Greenhouse Gas Projection Tool for States

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for Andrea Denny, EPA State and Local Climate Change Program

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EPA’s State & Local Climate Change Program (SLCCP)

- Began in 1990
- Mission: to build capacity in the states
- Products: States Workbook for calculating GHG emissions at the state level; States Guidance for developing action plans
- Support: provided technical support to states in the development of their inventories and action plans
- Results: 40 states and Puerto Rico have developed inventories for 1990; 30 states have completed action plans
Rationale for Inventory Support

- Help states develop targeted action plans; inventory emissions and target reductions from major sources
- Share EPA’s extensive inventory experience
  - Development of the National Inventory
  - Contributing to the Good Practice Guidance
- Help states overcome monetary, knowledge, and data constraints
- Facilitate comparisons across states by providing standardized inventory methodologies
States Need More than Guidance

- Inventories are resource-intensive
  - Collect data
  - Identify appropriate emission factors/methods
  - Set up calculation spreadsheets
  - QA/QC results

- Inventories for multiple years necessary to maximize usefulness
  - Emission trends are necessary for projecting emissions, identifying mitigation activities, and setting targets

- Guidance was updated as methods were improved, but states couldn’t keep pace with the changes
Beyond Guidance...the State Inventory Tool

- Allows users to input state-specific activity data and emission factors
  - Suggests potential data sources
  - Provides default data for situations where state data is not available and/or where national data may be preferable
- Automates calculations based on input data
- Includes 10 sector modules and 1 synthesis module
- Calculates emissions for 1990-2000
  - Additional years are currently being added
Taking the Inventory to the Next Level

- After completing the tool/implementing the guidance, states have estimates of GHG emissions by gas and sector from 1990-2000

*So Then What??*

- What will state emissions be in 2010 or 2020?
- Will the distribution of emissions by source or by gas be different in the future than it is today?
- Where should the state concentrate its mitigation efforts to maximize reductions?
State Climate Change Action Plans

- Brainstorm activities to reduce emissions
- Coordinate across various state agencies to find areas for cooperation and emission reduction opportunities (energy, environment, waste)
- Quantify GHG emission reduction potential of specific activities
- Quantify costs per ton of reduction
- Some states choose to set targets
State Action Plans

States and Territories with Existing Climate Change Action Plans

7 have targets

Climate Change Action Plan (30)
Setting a Target Means Something Different in 2000

GHG Emissions for State X

Emissions Estimates from SIT

1990 Emissions = 50 MMTCE

Reduction Goal = 10% below 1990 Emissions = 45 MMTCE

5 MMTCE difference between 1990 emissions and reduction goal
Setting a Target Means Something Different in 2000 than it Does in 2020

GHG Emissions for State X

Emissions Estimates from SIT

1990 Emissions = 50 MMTCE

5 MMTCE difference between 1990 emissions and reduction goal


Emissions Estimates from PT

Reduction Goal = 10% below 1990 Emissions = 45 MMTCE

2020 Emissions = 100 MMTCE

55 MMTCE difference between 2020 emissions and reduction goal
To the Rescue! The State Projection Tool

- Project emissions by gas and by sector through 2020
- Be compatible with, but not dependent on, the State Inventory Tool
  - Allow states to build on their estimates from the State Inventory Tool
  - Enable users who have not completed the State Inventory Tool to project emissions
- Include default state activity data and emission factors, but allow states to override this information
- Create a user-friendly framework
State Projection Tool Design

- Single Excel® module estimates emissions for all economic sectors
- Users may import historical emissions data from each sector module of the State Inventory Tool
- Other users may use default historical emission estimates
  - Simpler methods compared than those in SIT
  - Default historical emission estimates used to establish trends
  - SIT should be used to develop detailed inventories of historical emissions
Using the Projection Tool

- Open the Control Sheet
- Select a state
- Use the navigation arrows to access the energy consumption, population, and livestock sheets
- Once each of these sheets is completed, return to the Control Sheet to continue on to the next step
Using the Projection Tool (cont’d)

- Go to each of the 14 sector pages and enter data
  - Historical Data: import data from the State Inventory Tool, manually add data, or select defaults.
  - Projected Data: use default projections, project data based on historical data, or manually add projected data

- Once data has been entered for all sectors:
  - Return to Control Sheet
  - Select units
  - View emission results by sector
  - View emission results by gas
Projecton Tool Control Sheet

State Inventory Projection Tool

1. Choose a state:
   - Florida
   - React Tool

In the sheets that follow, cell shading is used to indicate whether a cell is for user inputs, calculation, or emission projections.

