

C3: The Harmonized Emissions Analysis Tool

An International Quantification Resource

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HEAT

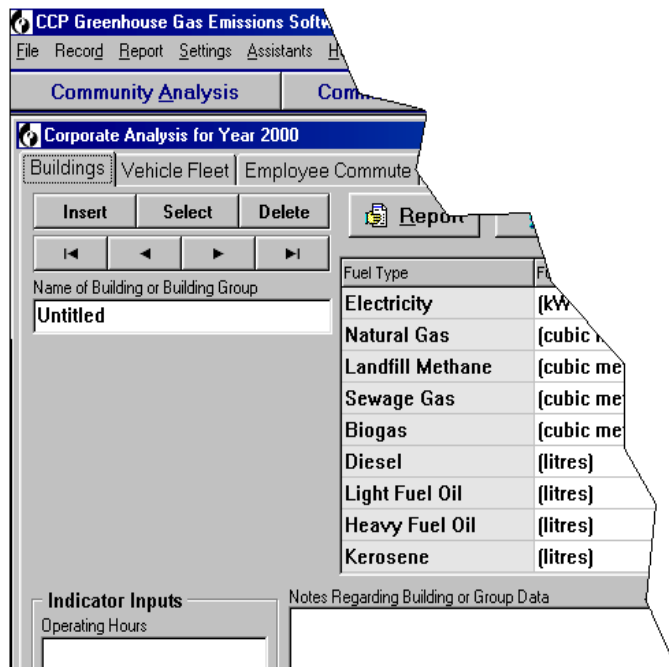
HARMONIZED EMISSIONS ANALYSIS TOOL

Session Objectives

- Introduce the HEAT Software: **What is it?**
- Live demonstration of HEAT's features and functionality: **How to use it.**
- Interactive discussion: **Your needs, and feedback.**

Existing International Software

CCP Software



- Has been evolving since 1993
- 450+ users internationally
- In use in ~8 Countries

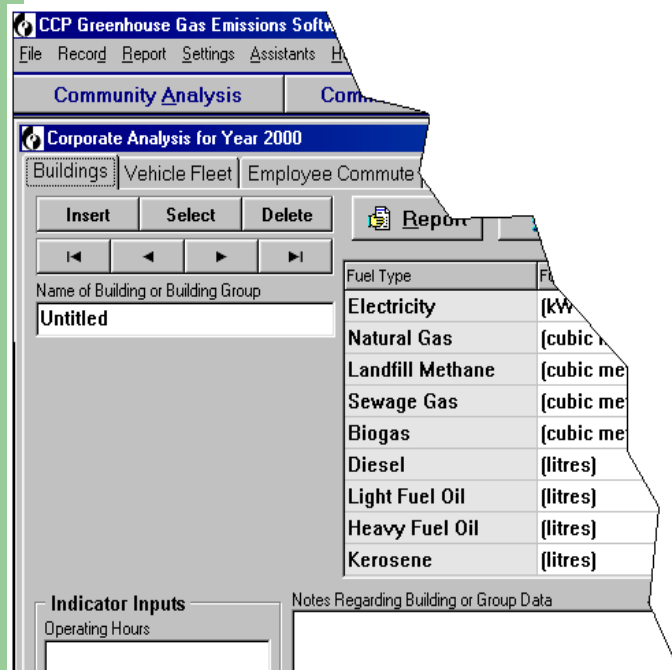
Tool to Support the 5 - Milestones

- Emission inventory and forecast
- Set reduction target
- Develop a quantified action plan
- Implement action plan
- Monitor and verify results

CCP software supports the first three milestones

Limitations of existing software...

CCP Software



- Only quantifies GHGs
- Only windows based
- Only in English & Spanish
- Separate versions for countries - hard to manage
- Difficult and expensive to maintain and upgrade
- Not available over the internet
- Limited ability for networking

Introducing HEAT!

