Development of a Multipollutant Emission Inventory for the State of Iowa

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Iowa Multi-Pollutant Pilot Project

- The What
- The How
- The When
- The Why

The What

- County-Level Multi-Pollutant Inventory for Iowa:
  - Criteria Air Pollutants – CAPs (VOC, NO_x, PM_{10}, $PM_{2.5}$, SO_2, CO, NH_3)
  - Toxic Air Pollutants – TAPs, including CAA listed Hazardous Air Pollutants (HAPs)
  - Greenhouse Gases – GHGs (CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6)

The What (continued)

- Focus on merger of two systems:
  - CAP/TAP
    - Detailed at Source Classification Code (SCC) level
    - Stationary Point/Nonpoint and Mobile onroad/nonroad basis
    - Spatial – county-level
  - GHG
    - Aggregated by economic sector
    - Spatial – state-level

The How (continued)

- Project Deliverables:
  - Work Plan
  - Inventory Preparation Plan
  - Final Report (including revised IPP)
  - 2005 Base Year Data Files

The How

- Primary Inventory Data Sources
  - GHG:
    - Iowa GHG Inventory & Forecast, 2008
  - CAP/TAP:
    - CENRAP 2002 Regional Haze Inventory
    - Iowa DNR Point Source Data
    - EPA National Emissions Inventory

The How (continued)

- General Approach
  - Identify CAP/TAP sources with no GHG component
  - For CAP/TAP/GHG Source Sectors:
    - Develop a common EPA SCC-framework
      - Including both point and nonpoint components
      - Common throughput (activity) units
    - Merge/develop inventory within EPA NIF structure at county-level
  - Methods for developing an optional 2020 forecast also being developed

CAP/TAP Sectors Without a GHG Analog

Inventory Sector
Paved Road Dust
Unpaved Road Dust
Commercial Cooking
Construction - Residential
Construction – Industrial/ Commercial/ Institutional
Construction - Roads
Industrial Processes – Mining/ Quarrying
Solvent Utilization – multiple subsectors
Petroleum Product Storage & Transport
Inorganic Chemical Storage
Waste Disposal – Treatment, Storage and Disposal Facilities
Miscellaneous Nonpoint – Domestic Animals, Wild Animals
Miscellaneous Nonpoint - Humans
Miscellaneous Nonpoint – Structure Fires
Miscellaneous Nonpoint – Catastrophic Releases

CAP/TAP/GHG Sectors

Chapter III Section	Inventory Sector
A	Agriculture – Crop Cultivation
B	Agriculture – Nutrient Application
C	Agriculture – Livestock Management
D	Forestry & Land Use
E	Fossil Fuel Production
F	Fuel Combustion – Electricity Generation
G	Fuel Combustion – Industrial
H	Fuel Combustion – Commercial/Institutional
I	Fuel Combustion – Residential
J	Industrial Processes
K	Nonroad Mobile Sources – includes Transportation – air, commercial marine, and rail; and Other Nonroad Engines
L	Transportation - Onroad Mobile Sources
M	Waste Management - Solid Waste Combustion
N	Waste Management – Solid Waste Landfills
O	Wastewater Treatment – Municipal and Industrial

Example: Comm/Inst Fuel Combustion

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4	Pollutants
2103002000	Stationary Source Fuel Combustion	Commercial/Institutional	Bituminous/Sub-bituminous Coal	Total: All Boiler Types	CAPs; CO_2, CH_4, and N_2O
2103004000	Stationary Source Fuel Combustion	Commercial/Institutional	Distillate Oil	Total: All Boiler Types	CAPs; CO_2, CH_4, and N_2O
2103005000	Stationary Source Fuel Combustion	Commercial/Institutional	Residual Oil	Total: All Boiler Types	CAPs; CO_2, CH_4, and N_2O
2103006000	Stationary Source Fuel Combustion	Commercial/Institutional	Natural Gas	Total: All Boiler Types	CAPs; CO_2, CH_4, and N_2O
2103007000	Stationary Source Fuel Combustion	Commercial/Institutional	Liquefied Petroleum Gas (LPG)	Total: All Combustor Types	CAPs; CO_2, CH_4, and N_2O
2103008000	Stationary Source Fuel Combustion	Commercial/Institutional	Wood	Total: All Boiler Types	CAPs; CO_2, CH_4, and N_2O
2103011000	Stationary Source Fuel Combustion	Commercial/Institutional	Kerosene	Total: All Combustor Types	CAPs; CO_2, CH_4, and N_2O

