

# **C3: The Harmonized Emissions Analysis Tool**

## **An International Quantification Resource**

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**HEAT**

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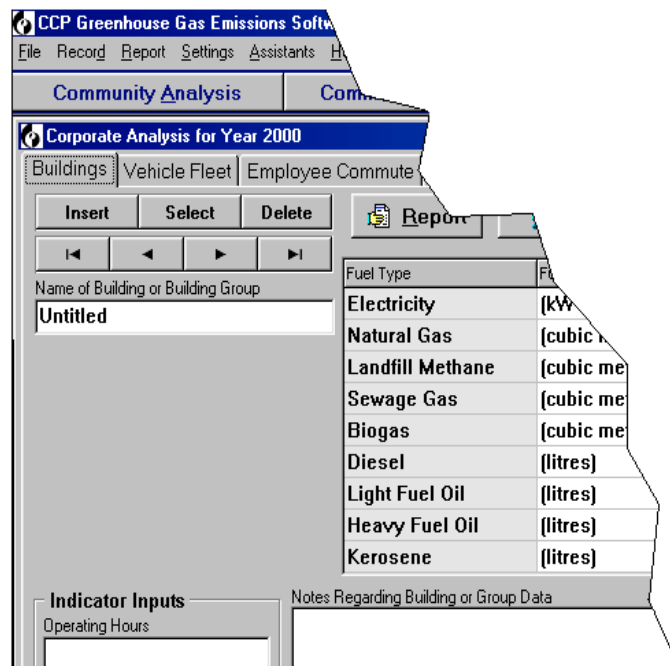
HARMONIZED EMISSIONS ANALYSIS TOOL

# 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

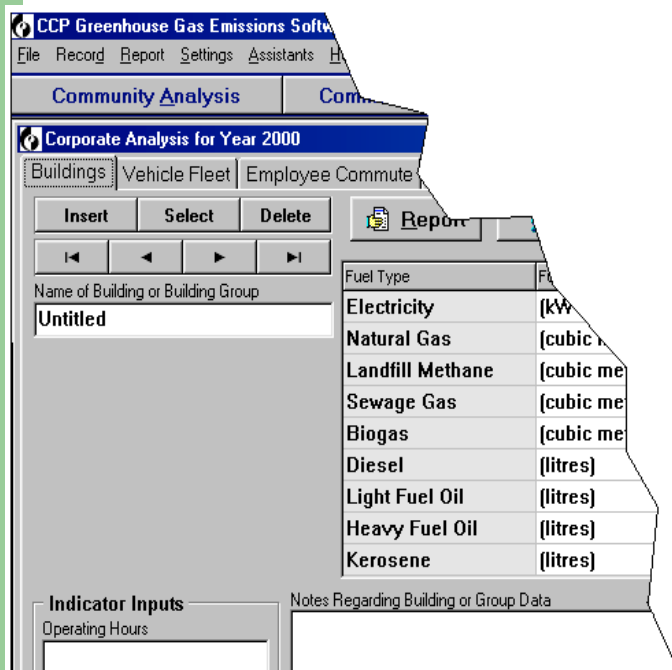
# Tool to Support the 5 - Milestones

- 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 ?

Community Analysis  
Residential  
Commercial  
Industrial  
Transportation  
Waste  
Other

Community Measures  
Government Analysis  
Government Measures

Name: Clotron (name of the Residential Building or Group)  
Note: Kuchaiguda (note regarding Residential Building or Group Data)

Fuel Type	Unit	Energy Use
Electricity (Grid Average)	(ekWh)	12
Coal	(ekWh)	1
Light Fuel Oil	(barrels)	1
Natural Gas	(billion cu ft)	1
Propane	(barrels)	1
Biomethane	(billion cu ft)	1
Fuelwood (Air Dry)	(barrels)	1
Solar	(barrels)	1
Green Electricity	(ekWh)	1

SAVE REFRESH

Output	Value	Unit	Output	Value	Unit
Energy Consumption	12	(ekWh)	Equivalent CO2 Production	12	(grams)
NOx Production	12	(grams)	SOx Production	12	(grams)
CO Production	12	(grams)	VOC Production	12	(grams)
PM10 Production	12	(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 (CO<sub>2</sub>)
  - Methane ( CH<sub>4</sub>)
  - Nitrous Oxide (N<sub>2</sub>O)
- Criteria Air Pollutants
  - NO<sub>x</sub>
  - SO<sub>x</sub>
  - CO
  - Volatile Organic Compounds (VOC)
  - Particulate Matter (PM<sub>10</sub>)