The Harmonized Emissions Analysis Tool

HEAT Harmonized Emissions Analysis Tool

HEAT APPLICATION | HEAT ADMINISTRATION | MESSAGE BOARD | DOWNLOADS

RESIDENTIAL Tools ?

Name: (Name of the Residential Building or Group)

City: (Name regarding Residential Building or Group Data)

| Fuel Type | Unit | Storage Use |
|----------------------------|---------------|-------------|
| Electricity (Grid Average) | kWh | 11 |
| Coal | kWh | 1 |
| Light Fuel Oil | gallons | 1 |
| Natural Gas | gallons cu ft | 1 |
| Propane | gallons | 1 |
| Kerosene | gallons cu ft | 1 |
| Fuelwood (Air Dry) | gallons | 1 |
| Solar | gallons | 1 |
| Green Electricity | kWh | 1 |

SAVE | REFRESH

| Report | Value | Unit | Report | Value | Unit |
|--------------------|-------|-------|---------------------------|-------|-------|
| Energy Consumption | 11 | kWh | Equivalent CO2 Production | 11 | grams |
| SO2 Production | 11 | grams | SO2 Intensity | 11 | grams |
| CO2 Production | 11 | grams | VOC Production | 11 | grams |
| PM10 Production | 11 | grams | | | |

“Towards harmonized air emissions and climate action planning”

What is HEAT? HEAT will be a...

- User account based,
- Multinational,
- Multi-lingual,
- Internet based tool for storing, tracking, and reporting emissions and reductions of both GHGs and CAPs
- That automatically updates to reflect the latest research and emissions factors

HEAT Calculates and Tracks

- Greenhouse Gases
 - Carbon Dioxide (CO₂)
 - Methane (CH₄)
 - Nitrous Oxide (N₂O)
- Criteria Air Pollutants
 - NO_x
 - SO_x
 - CO
 - Volatile Organic Compounds (VOC)
 - Particulate Matter (PM₁₀)

Other emissions types can be manually entered

Capability of the HEAT Software

- Conduct an emissions inventory
- Set a emissions reduction targets
- Forecast predicted emissions in future years under a “business-as-usual” scenario (i.e. the target year)
- Quantify the impact of reduction measures on emissions, energy use and cost
- Track changes over time and progress towards meeting targets

Stand-alone calculator or use modules together to create a complete emissions reduction plan

