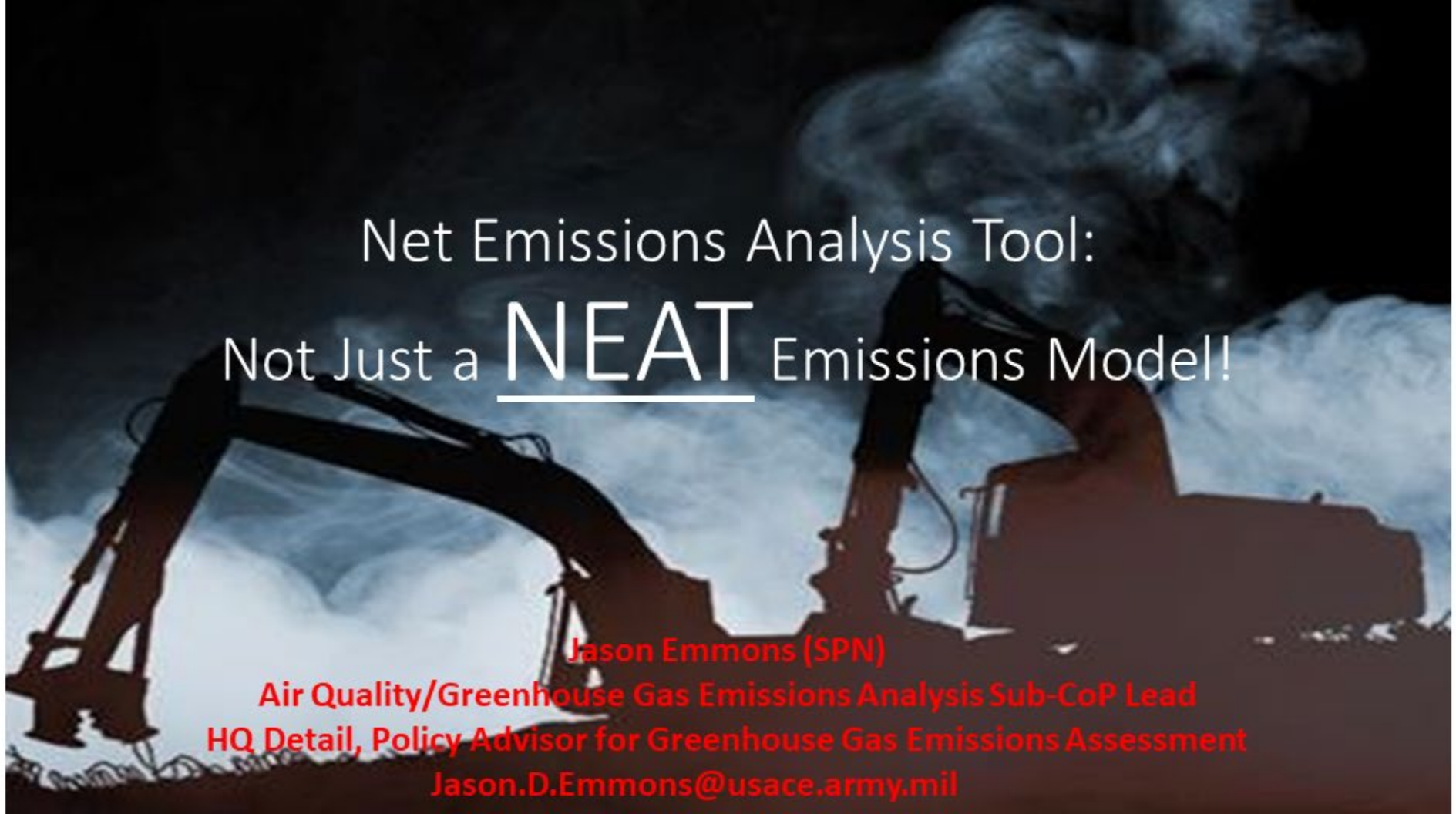

Net Emissions Analysis Tool:
Not Just a NEAT Emissions Model!

