Integrating Climate and Air Emissions Action Planning

Ryan Bell

Working for Clean Air in Clearwater

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About ICLEI

A worldwide movement of local governments dedicated to achieving tangible improvements in global environmental conditions through cumulative local actions.

Programs & Campaigns

- Climate Protection Programs
- Communities 21 / Local Action (Agenda) 21 / Triple Bottom Line
- Water Campaign
- Eco-budget
- Local Land and Soil Campaign
- Sustainable Procurement

Cities for Climate Protection Campaign (CCP)

Mission: CCP is an international initiative bringing together more than 570 local governments to reduce emissions of greenhouse gases and improve air quality within their communities.

- Standardized methodology
- Practical tools
- Library of policies / information / resources
- Local government network
- Technical assistance

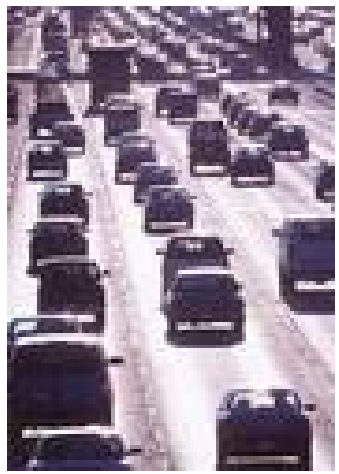
CCP Milestones

1. Conduct an emissions inventory and forecast
2. Set a GHG reduction target
3. Develop a Local Action Plan
4. Implement the Plan
5. Monitor and report on progress

How Local Governments Impact Emissions?

Local government policies affect all the major sources of global warming pollution