Example: Agriculture – Nutrient Application

SCC	SCC Level 1	SCC Level 2	SCC Level 3	SCC Level 4	Pollutants
2801700001	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	Anhydrous Ammonia	NH_3, N_2O
2801700002	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	Aqueous Ammonia	NH_3, N_2O
2801700003	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	Nitrogen Solutions	NH_3, N_2O
2801700007	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	Ammonium Thiosulfate	NH_3, N_2O
2801700010	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	N-P-K Multi-Grade Nutrient	NH_3, N_2O
2801700015	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	Liquid Ammonium Polyphosphate	NH_3, N_2O
2801700099	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application **- Synthetic**	Miscellaneous Fertilizers	NH_3, N_2O
2630050000	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Public Owned	Land Application - Digested Sludge	N_2O
2801800010	**Miscellaneous Area Sources**	**Agricultural Production - Crops**	**Fertilizer Application - Organic**	**Other**	**N_2O**
2802000001	**Miscellaneous Area Sources**	**Agricultural Production - Crops**	**Fertilizer Application - Synthetic**	**Anhydrous Ammonia – Indirect N_2O**	**N_2O (indirect)**
2802000002	**Miscellaneous Area Sources**	**Agricultural Production - Crops**	**Fertilizer Application - Synthetic**	**Aqueous Ammonia– Indirect N_2O**	**N_2O (indirect)**

Example: Agriculture – Nutrient Application

2802000012	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application - Synthetic	Potassium Nitrate - Indirect N_2O	N_2O (indirect)
2802000013	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application - Synthetic	Diammonium Phosphate - Indirect N_2O	N_2O (indirect)
2802000014	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application - Synthetic	Monoammonium Phosphate - Indirect N_2O	N_2O (indirect)
2802000015	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application - Synthetic	Liquid Ammonium Polyphosphate - Indirect N_2O	N_2O (indirect)
2802000099	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application - Synthetic	Miscellaneous Fertilizers - Indirect N_2O	N_2O (indirect)
2630050001	Waste Disposal, Treatment, and Recovery	Wastewater Treatment	Public Owned	Land Application - Digested Sludge – Indirect N_2O	N_2O (indirect)
2802100010	Miscellaneous Area Sources	Agricultural Production - Crops	Fertilizer Application - Organic	Other	N_2O (indirect)
2802500001	Miscellaneous Area Sources	Agricultural Production - Crops	Soil Liming	Limestone	CO_2
2802500002	Miscellaneous Area Sources	Agricultural Production - Crops	Soil Liming	Dolomite	CO_2

The How: Issues In Merging GHG and CAP/TAP Inventories

- Biogenic CO_2
  - As with traditional carbon accounting – excluded
  - Assumes sustainable use of biomass
  - Avoids double-counting with terrestrial carbon
- Terrestrial Carbon
  - Covers sources/sinks of forest carbon and ag soil carbon
  - Suggest housing estimates in a new NIF field

The How: Issues In Merging GHG and CAP/TAP Inventories (continued)

- Direct/Indirect Emissions from Combustion:
  - direct emissions only to avoid double-counting
  - does not address consumption-based emissions common in most state inventories for the electricity sector
- Indirect N_2O Emissions (e.g. agriculture):
  - emissions occurring away from the site of application
  - included (separate SCC)- these result from an in-state activity
- Unresolved Question: Is there a need to develop a framework for storing consumption-based estimates?
  - including life-cycle based emission estimates;
  - would have to be separate, yet-linked, to avoid double-counting.