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Agenda

- Motivation
- Air Quality and Greenhouse Gas Emissions Analysis General Strategy
- Model Background
- Model Walkthrough
- Next Steps and Concluding Remarks

The Motivation

- **EOs**

  14057 "Catalyzing Clean Energy Industries and Jobs Through Federal Sustainability," Dec 8, 2021
  Establishes government-wide emissions goals, targets, and oversight

  14072 "Strengthening the Nation's Forests, Communities, and Local Economies", Apr 27, 2022

  14008 "Tackling the Climate Crisis at Home and Abroad," 27 Jan 2021

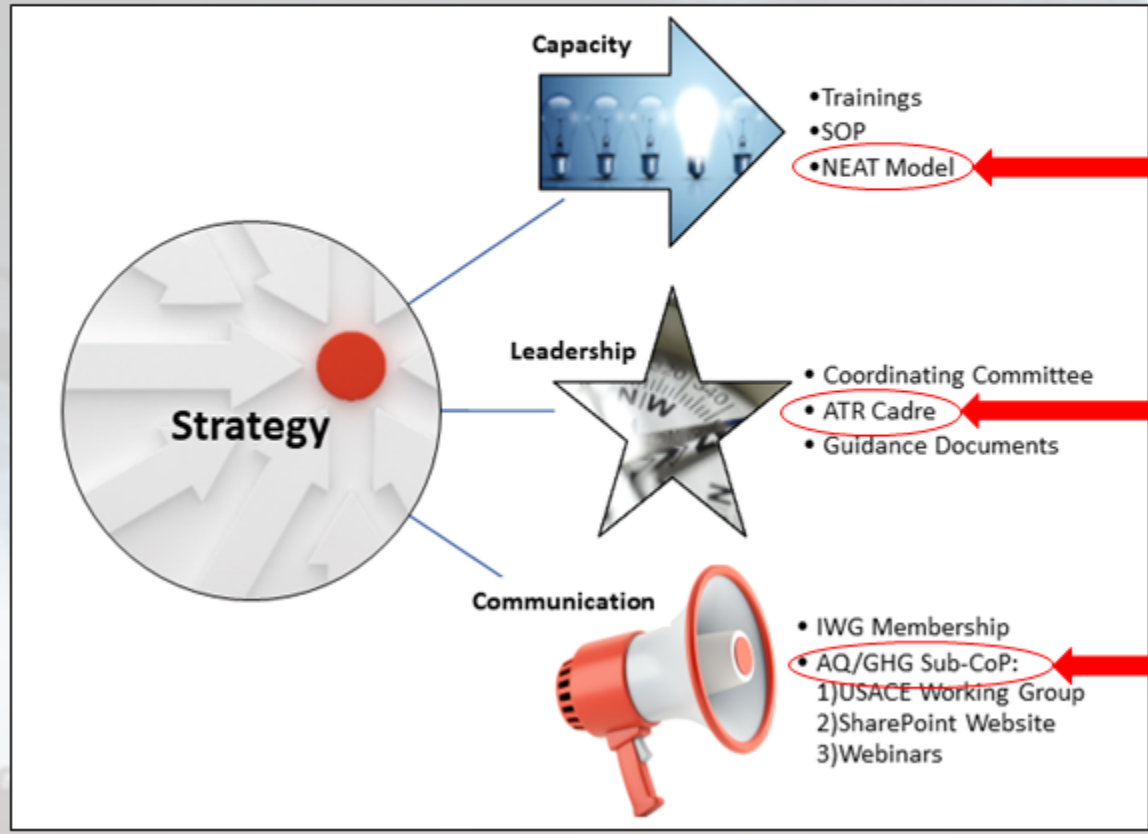
  13990 "Protecting Public Health and the Environment and Restoring Science to Tackle the Climate Crisis," Jan 20, 2021, Rescinds or revokes several Trump-era climate EOs and policies (e.g., FFRMS)

  14030 "Executive Order on Climate-Related Financial Risk," May 20, 2021
  Actions to reduce agency financial risks and future government expenses due to climate
  Actions to protect pensions and savings

- **CEQ** Jan. 9th 2023, *Interim NEPA Guidance on Greenhouse Gas Emissions and Climate Change*

- **OMB** Briefing Request: how USACE quantifies carbon sequestration in AER projects?