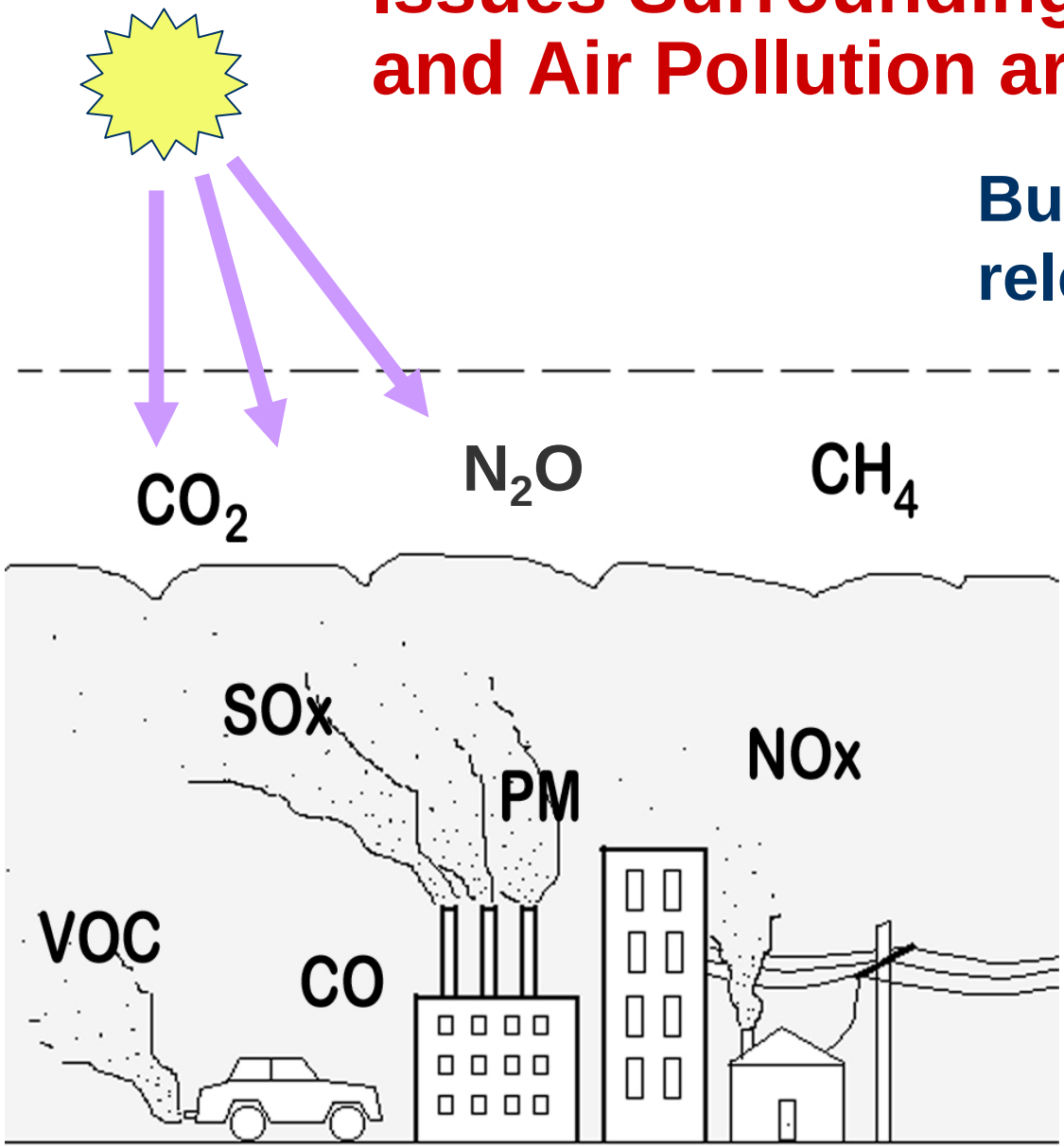
Energy Use



Transportation & Land Use

Solid Waste

Issues Surrounding Global Warming and Air Pollution are Linked



Burning fossil fuels release both:

- Heat trapping ***greenhouse gases***
- ***Air pollutants*** responsible for:
  - Smog,
  - Health problems
  - Reduce visibility
  - Diminished quality of life

Clean Air and Climate Protection Software

Project History

- ICLEI-CCP dedicated to GHG mitigation
- STAPPA/ALAPCO dedicated to air emissions
- CACP Software based on ICLEI's GHG CCP software
- Project initiated in 2000

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(Contact Denise Mulholland for more information
mulholland.denise@epa.gov)

What is the CACP Software?

- A harmonized tool for quantifying emissions of greenhouse gases and criteria air pollutants from combustion and energy, and waste disposal
- Assesses the effectiveness of existing and proposed emission reduction and control strategies
- Important policy planning tool
  - Compare the impact of different measures
  - Scenario building,
  - Emissions reduction planning
- Takes a flexible, reproducible, standardized, integrated approach to tracking emissions

Capability of the CACP Software

Stand-alone functionality or use modules together to create an Emissions Reduction Plan

- Conduct an emissions inventory
- Set a target for emissions reduction
- 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
- Create custom reports
- Track changes over time and progress towards meeting targets

What is Tracked?

- Greenhouse Gases
  - Carbon Dioxide (CO_2)
  - Methane (CH_4)
  - Nitrous Oxide (N_2O)

Reported in carbon dioxide equivalencies (eCO2)

- Criteria Air Pollutants
  - NO_X
  - SO_X
  - CO
  - Volatile Organic Compounds (VOC)
  - Particulate Matter (PM10)