The How: Issues In Merging GHG and CAP/TAP Inventories (continued)

For user's of multi-pollutant inventories:

- Need for an additional bridge between NIF SCCs and economic sectors commonly used in carbon accounting
- GHG mitigation analysts gain access to more detailed data:
  - e.g. emissions/fuel use by agricultural equipment type

The When

- Draft IPP under review
- Final report and data files by May 15, 2009

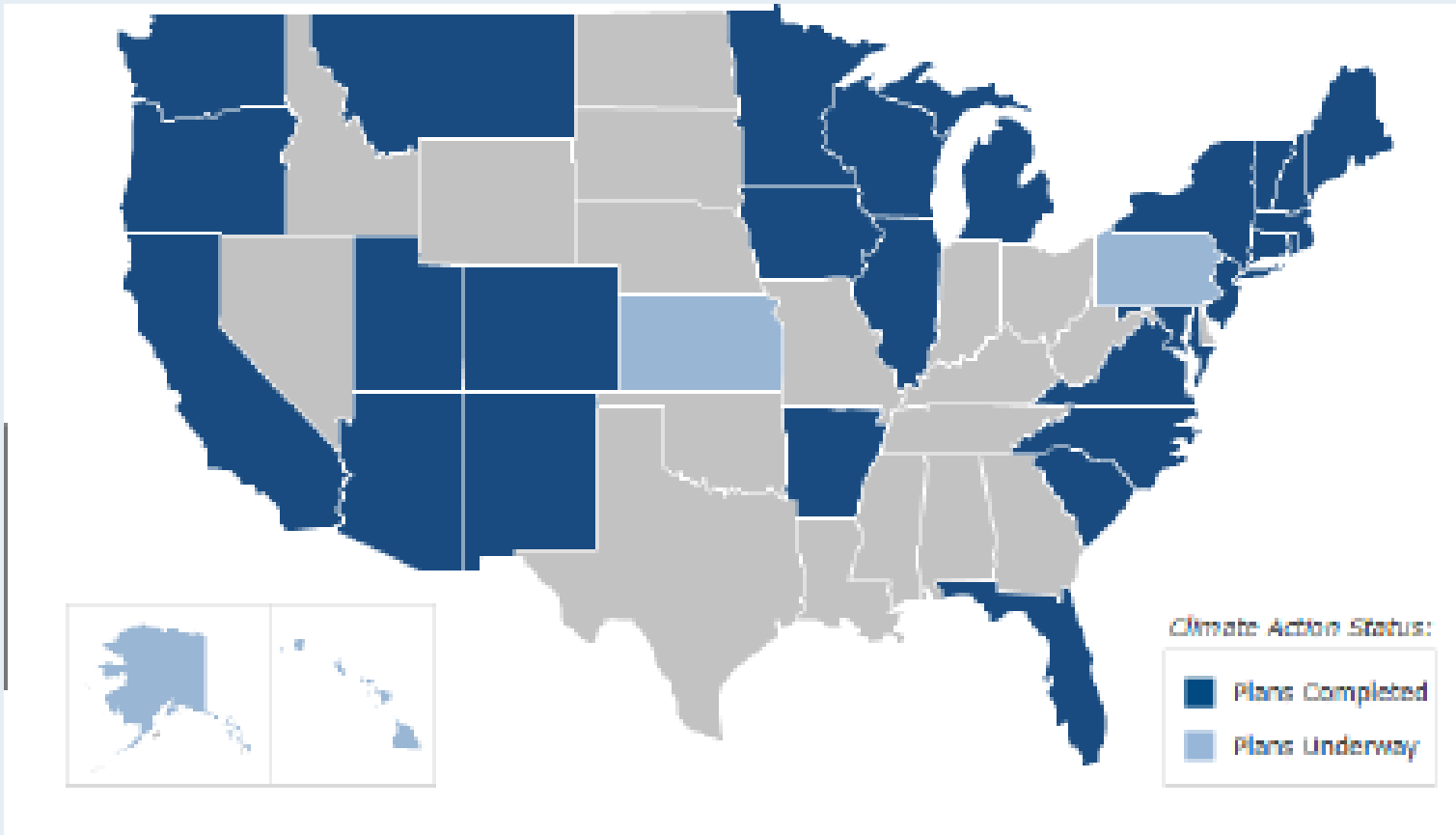
The Why

- Common data source for evaluation of programs covering:
  - Ambient air quality
  - Regional haze
  - Deposition of TAPs, acid rain
  - Climate change

The Why (continued)