The key to this color scheme is as follows:

- User-inputted activity data used in one or more emission calculation sheets
- User-inputted historical emissions data used in calculations
- Projected emissions
- Data or calculation cells that may not be changed.

2. Enter projected energy consumption. Users may select default data or enter their own.
   No defaults are available for wood and waste fuel consumption.

3. Enter human population data and projections. Users may select default data or enter their own.

4. Enter livestock population data and projections. Users may select default data or enter their own.

5. Proceed to sector pages. Directions for each sector are located on sector sheets.
   - Go to the CO2/FCC Sheet
   - Go to the N2O from Stationary Combustion Sheet
   - Go to the CH4 from Stationary Combustion Sheet
   - Go to the Mobile Combustion Sheet
### Mobile Combustion: Calculation

#### Table 1

**CH₄ Emissions from Mobile Sources (mtCE)**

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</thead>
<tbody>
<tr>
<td>Gasoline Highway</td>
<td>52,634</td>
<td>64,672</td>
<td>66,812</td>
<td>59,229</td>
<td>56,387</td>
<td>56,614</td>
<td>56,593</td>
<td>56,387</td>
<td>55,303</td>
<td>54,293</td>
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<td>51,665</td>
<td>51,145</td>
<td>50,705</td>
<td>50,444</td>
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<td>Light-Duty Trucks</td>
<td>22,570</td>
<td>24,070</td>
<td>25,240</td>
<td>24,490</td>
<td>26,016</td>
<td>26,702</td>
<td>25,552</td>
<td>24,716</td>
<td>23,952</td>
<td>22,979</td>
<td>21,744</td>
<td>20,880</td>
<td>20,154</td>
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<td>Heavy-Duty Vehicles</td>
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<td>2,230</td>
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<td>Light-Duty Trucks</td>
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<td>Heavy-Duty Vehicles</td>
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<tr>
<td>Motorcycle</td>
<td>1,188</td>
<td>1,250</td>
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<tr>
<td>Total</td>
<td>12,094</td>
<td>14,363</td>
<td>17,371</td>
<td>17,487</td>
<td>17,151</td>
<td>16,906</td>
<td>16,634</td>
<td>16,176</td>
<td>15,645</td>
<td>15,085</td>
<td>14,483</td>
<td>13,856</td>
<td>13,295</td>
<td>12,793</td>
<td>12,340</td>
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#### Table 2

**N₂O Emissions from Mobile Sources (mtCE)**

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<tbody>
<tr>
<td>Gasoline Highway</td>
<td>441,065</td>
<td>636,066</td>
<td>602,766</td>
<td>768,257</td>
<td>878,385</td>
<td>861,208</td>
<td>753,043</td>
<td>650,283</td>
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<tr>
<td>Light-Duty Trucks</td>
<td>147,100</td>
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<td>Motorcycle</td>
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<tr>
<td>Total</td>
<td>620,130</td>
<td>782,971</td>
<td>752,861</td>
<td>891,847</td>
<td>927,028</td>
<td>885,708</td>
<td>806,228</td>
<td>719,853</td>
<td>631,553</td>
<td>563,353</td>
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<td>475,353</td>
<td>444,353</td>
<td>420,353</td>
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Emissions Summary by Gas

### Summary of Projected GHG Emissions by Gas in Florida

<table>
<thead>
<tr>
<th>Gas Type</th>
<th>2030</th>
<th>2040</th>
<th>2050</th>
<th>2060</th>
<th>2070</th>
<th>2080</th>
<th>2090</th>
<th>2100</th>
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<tbody>
<tr>
<td>CO₂</td>
<td>50.19</td>
<td>50.39</td>
<td>51.24</td>
<td>52.72</td>
<td>55.16</td>
<td>56.64</td>
<td>58.62</td>
<td>62.00</td>
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<td>Nitrous Oxide</td>
<td>1.06</td>
<td>1.06</td>
<td>1.06</td>
<td>1.06</td>
<td>1.06</td>
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<tr>
<td>Halocarbons</td>
<td>0.05</td>
<td>0.05</td>
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<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
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</tr>
</tbody>
</table>

**Note:** The data above represents projected greenhouse gas emissions for different gases over the years 2030 through 2090.

**GHG Emissions by Gas, 1990-2020**

**1990 Emissions by Gas**

**2000 Emissions by Gas**

**Summary by Gas**

**Summary by Sector**

**Waste Landfills**

**Waste Calculations**

**Flaring & LEFTE**

**Waste Combustion**

**Waste Results**

**Wastewater**

**Ready**

**NUM**
Next Steps in Development

- Regularly update the tool as methodology, activity data, and emission factors are revised
- Create “patches” for tool as updates occur
  - Users can install the updates themselves, instead of reinstalling the entire tool
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