- "Indicators" standardize results for ease of comparisons

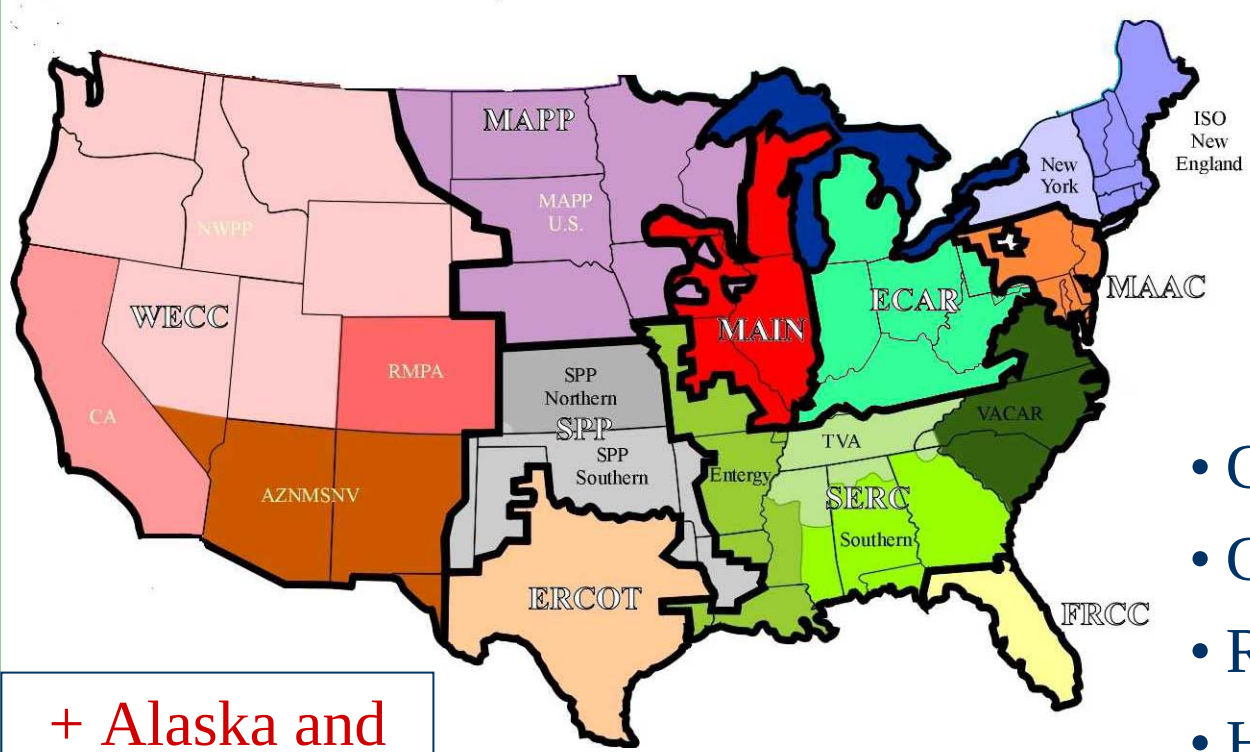
Emission Factors / Coefficients

(energy use) X (coefficient) = emissions

- The CACP Software contains thousands of default coefficients
- Coefficients and algorithms created by
  - Tellus Institute, Torrie Smith Associates, ICLEI
  - U.S. Environmental Protection Agency
  - U.S. Department of Transportation
  - U.S. Department of Energy

Electricity Emission Factors

Based upon energy end use



+ Alaska and Hawaii

- Grid Average
- Grid Marginal
- Regionally Based
- Historic and future coefficients

Emissions Factors for Fuels

- Fuel CO2
- Other GHGs and air pollutants are influenced by the technology used
  - Sector Averages
  - Specific technologies
  - Based on Tellus Institute research and AP-42
  - Over 1500 combinations fuels and technologies

Waste Emission Factors

- Only considers CH_4 emissions
- Methane Commitment
  - Analysis
    - Methane
    - Sequestration at site
  - Reduction measures
    - Forest sequestration
    - Upstream energy
    - Non-energy upstream emissions
- Waste in place

Durham's Original and Re-analyzed Climate Action Plan

	DCAP	CACP Software
1998 Baseline Emissions	2.61 million tons eCO2	3.8 million tons eCO2
2025 Forecast Emissions	4.31 million tons eCO2	4.91 million tons eCO2
Reduction Target below baseline	5%	5%
Emission reductions required	1.83 million tons eCO2	1.86 million tons eCO2

CACP Software's analysis of Durham's Plan

1998 baseline emission level

Sector	eCO_2 (tons)	NO_x (lbs)	SO_x (lbs)	CO (lbs)	VOC (lbs)	PM_{10} (lbs)
Residential	1,072,000	5,084,000	11,366,000	360,000	56,000	224,000
Commercial	794,000	4,134,000	10,126,000	256,000	38,000	174,000
Industrial	551,000	2,434,000	5,404,000	1,184,000	214,000	182,000
Transportation	867,000	6,868,000	338,000	45,806,000	4,988,000	240,000
Total	**3,284,000**	**18,520,000**	**27,236,000**	**47,608,000**	**5,296,000**	**820,000**

Predicted change in emissions by 2025

Sector	eCO_2	NO_x	SO_x	CO	VOC	PM_{10}
Residential	31%	-21%	-19%	56%	50%	21%
Commercial	36%	-25%	-18%	59%	53%	18%
Industrial	69%	32%	33%	73%	73%	65%
Transportation	77%	19%	44%	81%	57%	-18%
Total	**51%**	**0%**	**-8%**	**81%**	**58%**	**19%**

Durham's Plan to Reduce GHGs by 5%

Community Measures	eCO_2 (tons)	NO_x (lbs.)	SO_x (lbs.)	VOC (lbs.)	CO (lbs.)	PM_{10} (lbs.)
Transportation Measures						
Regional Rail System	69,270	-135,000	-96,837	453,000	5,018,000	-8,521
Expand Bus System	54,000	74,334	6,655	310,558	4,034,000	1,904
Increased Use of AF Vehicles	33,991	191,293	8,349	295,003	2,378,000	540
Land Use Planning	327,469	1,211,000	86,564	1,809,000	19,284,000	28,024
Promote walking and biking	1,166	4,314	308	6,443	68,680	100
Increase Telecommuting	12,245	45,299	3,237	67,647	721,000	1,048
Facilitate car and vanpooling	11,692	70,158	5,026	132,516	1,316,000	1,433
Decrease Vehicles Idling	10,014	6,921	0	13,983	208,000	13,801
Residential, Commercial, Industrial Measures						
Residential Fuel Switching	19,000	80,097	127,079	-204	9,204	23,835
Residential Energy Efficiency	514,000	1,479,000	3,624,000	28,000	196,000	99,000
Residential Renewable Energy	17,000	50,054	155,271	588	5,372	3,465
Comm./Indust. Fuel Switching	125,038	582,267	4,907,205	-1,354	61,030	158,045
Comm./Indust. Energy Efficiency	524,000	1,647,000	4,099,000	108,800	630,000	134,000
Comm./Indust. Renewable Energy	52,888	152,703	473,699	1,794	16,389	10,570
Reduce Heat Island Effect	35,349	102,000	316,000	1,199	10,954	7,065
Total	**1,807,122**	**5,561,440**	**13,715,556**	**3,226,973**	**33,956,629**	**474,309**