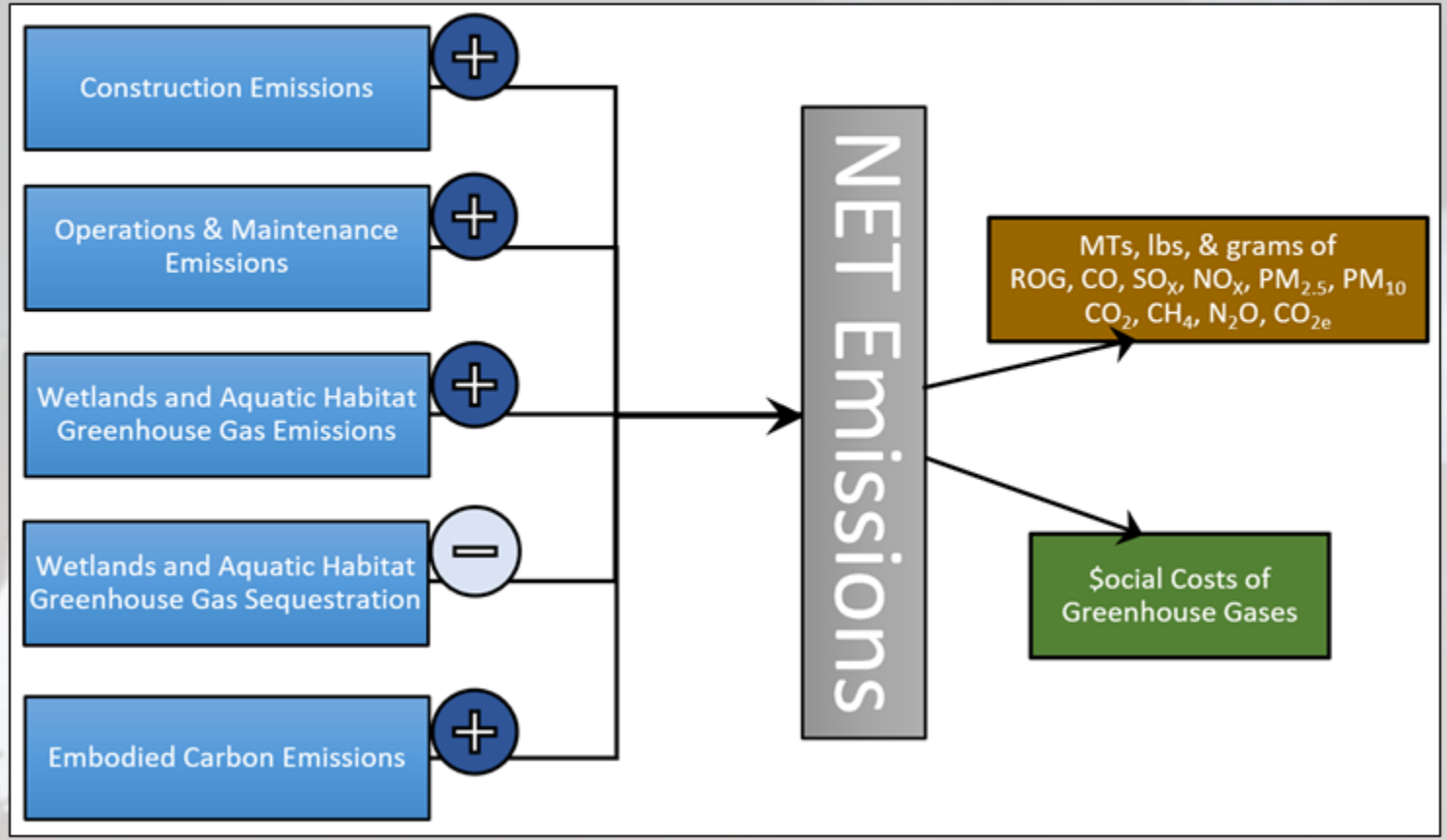
The Response:
The AQ/GHG Emissions Analysis General Strategy



NEAT Model Overview

- Built to quantify gross and net emissions, and social costs of GHGs
- NEAT can accept inputs from popular models for construction and O&M emissions (MOVES, CALEEMOD, EMFAC, AP-42, tabular models)
- NEAT EXPANDS CAPABILITIES for wetlands and aquatic habitat GHG emissions, and embodied carbon emissions quantification
- Up to 8 alternatives with up to 10-year construction period
- Spatial Extent:
    - Construction, O&M, Embodied Carbon = Worldwide
    - Wetland and Aquatic Habitat GHG Emissions = CONUS only

A `NEAT` Conceptual Model



Key Equations: Construction and O&M Emissions

$$Emissions = input\ parameters\ x\ emissions\ factor$$

Where:

Emissions = the amount of mass or weight (in grams, pounds, or metric tons) of a particular gas species that is produced
Input parameters = the distance or time an engine is used
Emission factor = the amount of emissions per unit of either distance or time that an engine is used