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**

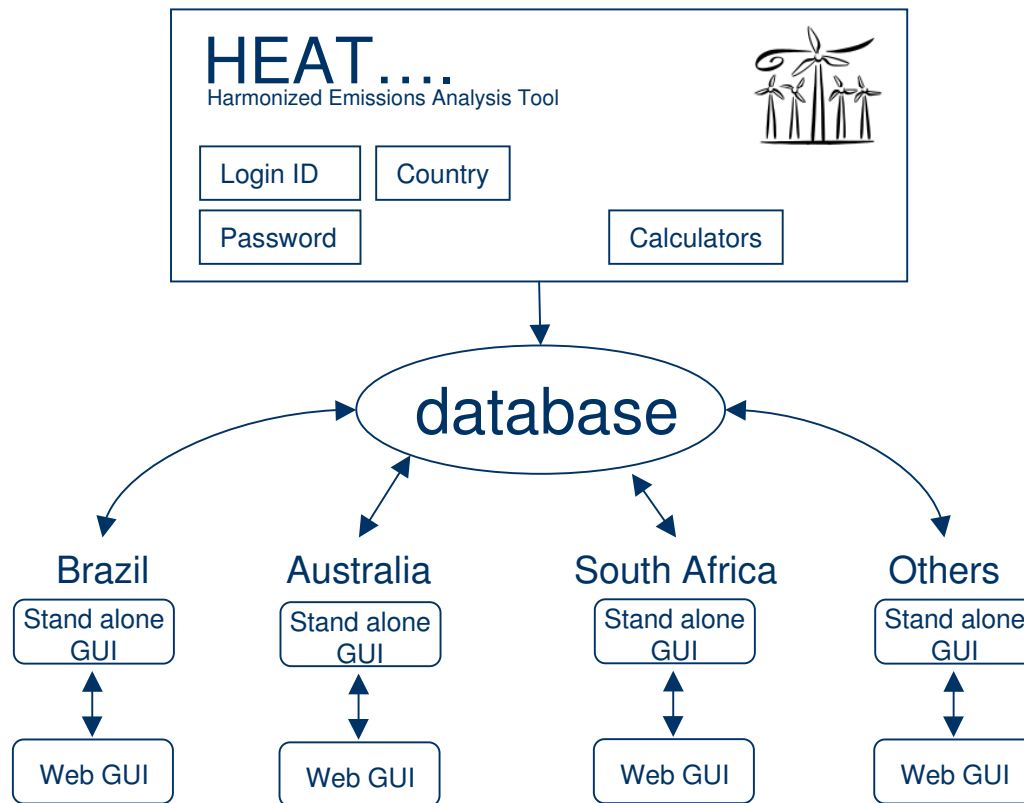
# Multi-National Data Repository

- 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 displays the 'EDIT TREE DETAILS' page for a dataset named 'Brazil Average Mobile'. The page is organized into several sections:

- Name:** Brazil Average Mobile \*
- Classification:** Mobile
- Structure Status:**  Complete  Incomplete
- Time Dependence:**  No  Yes To [ ]
- Regional Specificity:**  No  Yes
- Associated Pollutants:** A grid of checkboxes for various pollutants, including CO2, CH4, HFC-134a, HFC-152a, HFC-236fa, Perfluoroethane, HFC-23, SOx, CO, PM10, HC, N2O, HFC-125, HFC-143a, HFC-227ea, Perfluoromethane, Sulfur Hexafluoride, NOx, VOC, TSP, and PM2.5.
- Emission Default Unit:** (grams)
- Source Default Unit:** (vehicle km)
- Fuel Economy:** Distance Unit: (kilometers), Volume Unit: (liters)

The **Tree Elements** panel on the right shows a hierarchical tree structure for 'Brazil Average Mobile':

