INTEGRATION OF THE AIR POLLUTANT EMISSIONS INVENTORY WITH THE NATIONAL GREENHOUSE GAS INVENTORY FOR THE TRANSPORT

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INVENTORY REPORTING AT ECCC
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Greenhouse Gas Inventory
Air Pollutant Emissions Inventory
Black Carbon Inventory
Facility-reported Greenhouse Gas data
• Historically air pollutants and GHGs estimates were developed independently from each other in the National Inventory Report and the Air Pollutant Emissions Inventory
• Wanted to make the process more efficient and consistent
• **Opportunity:** Could we create a model that satisfies international reporting requirements as well as support domestic policy, regulatory work and projections?
• Combined, reviewed of all key inputs and models
  – vehicle fleets, distance travelled, biofuels, mileage, off-road equipment, modeling approach
  – validation and “road test” phase
PROCESS – PRODUCTION
ENVIRONMENT

Calculation Data Flow

On-road Inputs:
Vehicle Populations (includes electric, propane and NG) Kilometer Accumulation Rates Fuel Information (includes biofuels as a %) Regional temperatures and defaults MOVES default database (slightly modified*)

MOVES
17 Regions, each year is a separate run

Outputs:
Energy (kJ) GHGs CACs Air Toxics Black Carbon

Post-process #1
Convert kJ to litres of fuel
Create Fuel Pool

Outputs:
Fuel use GHGs CACs Air Toxics


Off Road Inputs:
Equipment Populations by Subclass Code Hours of Use, Load Factor Horsepower Model year and Fuel Type Fuel Properties (includes biofuels as a %)

NONROAD
All provinces and years modelled simultaneously

Outputs:
Fuel use GHGs CACs Air Toxics

Post Process #2s: Scale Energy Pool to match RESD volumes, adjust biofuel volumes Address Propane and NG emissions

Post Process #3: Scale Emissions and Activity
Apply any custom EFs (on-road GHGs, off-road black carbon)
On-road variable KARs Off-road variable: hours of use Add propane and NG vehicles (tier 1) Activity VKTs, KARs, FCR

Format Output Tables

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HARMONIZING BETWEEN TOP-DOWN AND BOTTOM-UP METHODS

- “Top down” refers to applying compiled fuel data to emission factors (info on underlying sources are either known or unknown)
- “Bottom up” refers to an activity based estimate built up from individual units.
- IPCC good practice considerations: (1) develop higher tier methods (i.e., bottom up) and (2) align fuel use with the national energy balance

Need to compare with fuel volume statistics

<table>
<thead>
<tr>
<th>Vehicle population (#)</th>
<th>Equipment population (#)</th>
<th>Flights (#)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Driving rate (km/yr)</td>
<td>Hours of use (hr)</td>
<td>Origin-Destination (km)</td>
</tr>
<tr>
<td>Fuel efficiency (l/100 km)</td>
<td>Brake-specific horsepower (l/hp-hr)</td>
<td>Fuel burn rate (l/km)</td>
</tr>
</tbody>
</table>
RESULTS AND BENEFITS

• Divide the work year into two parts:
  – Production
    • Revised annually
  – Continuous Improvement
    • Implemented once complete

• Production efficiencies have allowed us to focus on longer term improvements
  – Off-road hours of use, NONROAD model update, sector by sector review
  – Bottom up marine model
  – In-house development of fleet characteristics (VIN decoding)