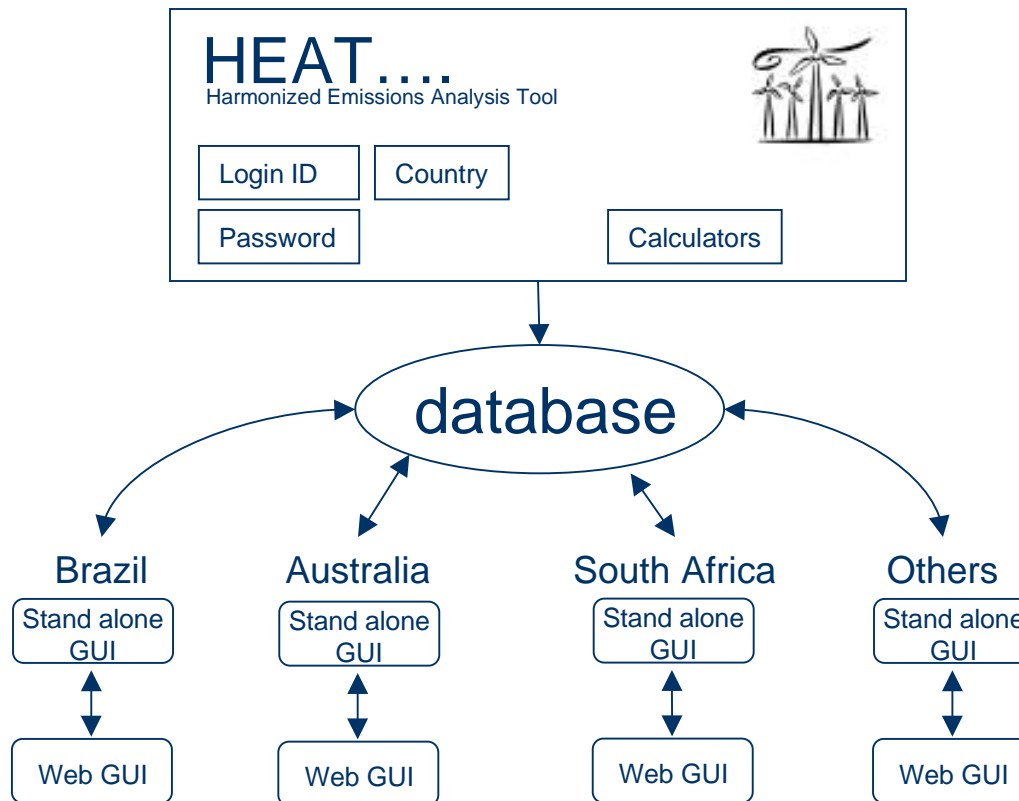
Multi-National Data Repository

- Multi-jurisdictional information compiled in one location
- International data queries and research potential
- County level reporting
 - Benchmarking
- Import results from other analyses

HEAT will not be...

- Air quality/dispersion model
- An emissions factor model
- An air quality management (AQM) tool

HEAT Design Layout



Internet Portal

On-line Database

Local Browser Based
Java Script

HEAT Calculators Compute...

- Emissions Sources

 - **Community**

 - Buildings / Facilities
 - Fleet
 - Transportation / Commute

 - **Government**

 - Waste Generation
 - Streetlights and Signals

- Emissions Mitigation Actions

 - Energy efficiency
 - Landfill gas use
 - Fleet fuel switch
 - Installing renewable energy
 - Waste Reduction / Recycling

- Many others.....

Calculators: Quantification Tools

- Basic Algorithm for Inventory:

$$\text{Emissions} = \text{EF} \times \text{Activity}$$

Where,

- EF is the emission factor
- Activity is energy use, waste, and transportation data supplied by user, and

Data Sets: Emission Factor Trees

The screenshot shows the ICLEI Local Governments for Sustainability website. The page is titled "Datasets : Factor Trees" and is in the "EDIT TREE DETAILS" view for a tree named "Brazil Average Mobile". The tree is classified as "Mobile" and is currently "Complete". The "Tree Elements" list shows a hierarchy of emission factors, with "Commuter Rail" selected under "Heavy Commercial Vehicle". The page also includes sections for "Associated Pollutants", "Emission Default Unit", "Source Default Unit", and "Fuel Economy".

Associated Pollutants:

| | |
|--|--|
| <input checked="" type="checkbox"/> CO2 | <input checked="" type="checkbox"/> N2O |
| <input checked="" type="checkbox"/> CH4 | <input type="checkbox"/> HFC-125 |
| <input type="checkbox"/> HFC-134a | <input type="checkbox"/> HFC-143a |
| <input type="checkbox"/> HFC-152a | <input type="checkbox"/> HFC-227ea |
| <input type="checkbox"/> HFC-236fa | <input type="checkbox"/> Perfluoromethane |
| <input type="checkbox"/> Perfluoroethane | <input type="checkbox"/> Sulfur Hexafluoride |
| <input type="checkbox"/> HFC-23 | <input checked="" type="checkbox"/> NOx |
| <input checked="" type="checkbox"/> SOx | <input checked="" type="checkbox"/> VOC |
| <input checked="" type="checkbox"/> CO | <input checked="" type="checkbox"/> TSP |
| <input checked="" type="checkbox"/> PM10 | <input checked="" type="checkbox"/> PM2.5 |
| <input type="checkbox"/> HC | |

Emission Default Unit: (grams)

Source Default Unit: (vehicle km)

Fuel Economy:

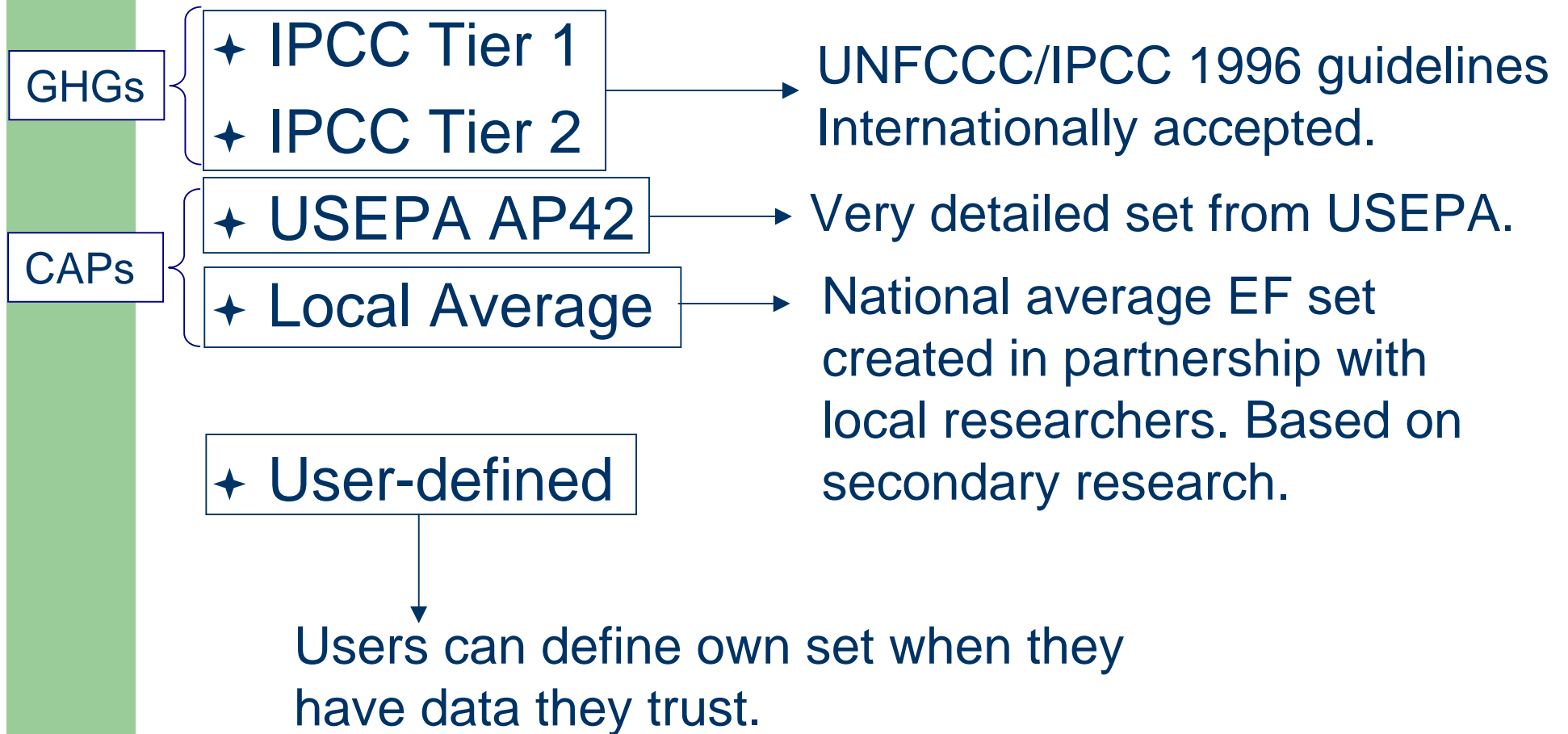
Distance Unit: (kilometers)

Volume Unit: (liters)

Emissions factor set forms a “tree”