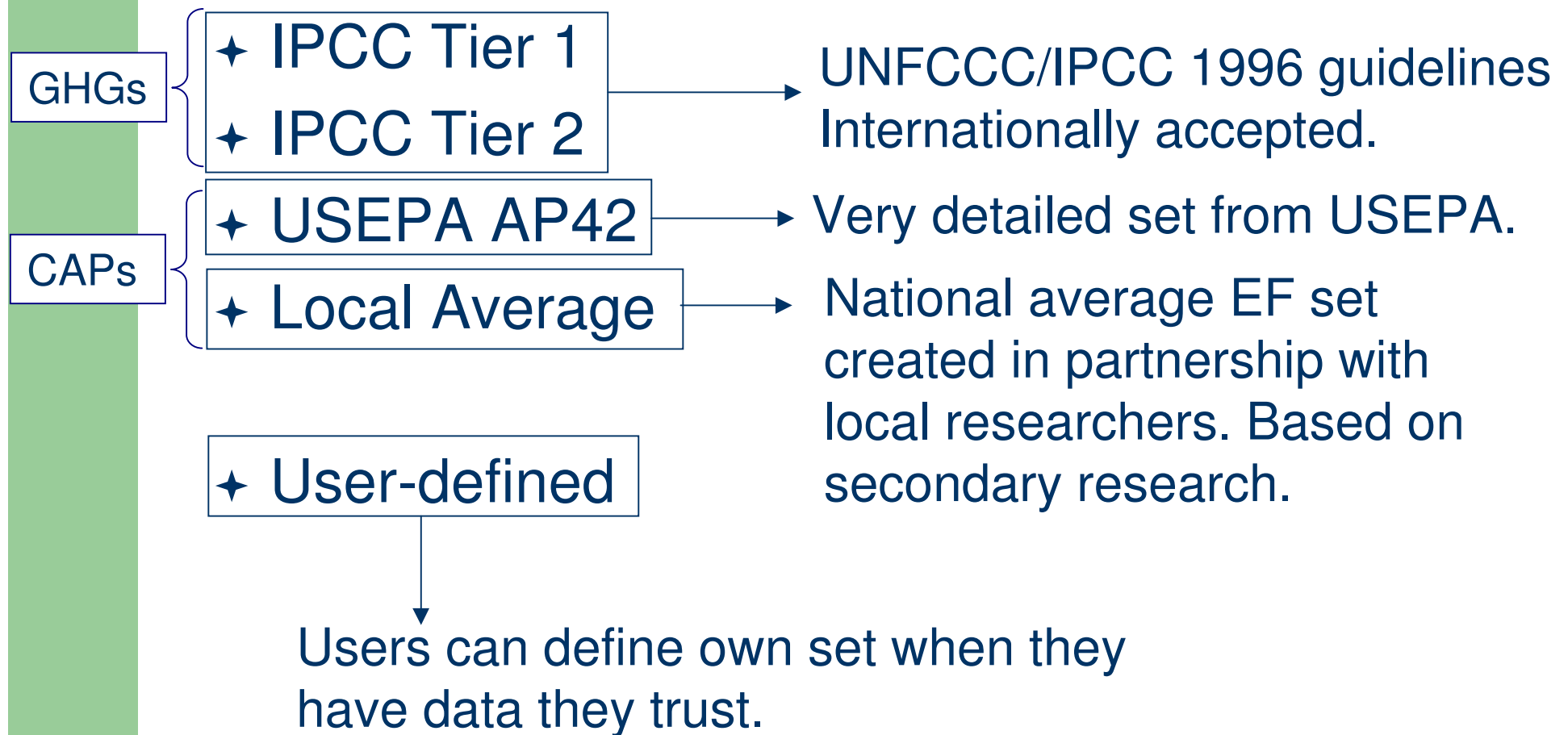
- Brazil Average Mobile
  - Conventional fuels
    - Diesel** (selected)
    - Bus
    - Heavy Commercial Vehicle
      - Commuter Rail
    - Ethanol (E100)
    - Gasohol
  - Alternative fuels
    - Biodiesel (B-5)
    - CNG

A note at the bottom of the tree panel states: 'Note: Element selection of the tree has been finalized. Click button below to reach tree factor view for this tree.' Below the note is a button labeled 'TREE FACTOR VIEW'.

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 <sub>2</sub>	eCO <sub>2</sub>	NOx	SOx	VOC	CO	PM <sub>10</sub>
<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
<b>Total</b>	<b>1,641,000</b>	<b>1,807,122</b>	<b>5,561,440</b>	<b>13,715,556</b>	<b>3,226,973</b>	<b>33,956,629</b>	<b>474,309</b>

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
- South Africa
- India
- 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](http://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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