The Army's Carbon Bootprint

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Report Documentation Page

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Agenda

- Greenhouse Gases
- What we did
- How we did what we did
- Uses for what we did
- Summary

What are we talking about?

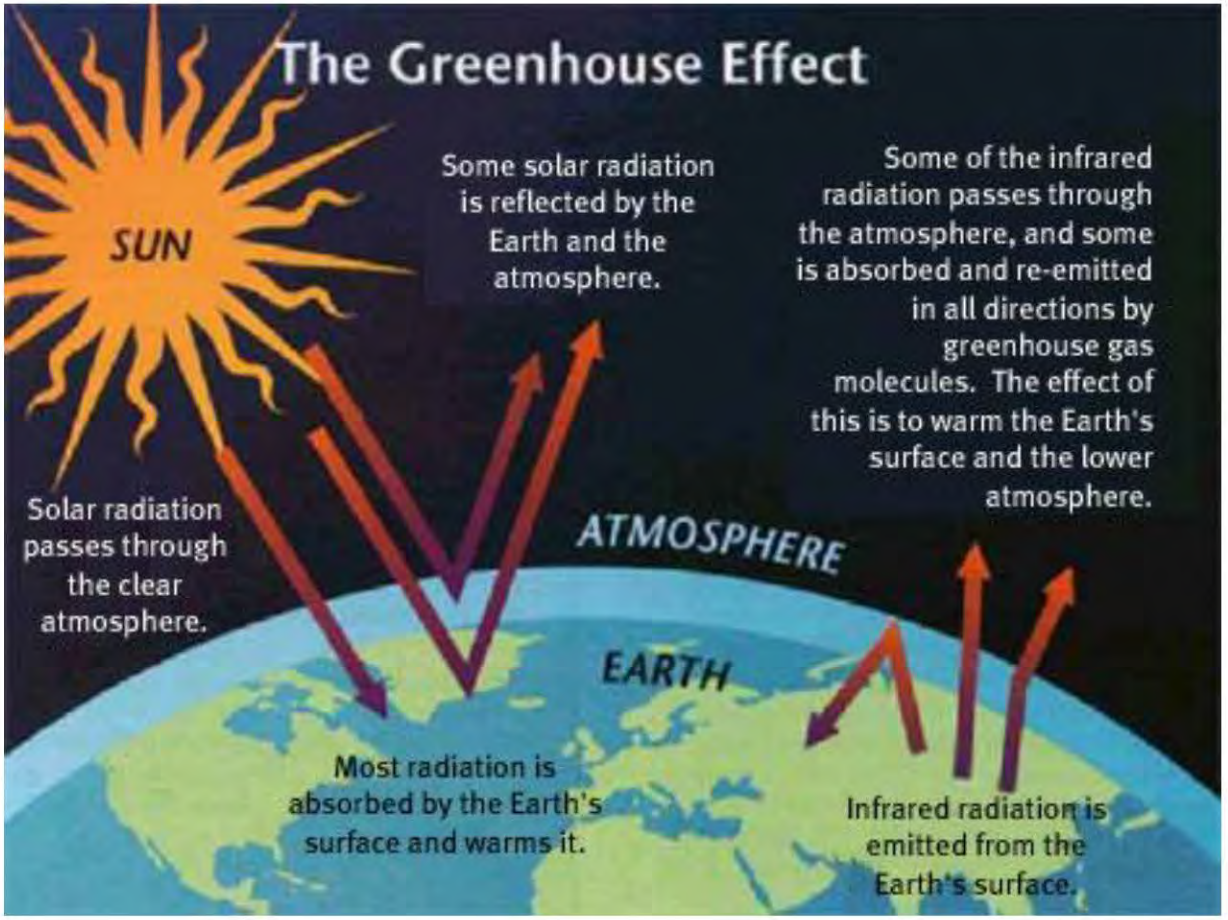

Image Source: http://students.washington.edu/nofrills/phil.htm

Global Warming Potential (GWP)