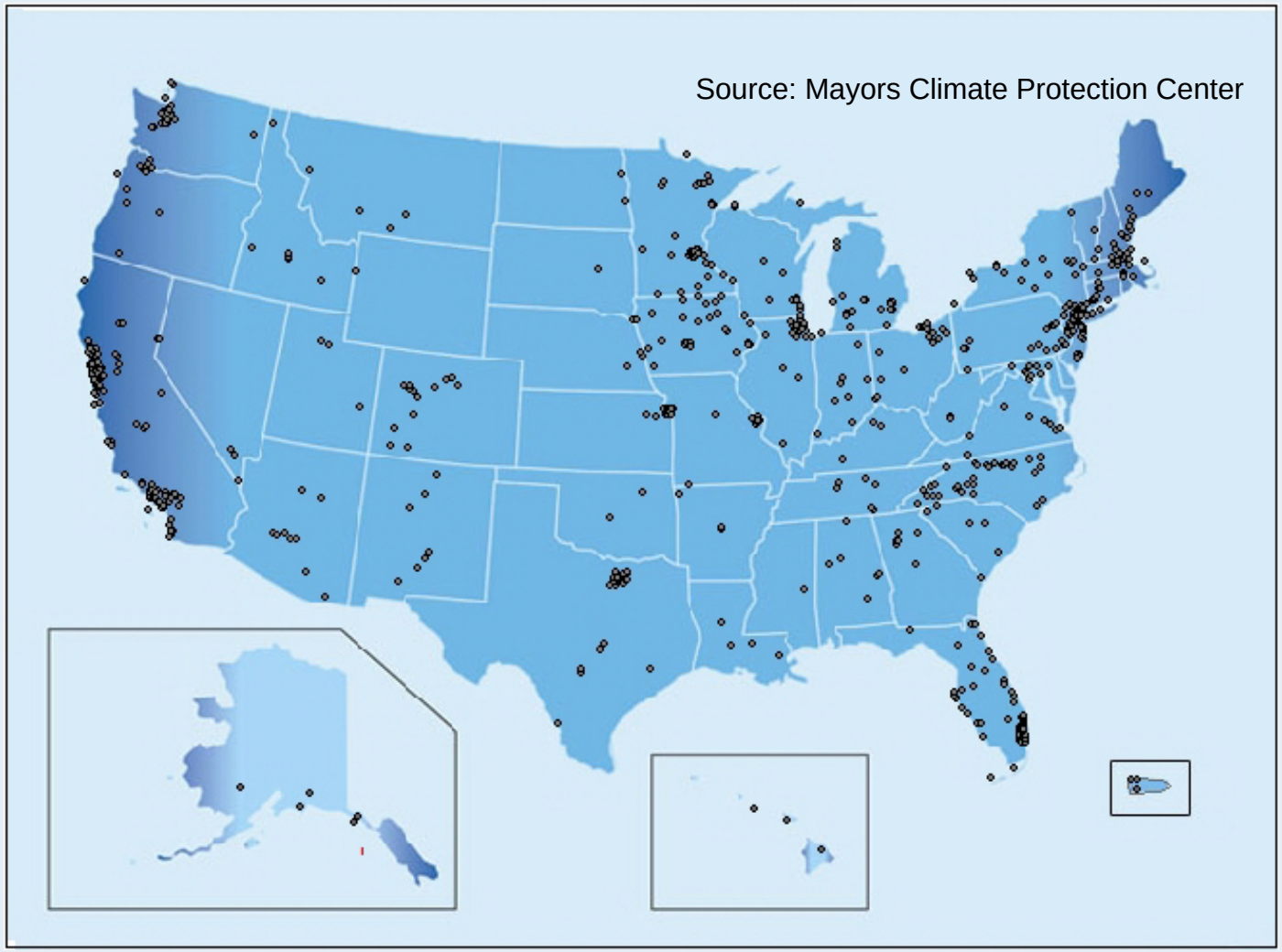
- Lower costs for developing/maintaining one inventory
- Extension to larger user community
  - County agencies, municipalities

The Why (continued)



Source: The Center for Climate Strategies

The Why (continued)



Cities that have signed on to the Mayors' Climate Protection Agreement

Multi-Pollutant Inventories

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