Renewable Doesn’t Mean Carbon Neutral: Emerging Greenhouse Gas Inventory Challenge

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Mr. Jeremey Alcorn, CTC/NDCEE
Dr. Shannon Lloyd, CTC/NDCEE

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National Defense Center for Energy and Environment (NDCEE), Concurrent Technologies Corporation, 100 CTC Drive, Johnstown, PA, 15904

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Presentation Overview

- Greenhouse Gas (GHG) Drivers
- Federal Efforts Moving Forward
- What are Biogenic Emissions?
- GHG Protocols and Biogenic Emissions
- Biogenic Emissions: Area of Concern?
- Calculation Example
- Biogenic Calculation Challenges
- Considerations and Next Steps
GHG Inventory Drivers

- Executive Order 13423
- *Massachusetts v. EPA* - U.S. Supreme Court (2007)
- EPA’s GHG Advance Notice of Proposed Rulemaking (ANPR) or “GHG Rule” (2008)
- New Administration Direction
  - “State of Union” call for GHG Cap and Trade System
  - New GHG Executive Order(s)
- State and Regional GHG Mandates and Activities
Federal Efforts Moving Forward

- These drivers are spurring DoD and civilian federal agencies to better understand:
  - GHG inventory frameworks
  - Calculation methodologies
  - Registry and regulatory programs

- Proactive federal GHG inventory efforts emerging in:
  - Deputy Assistant Secretary of the Army (ESOH) via NDCEE
  - NASA Headquarters and Goddard Space Flight Center
  - Army Environmental Command
  - U.S. Air Force
  - National Park Service

- Some efforts already looking at biological sequestration
What are Biogenic CO₂ Emissions?

- Biogenic emissions are “CO₂ emissions produced from combusting a variety of biofuels, such as biodiesel, ethanol, wood, wood waste and landfill gas” per CCAR 2008 guidance.

- Biogenic CO₂ could be generated by direct combustion of renewable fuels (and materials), such as:
  - Biomass, wood, and wood waste
  - Landfill gas / biogas
  - Biofuels (B100, E100)
  - Biofuel component of mixed fuels (B20, E85)

- “Renewable” energy purchases produced via combustion of:
  - Biomass / biogas
  - Biofuels
  - Biomass portion of MSW
Most Federal Efforts Developed Using GHG Inventory Protocols/Guidance

- WBCSD/WRI GHG Protocol
- ISO 14064 Standards
- EPA Climate Leaders Guidance
- CCAR Reporting Protocol
GHG Protocol Overviews on Biogenic

  - P.25 - Stationary emissions of biomass, not included in Scope 1 or 2
  - P.63 - Biologically sequestered carbon “reported separately from scopes”
  - P.88 - Biologically sequestered atmospheric carbon explained

- **U.S. EPA Climate Leaders, Greenhouse Gas Inventory Protocol, Design Principles**
  - P.15,16 - Direct emissions from combustion of biomass, not included in Scope 1 or 2 emissions
  - P.85 - Biofuels fall under “renewable energy”

- **CCAR, General Reporting Protocol, Version 3 (April 2008)**
  - P.41 – Lack of international consensus on biogenic emissions but distinct from anthropogenic emissions
  - P.45 - Provides specific example of calculation methodology for biodiesel mixes
Biogenic Emissions: Area of Concern?

- **Growing area of concern is calculation of biogenic CO₂ emissions** from renewable sources
  - Urgency with keen interest in sequestration quantification and offset projects
- **GHG Protocols exclude biogenic (or biologically sequestered) CO₂ emissions** from Scope 1 & 2 inventories
- **But, the N₂O or CH₄ emissions** from same biomass / biofuel sources are considered **anthropogenic (or human generated)** and are **included** in Scope 1 & 2 inventories
- **Biogenic CO₂ emissions** to be calculated but are **considered optional** by most protocols and registry programs
Biogenic CO$_2$ – “Devil is in the Details”

- Current federal inventory calculation approaches account for biogenic emissions in divergent ways
- Common approach is to “zero out” the biogenic CO$_2$
  - Pros - Easier calculation and simpler calculation paths
  - Cons - Emission factors or calculations that omit biogenic CO$_2$ portion
- Alternative approach to fully but separately account for biogenic emissions
  - Pros - Enables fuller accounting of GHG emissions and supports future biogenic requirements whether optional or mandatory
  - Cons - More calculation complexity and limited emission factors
- Lets work through a biogenic calculation example…
Bio-diesel (B20) is a mixed renewable or alternative bio-fuel. It consists of 80% Petro-diesel and 20% Bio-diesel.
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Source: I.S. Higuchi, NASA and J. Alcorn, CTC
Calculating B20’s combustion emissions first requires a percentage breakdown into its fuel constituents (i.e., Petro-diesel & B100).

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Calculating B20’s combustion emissions first requires a percentage breakdown into its fuel constituents (i.e., Petro-diesel & B100). **Next**, the B100’s respective anthropogenic CH₄ and N₂O emissions must be allocated to **Scope 1 emissions category** while its respective **biogenic CO₂ emissions** are reported separately.

**Bio-diesel (B20)** is a mixed renewable or alternative bio-fuel. **It consists of 80% Petro-diesel and 20% Bio-diesel.**

**Installation Alternative Fuel Vehicle**

**Petro-diesel Combustion**

**Bio-diesel Combustion**

**Scope 1 Emissions**

- CH₄
- CO₂
- N₂O

**Biogenic Emissions**

**Source:** I.S. Higuchi, NASA and J. Alcorn, CTC
Biogenic Calculation Challenges

- Lack of international consensus on biogenic emissions
- Not currently a “required” element
- Emission factors often don’t differentiate between biogenic and anthropogenic or “zero out” the biogenic CO₂ portion
- Increases data calculation complexity and recordkeeping
- Many of GHG inventory efforts jump from Scope 1 & 2 to sequestration projects but ignore “optional” biogenic emissions
Considerations and Next Steps

- Despite dynamic regulations/consensus, protocols have biogenic provisions to reporting.
- Prudently develop federal GHG inventory approaches with biogenic calculation provisions from the start because:
  - Requires minimal resources to do so now
  - Avoids costly rework and recalculation in the future
  - Enables fuller accounting of GHG emissions whether biogenic emissions requirements are optional or mandatory
- Build awareness of optional protocol provisions
- Makes for easier progress to sequestration/offset projects
Contact Information

- **CTC Technical Lead**
  Shannon Lloyd, Principal Research Engineer
  lloyds@ctc.com
  (814) 248-7599

- **CTC Technical Team**
  Jeremey Alcorn, Senior Environmental Engineer
  alcornj@ctc.com
  (703) 310-5662
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  Mr. Tad Davis, DASA (ESOH)

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  Mr. Tom Guinivan, USEAC

- **NDCEE Contracting Officer’s Representative**  
  Mr. Tom Moran, ODASA (ESOH)

- **Government Technical Monitor**  
  Mr. Pete Heinricher, ERDC-CERL

- **NDCEE Project Manager**  
  Ms. Cristina Tomlinson, CTC

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Key Reference Resources

