, O&M emissions and wetland sequestration to yield Net Emissions.
- NEAT also calculates the social cost of greenhouse gases using guidance from EPA's Report on the Social Costs of Greenhouse Gases.
- NEAT is currently for internal use only but we're working on an updated version for use outside of USACE.

QUANITATIVE ANALYSIS

- There is no numerical threshold for federal projects.
- The recommended metric for determining significant effects is to evaluate whether the anticipated GHG emissions will prevent the FEDERAL 2050 GHG NET ZERO GOAL from being met.

ASSUMPTIONS

- Always document your assumptions so reviewers can understand how emissions were calculated.
- Examples:
  - Construction Duration
  - Number of O&M Events
  - Equipment Lists
  - Fuel Quantities
  - Acres of Wetlands Created/Impacted

U.S. ARMY

QUESTIONS?