- Select the most appropriate one for your calculation

Customizable Emission Factor Tree



Sample HEAT Results

| Durham Community Measures | DCAP | CACP Reanalysis | | | | | |
|--|------------------|------------------|------------------|-------------------|------------------|-------------------|------------------|
| | eCO ₂ | eCO ₂ | NOx | SOx | VOC | CO | PM ₁₀ |
| <i>Transportation Measures</i> | | | | | | | |
| Regional Rail System | 85,000 | 69,270 | -135,000 | -96,837 | 453,000 | 5,018,000 | -8,521 |
| Expand Mass Transit Bus System | 68,000 | 54,000 | 74,334 | 6,655 | 310,558 | 4,034,000 | 1,904 |
| Increased Use of Alternative Fuels in Motor Vehicles | 39,000 | 33,991 | 191,293 | 8,349 | 295,003 | 2,378,000 | 540 |
| Land Use Planning | 320,000 | 327,469 | 1,211,000 | 86,564 | 1,809,000 | 19,284,000 | 28,024 |
| Decrease motor vehicle traffic (walking and biking) | 1,000 | 1,166 | 4,314 | 308 | 6,443 | 68,680 | 100 |
| Decrease motor vehicle traffic (telecommuting) | 6,000 | 12,245 | 45,299 | 3,237 | 67,647 | 721,000 | 1,048 |
| Decrease motor vehicle traffic (car and vanpooling) | 12,000 | 11,692 | 70,158 | 5,026 | 132,516 | 1,316,000 | 1,433 |
| Decrease Idle time of Motor Vehicles | 10,000 | 10,014 | 6,921 | 0 | 13,983 | 208,000 | 13,801 |
| <i>Residential, Commercial, Industrial Measures</i> | | | | | | | |
| Residential Fuel Switching | 36,000 | 19,000 | 80,097 | 127,079 | -204 | 9,204 | 23,835 |
| Residential Energy Efficiency | 341,000 | 514,000 | 1,479,000 | 3,624,000 | 28,000 | 196,000 | 99,000 |
| Residential Renewable Energy | 9,000 | 17,000 | 50,054 | 155,271 | 588 | 5,372 | 3,465 |
| Commercial/Industrial Fuel Switching | 173,000 | 125,038 | 582,267 | 4,907,205 | -1,354 | 61,030 | 158,045 |
| Commercial/Industrial Energy Efficiency | 495,000 | 524,000 | 1,647,000 | 4,099,000 | 108,800 | 630,000 | 134,000 |
| Commercial/Industrial Renewable Energy | 28,000 | 52,888 | 152,703 | 473,699 | 1,794 | 16,389 | 10,570 |
| Reduce Heat Island Effect | 18,000 | 35,349 | 102,000 | 316,000 | 1,199 | 10,954 | 7,065 |
| Total | 1,641,000 | 1,807,122 | 5,561,440 | 13,715,556 | 3,226,973 | 33,956,629 | 474,309 |

tons

lbs

What Can HEAT Be Used For?

- Advocacy and outreach
- Supporting voluntary programs
- Identify actions that reduce emissions targeted in an AQM plan before advanced modeling
- Policy implementation and planning
- Supporting anyone wishing to track emission impacts of energy, transportation, and waste activities

Who benefits from HEAT?

- Local and State Governments
- Energy, transportation, land use, and waste planners
- Research community
- Other NGO partners
- Anyone wishing to translate energy data into an emissions estimate

Current Multinational Application

HEAT is currently adapted for...

- Brazil
- India
- South Africa
- Indonesia

Planning is underway for...

- Canada
- United States
- Australia

Future for HEAT?

- Thousands of inventories and action plans
- 5-10 languages
- HEAT becomes premiere international repository for local energy and emissions data.
- Develop customized calculators for advanced analysis:
 - CDM methodologies
 - Carbon Asset Accounting
 - Land use/carbon stock
 - Sustainability indicators
 - Vulnerability/Adaptation tools

www.icleiheat.org
Choose “Public Log-in” to Demo

Thank You!

Please contact us to:

- Learn more about HEAT
- Explore ideas for partnerships
- Integrate advanced / specialty tools into this project
- Investigating developing HEAT for your country

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