- CO_2 is the most prevalent GHG
- Other GHG are assigned a GWP relative to CO_2
- GWP is determined by stability of the chemical in the atmosphere and its capacity to influence global warming

What, how bad, and from where

Greenhouse Gas (GHG)	Global Warming Potential	From…	On Army installations.
Carbon Dioxide (CO_2)	1	Combustion; aerobic decomposition	Boilers, generators, vehicles, wastewater treatment
Methane (CH_4)	21	Combustion; anaerobic decomposition	Landfills, boilers, generators, vehicles
Nitrous Oxide (N_2O)	310	Combustion	Boilers, generators, vehicles
Hydrofluorocarbons (HFCs)	140 - 11,700	CFC replacements	Air conditioning, refrigeration
Perfluorocarbons (PFCs)	6500 - 9200	Aluminum production, semiconductor manufacturing	----------
Sulfur Hexafluoride (SF_6)	23,900	Labs; electrical equipment	Tracer gas, electrical distribution equipment

Project Description

- All US installations
- CY2008
- Identify, evaluate, estimate

Reporting Standards

- Global Reporting Initiative (GRI)
  - international, sustainability
- US Environmental Protection Agency
  - federal, environmental impact/compliance
- California Climate Action Registry
  - leading state, volunteer verifiable reduction

What we found

Source category to be calculated	Source categories not calculated
Boilers	Landfills
Government-owned vehicles (tactical and non-tactical; ground and air)	Off-post landfills
Generators	Wastewater treatment
Munitions Firing	Off-post wastewater treatment
Off-post electrical utilities	Manufacture of items used by the installation
Off-post steam production	TDY travel
Commuter travel	Prescribed burning

Equations…generally

- Boilers, vehicles – fuel * EF * conversions
- Electricity – KWh * eGrid factor
- Steam purchased – MMBTU Steam * EF
- Commuter - # commuters * avg distance * avg fuel mileage * EF
- Munitions – DODIC count * EF
- Sequestration – Carbon On-Line Estimator

EF = emissions factor
KWh = Kilowatt-hour
MMBTU = million British thermal units
DODIC = Department of Defense Identification Code

Example Equations

- **Boilers and Generators**
-
- **Natural Gas fired (Stationary Boiler)**
-
- Equation
- World Business Council for Sustainable Development (WBCSD) and World Resource Institute (WRI) Greenhouse Gas Protocol
-
- CO2 metric tons = Cubic Feet Natural Gas * 1,047 BTU/cubic foot * 56,100 kg CO2/Terajoule*(1 Terajoule/10^9 Kilojoules)*(1.055 Kilojoules/BTU)*(1 metric ton/1000kg)
- CH4 metric tons = Cubic Feet Natural Gas * 1,047 BTU/cubic foot * 1.0 kg CH4/Terajoule*(1 Terajoule/10^9 Kilojoules)*(1.055 Kilojoules/BTU)*(1 metric ton/1000kg)
- N2O Metric tons = Cubic Feet Natural Gas * 1,047 BTU/cubic foot * 0.1 kg N2O/Terajoule*(1 Terajoule/10^9 Kilojoules)*(1.055 Kilojoules/BTU)*(1 metric ton/1000kg)
-
- Metric Tons CO2 equivalent = CO2 metric tons + 21 * CH4 metric tons + 310 * N2O metric tons
-
- Data Needed - Cubic Feet Natural Gas
- Data Source - Installation Purchase Records
- The World Business Council for Sustainable Development and the World Resource Institute "The Greenhouse Gas Protocol Initiative"- CO2 emissions from fuel use in facilities - http://www.ghgprotocol.org/calculation-tools/all-tools.
- Perry, Robert H., and Donald W. Green, eds. Perry's Chemical Engineers' Handbook. New York: McGraw-Hill Education, 1984. Table 9-14
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Data sources