Key Equations: Wetland and Aquatic Habitat-Carbon Sequestration

$$CO_{2seq} = SR\ x\ A\ x\ T$$

Where:

CO_{2seq} = the amount of carbon dioxide (CO_2) sequestered (grams, pounds, metric tons)

SR = CO_2 sequestration rate, mass per unit area, per unit of time

A = area of wetland or aquatic habitat to be created

T = the unit of time over which benefits are calculated (50 years typically though may be reduced due to habitat disturbance)

Key Equations: Wetland and Aquatic Habitat-Methanogenesis

$$CH_4 = MR \; x \; A \; x \; T$$

Where:

CH_4 = the amount of methane (CH_4) emitted (grams, pounds, metric tons)
MR = methanogenesis rate in unit mass of CH_4 per unit area, per unit of time
A = area of wetland or aquatic habitat to be created
T = the unit of time over which benefits are calculated (50 years typically, though may be reduced due to habitat disturbance)

Key Equations: Wetland and Aquatic Habitat- Nitrous Oxide Production

$$N_2O = NR \; x \; A \; x \; T$$

Where:

N_2O= the amount of nitrous oxide (N_2O) formed and emitted (produced) (grams, pounds, metric tons)
NR = nitrous oxide production rate in unit mass of N_2O per unit area, per unit of time
A = area of wetland or aquatic habitat to be created
T = the unit of time over which benefits are calculated (50 years typically, though may be reduced due to habitat disturbance)

Wetland and Aquatic Habitat Emissions and Sequestration Rates

Wetland and Deepwater Habitat Type	Carbon Dioxide (CO_2) Sequestration Rate (grams/m2/yr)	Carbon Dioxide (CO_2) Sequestration Rate Upper/Lower Value Range (grams/m2/yr)	Methane (CH_4) Production Rate Used (grams/m^2/yr)	Methane (CH_4) Production Rate Upper/Lower Value Range (grams/m^2/yr)	Nitrous Oxide (N_2O) Production Rate (grams/m^2/yr)	Nitrous Oxide (N_2O) Production Rate Upper/Lower Value Range (grams/m^2/yr)
Marine and Estuarine-Emergent	768.60	3294 / 183	LOG(Y) = -0.079x + 2.123; where x = salinity in ppt	110.00 / 1.00	0.13	3.43 / -.96
Marine and Estuarine-Forested and Shrub	572.52	756.02 / 0	LOG(Y) = -0.079x + 2.123; where x = salinity in ppt	110.00 / 1.00	0.37	2.31 / 0.04
Marine-Nearshore	179.35	932.01 / -471.7	0.34	0.657 / 0.04	0.15	2.00 / 0
Estuarine-Submerged	440.00	535 / 345	0.38	2.35 / 0.007	0.15	2.00 / 0
Palustrine-Agricultural	1,136.67	4132.33 / 0	113.15	159.87 / 63.335	0.04	0.07 / 0.01
Palustrine-Emergent	884.47	2392 / 246	63.78	149.3 / 16.00	0.17	0.89 / 0
Palustrine-Forested and Shrub	1,240.46	1735.91 / 741.34	43.70	173.4 / 0	0.06	.126 / 0
Palustrine-Lakes and Ponds	113.67	2031.33 / 128.33	11.43	161.04 / 0.32	0.17	9.41 / -0.39
Palustrine-Riverine	513.80	572.52 / 455.08	328.67	505.33 / 102.00	0.0018	0.0034 / 0.0009

A `NEAT` Walkthrough….

NEAT Supporting Documents

Model Certification information and SOP

- Step by step walkthrough of the model
- Helpful tips for using the model
- Full list of references used for NEAT development

Next Steps for NEAT…

Model Certification of v1.0 Wrapping Up…

Additional Emissions Sources for v2.0:

- Quantify emissions for prescribed fires, marine vessels (incl. dredge plants)

Updates for v2.0 in Wetland and Aquatic Habitat GHG Modeling:

- Use regional production/sequestration rates
- Expand to include Alaska, Hawaii, and US Territories

Acknowledgements

CPR CoP:

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- Yadav Sapkota (literature review for model development)

MVD & AQ/GHG Sub-CoP:

- David Day (beta testing)

ECO-PCX:

- Kip Runyon (model review and certification)


Q&A/DISCUSSION