Results of the Reanalysis

- Analyzing the DCAP measures in CACP Software
- GHG emissions 5% below baseline
- NO_x, SO_x, and PM_{10} reduced much more
  - 30%, 57%, and 39% respectively.
- Measures impact reflect both absolute reductions and improvements in control technologies
- Curbing GHG emissions may have a larger impact on other air pollutants than on the GHGs

Analyzing Alternatives

Impacts of alternative measures to reduce Durham's transportation emissions

	eCO_2	NO_x	SO_x	CO	VOC	PM_{10}
All VMT at SULEV standard	314,000	3,085,000	134,000	38,367,000	4,758,000	8,170
50% VMT at SULEV standard	157,000	1,542,000	67,000	19,184,000	2,379,000	4,085
50% VMT hybrid SULEV	274,000	1,542,000	67,000	19,184,000	2,379,000	4,357
All VMT at LEV standards	314,000	1,724,000	134,000	35,800,000	4,200,000	8,170

Quantify Impacts of Potential Measures

	eCO_2 (tons)	NO_x (lbs.)	SO_x (lbs.)	CO (lbs.)	VOC (lbs.)	PM_{10} (lbs.)
	Transportation Mode Shift					
Switch to new routes: High occupancy – 27 pass/bus)	325,521	325,521	26,838	6,946,419	716,399	436
Switch to new routes - Medium occupancy – 10.6 pass/bus	-235,569	235,569	5,661	6,530,849	663,077	-22,940
Switch to utilizing existing routes	655,574	655,574	39,296	7,190,871	747,766	14,186
	Fuel Switch					
Switch from traditional diesel to biodiesel in the bus fleet	56,591	-109,291	26,654	292,651	54,329	16,461
Switch from traditional to Ultra Low Sulfur diesel in the bus fleet	0	0	30,715	0	0	1,751

***Based on Minneapolis's downtown transit commute trips**

Build Scenarios

Reducing emissions in Salt lake City

	eCO_2 (tons)	NO_x (lbs.)	SO_x (lbs.)	CO (lbs.)	VOC (lbs.)	PM_{10} (lbs.)	Cost Savings
Lighting upgrades	344	795.2	713.1	425	46.9	305.4	$33,571
Wind power	215	497.5	446.1	265.9	29.3	191	
681 LED traffic signals	242	557.7	500.1	298.1	32.9	214.2	$32,962
Biodiesel airport buses	227	-346	112	1,153	118	132	Unknown
TOTAL 2001	**1,028**	**1,504**	**1,771**	**2,142**	**227**	**842**	**$66,533**

Scenario Building

Potential reductions for state actions

	eCO_2 (tons)	NO_x (tons)	SO_x (tons)	CO (tons)	VOC (tons)	PM_{10} (tons)
25% Renewable Standard	68,628,690	7,493	23,055	9,924	1,095	7,131
Energy Star Homes, Oil	4,441,344	5,826	3,250	1,181	199	695
Energy Star Lighting	3,173,581	3,465	10,661	4,589	506	3,297
TOTAL Reductions	**15,477,794**	**16,785**	**36,966**	**15,694**	**1,800**	**11,123**

Conclusions

- Actions taken to reduce GHG's by can have larger effects on air pollutants
- Harmonized quantification creates a stronger case for taking action to prevent climate change
- Considering both GHGs and CAPs emissions may lead to a different suite of emission reduction measures
  - High GHG reduction potential may negatively impact air quality
  - Air quality measure may have no impact (or worsen) emissions that lead to global climate change
  - Local governments should look at all impacts of a measure to maximize the benefits obtained from limited dollars
- The Clean Air Climate Protection Software is a useful tool for local planners

The Solution to Global Problems Starts with Local Action!

Ryan Bell

Email: rbell@iclei.org
Web: www.iclei.org/us
Phone: (510) 540-8843