- Using existing, central data sources
- Boiler Fuel, steam, KWh – Army Energy and Water Resource System (AEWRS)
- Commuters – Army Stationing and Installation Planning Database (ASIP); Army Housing Office
- Vehicle fuel – Defense Logistics Agency fuels database

Distribution

Source category to be calculated	Source categories not calculated
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Also out there…

- Installation level
- Prevention
- Sequestration
- State reporting requirements
- Upcoming Federal reporting requirement

Also out there: Installation level

- NDCEE project by Enviance, Inc
- Collected 2007 data at 10 installations +
- Currently comparing results, methods

Also out there: Prevention

Fort Carson, CO

Camp Williams, UT

Also out there: Sequestration

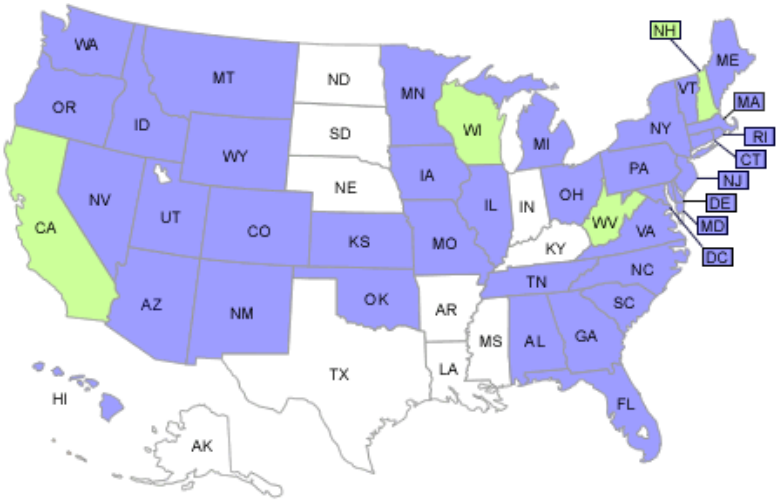
Geologic

Terrestrial

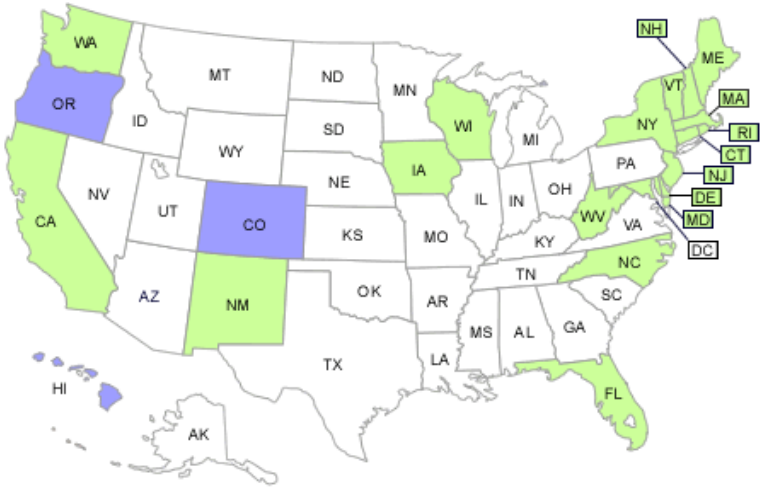
Also Out There: State Reporting Requirements

- Regional Greenhouse Gas Initiative; Western Climate Initiative
- Maps as of Aug 08.

Voluntary Climate Registry



Mandatory Reporting



Also out there: Federal Laws and Regs

- Reporting rule
- Cap and trade
  - upstream, downstream
  - sector, economy-wide

In Summary

- First estimate of Army GHG: 80% solution
- Main contributor is CO_2 from purchased electricity
- On-going energy programs will reduce this, as well as Army's own source emissions
- This is just the beginning.

INSTALLATION MANAGEMENT COMMAND

"Sustain, Support and Defend"

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